Global Comparisons of Earthquake Source Spectra

by

Shengzao Chen, B.Sc., M.Sc., Ph.D.

A thesis submitted to
The Faculty of Graduate Studies and Research
in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy

Department of Earth Sciences
Carleton University
Ottawa, Ontario, Canada
October, 2000

© Shengzao Chen, 2000

Abstract

A key question in earthquake seismology is whether earthquake sources in different tectonic regions are functionally equivalent in terms of radiated ground motion. This thesis compares the apparent earthquake source radiation for six different tectonic regions covering Japan, Mexico, Turkey, California, British Columbia (B.C., western Canada), and eastern North America (ENA). The source, path and site effects were systematically separated from the observed spectra to the extent possible, to allow inter-regional comparisons of apparent source radiation.

Large Fourier spectra databases were developed for both horizontal and vertical components over all distances for earthquakes of magnitude 2.5 to 7.5. Regional parameters characterizing source, path, and site properties, including crustal and near-surface site amplifications, were thoroughly investigated to separate the corresponding spectral responses, and thereby isolate apparent source processes.

Effects on observed spectra of geometrical spreading, regional anelastic scattering, crustal and site amplification and deamplifications were removed to obtain the source spectra. Fourier spectra corrected for the attenuation effects to a reference hypocentral distance of $R = 1$ km are referred to as “R1 spectra” or “1-km spectra”; the R1 spectra corrected for crustal/near-surface site amplification effects and kappa (high-frequency spectral decay) effects are referred to as “apparent source spectra”. The R1 source spectra and apparent source spectra were derived for both horizontal and vertical

components within 100 km of the source. The limitation to observations within 100 km was used to minimize the complex effects of regional attenuation on the inferred source spectra.

The crustal and site amplifications are independent but closely related site effects. Their combined effects are well represented, as a first approximation, by the ratio of the horizontal to the vertical component of ground motion (H/V ratio). The H/V ratios were computed for the study regions and classified for various rock and soil site conditions. It was found that the H/V ratio can be quantitatively described as $R_{H/V}(f) = \text{Amp}(f)\exp(-\pi\kappa f)$, where $\text{Amp}(f)$ is the crustal and near-surface amplification function and κ is a site-dependent parameter that expresses near-surface anelastic attenuation effects. The site effects were generally removed by division of the spectra by the regional H/V ratios for the applicable site condition (rock or soil).

Based on the vertical-component R1 spectra, which are relatively free of site effects, a new magnitude scale $\mathbf{m}_1$ was defined from the spectral level at 1 Hz. $\mathbf{m}_1$ is a natural complement to existing magnitude scales that measure the low-frequency and high-frequency spectral amplitudes (moment magnitude $\mathbf{M}$ and high-frequency $\mathbf{m}_{\text{hf}}$, respectively). The $\mathbf{m}_{\text{hf}}$ was slightly modified to include a wide range of magnitudes ($\mathbf{M} = 2.5$ to 8.5). Moment magnitude $\mathbf{M}$ was calculated where possible from the long period level of the R1 displacement spectra. All magnitudes were calculated for each record, then averaged over all records for an event. All Fourier acceleration spectra and calculated parameters were collated to produce integrated databases for both the

horizontal and vertical component of ground motion. Various statistical relationships between magnitude scales were derived. m_1 provides an excellent and stable estimate of moment magnitude (M), which is evidenced by the relationship $M = -0.002(m_1 - 5)^2 + 1.0506(m_1 - 5) + 5.1561$, derived in this study.

The apparent source spectra show good agreement with the simple single-corner Brune (1970, 1971) point-source model (ω^2 spectrum), with a stress parameter of about 100 bars (10 MPa). A 2-corner source model better matches the spectra for large-magnitude earthquakes ($M \geq 6$), especially at intermediate frequencies. For small to moderate events, the two source models are nearly equal.

Apparent source spectra from small to moderate earthquakes (e.g., $m_1 = 3.5 \pm 0.2$ to 6.5 ± 0.2) suggest a general similarity between different tectonic regions studied. Minor discrepancies may appear in some cases, but there are no significant distinguishing regional characteristics. No evident depth effects were found on the apparent source spectra for the data sets studied.

Empirical source models were described at discrete frequencies as functions of m_1 for each study region. Vertical spectra are more closely related to, and diagnostic of, the apparent source radiation than are horizontal spectra. Further study on source spectral scaling should take the source mechanism into account. After all the corrections made in this study, any discrepancies in source spectra between regions may be related to faulting mechanism. Source mechanism appears to be an important remaining influential factor

that has not been sufficiently investigated at the present time. This is supported by the recent experimental findings that faulting types and shearing modes could have at least affected the spectral levels, if not the shape.

The maximum slip velocity, $v_m \cong 0.5$ m/s, estimated from the regional high frequency levels of the spectra, provides a region-independent source parameter that is more meaningful than the Brune stress parameter.

Acknowledgments

The completion of this thesis would have not been possible without strong motion data (SMD) available. The organizations in the relevant countries or regions that initiated the SMD bases are appreciated.

I would thank my supervisor, Dr. Gail M. Atkinson, for her guidance, support, and encouragement. My sincere gratitude is also given for her enthusiasm and patience during the period of the thesis work.

I am grateful to Professor Giorgio Ranalli, member of the Thesis Advice Committee, for his continuous encouragement, support and advice throughout the course of the study program.

I appreciate those who were generously providing me with useful information for the initial data search: Engin Inan for providing the focal depth information of Turkey, Shigeo Kinoshita for sharing the 1996-97 SMD collection of Japan from which I selected some strong motion records for source spectral analysis, and Yuehua Zeng for responding to my inquiry on the Mexican strong motion database.

The study program is partly supported by the Ontario Graduate Scholarship and Carleton University Scholarship, and by the Natural Sciences and Engineering Research Council of Canada.

I would last, but not least, thank my family members, my wife Ming, son Quinn, and daughter Christine, for their patience and support in one way or the other through the years of my studies.

Original Contribution

This thesis contains only the original results of research conducted by the candidate under supervision of his mentor. The original contributions are summarized as follows:

An extensive data retrieving and integrated analysis based on the strong-motion data files and other relevant sources resulted in the catalogs attached in Appendixes 1 to 3 for Japan, Mexico, and Turkey, as described in Chapter 2. Seismicity and crustal friction was studied as data allowed.

Development of the Fourier acceleration spectrum databases for all distances, for both horizontal and vertical components, was undertaken for Japan, Mexico, and Turkey using procedures described in Chapter 3 and Appendix 4. The Fourier spectrum data for California, B.C., and ENA were extracted respectively from Atkinson and Silva (1997), Atkinson (1995), and Atkinson and Mereu (1992). For these three regions, the Fourier data were reformatted to facilitate the compilation of an integrated database. To obtain the R1 and apparent source spectra all corrections for the path and site effects were made for all the regions.

Methods of determining source spectra and regional models were thoroughly examined in Chapter 4, in which the regional parameters, including crustal and site amplifications, and the corresponding crustal models, were systematically investigated.

The computed results of the R1 source spectra for both H and V components and various magnitude scales were described in Chapter 5. In this chapter, a new magnitude m_l was defined, the m_{hf} was slightly modified, and the moment magnitude M was computed from the long period level of the displacement spectrum. All these magnitudes were routinely calculated for the six regions. Finally a standalone database, combining all the magnitudes, H/V ratios or amplification coefficients as functions of frequency, site classification, and the Fourier acceleration spectra for both the horizontal and vertical components over all the study regions, was compiled (Appendixes 5A and 5B). This product will be of significant potential benefit in geotechnical engineering and studies of earthquake seismology. Various statistical relations were given between the magnitudes.

Site effects on source spectra were studied for different types of rock and soil site conditions (e.g., California A/B/C/D and Japan A/B/C/E generic rock and soil sites, based on the average near-surface shear velocity in the top 30 m of the crustal profiles). A specific method of studying the site classification and effects was developed using the H/V ratios in Chapter 6. The H/V ratios were first computed for the regions and then related to the theoretical site amplification function.

The apparent source spectra, as described in Chapter 7, were calculated for all regions studied. Empirical source models were described for each of the six regions and compared to data. Evaluated models include the Brune (1970, 1971) model and the 2-corner model (see Atkinson and Silva, 2000). Estimates of the high-frequency decay

parameter (κ) were carried out for both H and V components for different groups of events. Further studies of the effects on source spectra of source mechanism, the H/V inversion problem for near surface and crustal structure, and modification of source models are discussed and recommended in Chapter 8, where a region-independent parameter v_m (~ 0.5 m/s), the maximum slip velocity, is estimated from the regional high frequency levels. Finally, general conclusions were made in Chapter 9.

The candidate coded the main programs in FORTRAN for the above relevant computations and file manipulations; the FFT subroutine and the site amplification routines of Boore (1996) were used.

Some recent publications relevant to the study program were not included in the thesis. These are listed below such as the study of historical seismograms in southeastern Canada (Atkinson and Chen, 1997), the Tibetan lithosphere from geophysical evidence (Chen and Ranalli, 1997), and dynamic friction – depth distribution of earthquakes in continental crust (Chen, 1998a, 1998b).

Table of Contents

Title page	i
Acceptance form	ii
Abstract	iii
Acknowledgments	vii
Original Contribution	ix
Table of Contents	xii
List of Tables	xvi
List of Figures	xvii
List of Appendixes	xxiv

Chapter 1

Introduction	1
1.1 Conceptual review	1
1.2 Research areas and objectives	3
1.3 Recent progress on earthquake source	4
1.3.1 Source spectrum and mechanism.....	4
1.3.2 Tectonic environments: Earthquake classifications.....	8
1.4 Outline of the dissertation	10
1.5 Other notes	11

Chapter 2

Strong motion data sets and analysis	12
2.1 Data sources	12
2.1.1 Data access and formats	12
2.1.2 Acceleration records of Japan, Mexico, and Turkey.....	13
2.1.3 Data of California, BC and ENA.....	14
2.2 Catalogue of strong motion earthquakes	15
2.3 Data analysis	16
2.3.1 Distribution of epicenters and recording stations	16
2.3.2 Regional magnitudes	17

2.3.3 Depth distribution of earthquakes	17
2.4 Discussion	20
Chapter 3	
Fourier acceleration spectra	30
3.1 Data processing procedures	30
3.1.1 Parameter retrieval and S window of time series	30
3.1.2 Calculations of Fourier acceleration	31
3.2 Fourier acceleration databases	33
3.3 Analysis of results	34
3.4 Recommendation on strong motion data formatting	36
Chapter 4	
Method of determining source spectra and regional models	44
4.1 A perspective	44
4.2 Source spectral models	47
4.3 Regional model parameters	52
4.3.1 Introduction	52
4.3.2 Material constants	52
4.3.3 Regional path properties	55
4.3.3.1 General remarks	55
4.3.3.2 Geometrical spreading	55
4.3.3.3 Q models	56
4.3.3.4 Duration	57
4.3.4 Site properties	58
4.3.4.1 Crustal amplification	58
4.3.4.2 Kappa values	60
4.3.4.3 Other input parameters	63
Chapter 5	
R1 spectra and magnitude scales	74
5.1 Introduction	74
5.2 New magnitude scale m_1 and its relation to M , m_{hf} and regional magnitudes (M_{rg})	75

5.2.1 Introduction	75
5.2.2 Moment magnitude	76
5.2.3 m_l and m_{hf} scales	77
5.2.4 Comparisons between magnitude scales	80
5.3 Analysis of distance and depth dependence of results	84
5.4 R1 source spectra	85
5.4.1 Spectral amplitude vs magnitude m_l	86
5.4.2 Apparent difference in R1 spectra	87
5.5 Conclusions and discussion	89

Chapter 6

Horizontal-to-vertical (H/V) spectral ratio and site effects	131
6.1 Introduction	131
6.2 Site classification	134
6.3 Regional H/V ratio with respect to site amplification	136
6.3.1 Methodology	136
6.3.2 Regional evaluation of H/V ratios	137
6.3.3 Comparison of H/V ratio and site amplification	139
6.4 Conclusions and discussion	143

Chapter 7

Apparent Source spectra of earthquakes	165
7.1 Methodology	165
7.2 Regional characteristics of source spectra	167
7.2.1 Spectral level versus magnitude m_l	167
7.2.2 Effect of depth on source spectra	169
7.2.3 Source spectra and tectonic implications	170
7.3 Empirical models: Apparent source spectra as functions of magnitude m_l ..	171
7.3.1 General expressions	171
7.3.2 Japan	174
7.3.3 Mexico	174
7.3.4 Turkey	175
7.3.5 California	175

List of Tables

Table 2.1 Acceleration records of Japan, Mexico, Turkey, Calif., B.C. and ENA	15
Table 2.2 Percentage of earthquakes within given depth ranges	18
Table 3.1 Available records of the Fourier acceleration spectra and their frequency intervals in log units	33
Table 4.1 Summary of regional model parameters	54
Table 6.1 Site classification	135
Table 6.2 Velocity model for the modified generic rock site (CAROCK: AB/California & BC/Japan)	142
Table 6.3 Velocity Model for the modified generic soil site (GENSOIL: CD/California)	142
Table 6.4a Node points of amplification for the modified generic rock and soil sites ..	145
Table 6.4b H/V related amplification factors	146
Table 7.1 Kappa estimate for different groups of events ($R < 100$ km)	168

List of Figures

Figure 2.1 Epicentral distribution of Japan, with location of seismic stations	22
Figure 2.2 Epicentral distribution of Mexico, with location of seismic stations	23
Figure 2.3 Epicentral distribution of Turkey, with location of seismic stations	24
Figure 2.4 Data distribution in magnitude and distance	25
Figure 2.5 Hypocentral distribution across the Japanese Trench and Island Arc	26
Figure 2.6 Hypocentral distribution of Guerrero subduction zone, Mexico	27
Figure 2.7 Hypocentral distribution across Turkey in S-N direction	28
Figure 2.8 Hypocentral distribution across Turkey in W-E direction	29
Figure 3.1a S window of H component, defined by 90% energy criterion, $M_S = 5.0$, H_1 , $R_e = 17$ km	37
Figure 3.1b S window of vertical component, defined by 90% energy criterion, $M_S = 5.0$, V , $R_e = 17$ km, Turkey	38
Figure 3.2 Regional FA samples: corrected for geometrical spreading (R^{-1})	39
Figure 3.3 FA sample spectrum, 00l0986a.dnz: log-average vs unsmoothed and smoothed spectrum	40
Figure 3.4 FA sample spectrum, 00t0986a.dnz: log-average vs unsmoothed and smoothed spectrum	41
Figure 3.5 FA sample spectrum, 08l2756a.hty: log-average vs unsmoothed and smoothed spectrum	42
Figure 3.6 FA sample spectrum, 08t2756a.hty: log-average vs unsmoothed and smoothed spectrum	43
Figure 4.1 Comparison of the 1-corner and 2-corner source models	65
Figure 4.2 Attenuation of source spectra with distance ($M = 5$)	66
Figure 4.3 S velocity and density vs depth, Japan	67
Figure 4.4 S velocity and density vs depth, Mexico	68
Figure 4.5 S velocity and density vs depth, Turkey	69
Figure 4.6 Amplification as function of frequency, Japan	70
Figure 4.7 Amplification as function of frequency, Mexico	71

Figure 4.8 Amplification as function of frequency, Turkey	72
Figure 4.9 Amplification as function of frequency for California, B.C., and ENA	73
Figure 5.1 m_{hf} as function of A_{hf}	90
Figure 5.2 m_1 as function of A_1	91
Figure 5.3 M_{rg} vs m_1 , derived from vertical component.....	92
Figure 5.4 M_{rg} vs m_{hf} , derived from vertical component.....	93
Figure 5.5 M_{rg} vs M_{lp} , derived from vertical component	94
Figure 5.6 m_{hf} vs m_1 , derived from vertical component	95
Figure 5.7 M_{lp} vs m_1 , derived from vertical component	96
Figure 5.8 m_{hf} vs M_{lp} , derived from vertical component	97
Figure 5.9 M_{lp} vs CMT moment magnitude M	98
Figure 5.10 m_1 vs CMT moment magnitude M	99
Figure 5.11 m_1 as a function of M (CMT)	100
Figure 5.12 m_{hf} vs CMT moment magnitude M	101
Figure 5.13 m_1 as a function of regional magnitude M_{rg} , $N_{stn} \geq 3$	102
Figure 5.14 m_{hf} as a function of m_1 , $N_{stn} \geq 3$	103
Figure 5.15 Distribution of m_1 and hypocentral distance	104
Figure 5.16 Residuals of m_1 vs hypocentral distance	105
Figure 5.17 Residuals of M_{lp} vs hypocentral distance	106
Figure 5.18 Residuals of m_{hf} vs hypocentral distance	107
Figure 5.19 Residuals of m_1 vs hypocentral distance, $h < 30$ km	108
Figure 5.20 Residuals of m_1 vs hypocentral distance, $h = 30-60$ km	109
Figure 5.21 Residuals of m_1 vs hypocentral distance, $h > 60$ km	110
Figure 5.22a Horizontal R1 spectral level A1 ($f = 1$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$	111
Figure 5.22b Horizontal R1 spectral level A2 ($f = 2$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$	112
Figure 5.22c Horizontal R1 spectral level A5 ($f = 5$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$	113
Figure 5.22d Horizontal R1 spectral level A10 ($f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$	114

Figure 5.23a Vertical R1 spectral level A1 ($f = 1$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, Nstn ≥ 3	115
Figure 5.23b Vertical R1 spectral level A2 ($f = 2$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, Nstn ≥ 3	116
Figure 5.23c Vertical R1 spectral level A5 ($f = 5$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, Nstn ≥ 3	117
Figure 5.23d Vertical R1 spectral level A10 ($f = 10$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, Nstn ≥ 3	118
Figure 5.24a Horizontal R1 spectral level A1 ($f = 1$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, all records	119
Figure 5.24b Horizontal R1 spectral level A2 ($f = 2$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, all records	120
Figure 5.24c Horizontal R1 spectral level A5 ($f = 5$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, all records	121
Figure 5.24d Horizontal R1 spectral level A10 ($f = 10$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, all records	122
Figure 5.25a Vertical R1 spectral level A1 ($f = 1$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, all records	123
Figure 5.25b Vertical R1 spectral level A2 ($f = 2$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, all records	124
Figure 5.25c Vertical R1 spectral level A5 ($f = 5$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, all records	125
Figure 5.25d Vertical R1 spectral level A10 ($f = 10$ Hz, $R = 1$ km) vs magnitude $\mathbf{m}_1$, all records	126
Figure 5.26 Horizontal R1 source spectra ($R = 1$ km), $\mathbf{m}_1 = 5.5 (\pm 0.2)$	127
Figure 5.27 Vertical R1 source spectra ($R = 1$ km), $\mathbf{m}_1 = 5.5 (\pm 0.2)$	128
Figure 5.28 Horizontal R1 source spectra ($R = 1$ km), $\mathbf{m}_1 = 5.0 (\pm 0.2)$	129
Figure 5.29 Vertical R1 source spectra ($R = 1$ km), $\mathbf{m}_1 = 5.0 (\pm 0.2)$	130
Figure 6.1 Comparison of H/V ratio between regions	148
Figure 6.2a-j Samples of H/V ratio for different site classes: a) Japan site class A	149
Figure 6.2b Japan: site class B	150

Figure 6.2c Japan: site class C	151
Figure 6.2d Japan: site class E	152
Figure 6.2e Turkey: overall soft rock	153
Figure 6.2f Mexico: overall rock site	154
Figure 6.2g California: site class A	155
Figure 6.2h California: site class B	156
Figure 6.2i California: site class C	157
Figure 6.2j California: site class D	158
Figure 6.3 Generic site velocity models	159
Figure 6.4 Amplifications derived from generic rock/soil sites	160
Figure 6.5 H/V ratio matches with amplification for the modified generic rock model (CAROCK)	161
Figure 6.6 H/V ratio matches with amplification for the modified generic soil model (GENSOIL)	162
Figure 6.7 Soft rock sites (Turkey) show an intermediate H/V ratio between BJ97 and the modified generic sites	163
Figure 6.8 H/V ratio compared with theoretical amplification for hard rock/rock sites of B.C., ENA and Mexico	164
Figure 7.1a Apparent source spectral level A1 (H comp., $f = 1$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$	179
Figure 7.1b Apparent source spectral level A2 (H comp., $f = 2$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$	180
Figure 7.1c Apparent source spectral level A5 (H comp., $f = 5$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$	181
Figure 7.1d Apparent source spectral level A10 (H comp., $f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$	182
Figure 7.2a Apparent source spectral level A1 (V comp., $f = 1$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$	183
Figure 7.2b Apparent source spectral level A2 (V comp., $f = 2$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$	184
Figure 7.2c Apparent source spectral level A5 (V comp., $f = 5$ Hz, $R = 1$ km) vs	

magnitude m_1 , $N_{stn} \geq 3$	185
Figure 7.2d Apparent source spectral level A10 (V comp., $f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$	186
Figure 7.3a Apparent source spectral level A1 (H comp., $f = 1$ Hz, $R = 1$ km) vs magnitude m_1 all records	187
Figure 7.3b Apparent source spectral level A2 (H comp., $f = 2$ Hz, $R = 1$ km) vs magnitude m_1 , all records	188
Figure 7.3c Apparent source spectral level A5 (H comp., $f = 5$ Hz, $R = 1$ km) vs magnitude m_1 , all records	189
Figure 7.3d Apparent source spectral level A10 (H comp., $f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , all records	190
Figure 7.4a Apparent source spectral level A1 (V comp., $f = 1$ Hz, $R = 1$ km) vs magnitude m_1 , all records	191
Figure 7.4b Apparent source spectral level A2 (V comp., $f = 2$ Hz, $R = 1$ km) vs magnitude m_1 , all records	192
Figure 7.4c Apparent source spectral level A5 (V comp., $f = 5$ Hz, $R = 1$ km) vs magnitude m_1 , all records	193
Figure 7.4d Apparent source spectral level A10 (V comp., $f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , all records	194
Figure 7.5a Japan: Apparent source spectral level A1 ($f = 1$ Hz, $R = 1$ km, H) vs m_1 showing variation of focal depths	195
Figure 7.5b Japan: Apparent source spectral level A2 ($f = 2$ Hz, $R = 1$ km, H) vs m_1 showing variation of focal depths	196
Figure 7.5c Japan: Apparent source spectral level A5 ($f = 5$ Hz, $R = 1$ km, H) vs m_1 showing variation of focal depths	197
Figure 7.5d Japan: Apparent source spectral level A10 ($f = 10$ Hz, $R = 1$ km, H) vs m_1 showing variation of focal depths	198
Figure 7.6a Mexico: Apparent source spectral level A1 ($f = 1$ Hz, $R = 1$ km, H) vs m_1 showing variation of focal depths	199
Figure 7.6b Mexico: Apparent source spectral level A2 ($f = 2$ Hz, $R = 1$ km, H) vs m_1 showing variation of focal depths	200

Figure 7.6c Mexico: Apparent source spectral level A5 ($f = 5$ Hz, $R = 1$ km, H) vs $\mathbf{m}_1$ showing variation of focal depths	201
Figure 7.6d Mexico: Apparent source spectral level A10 ($f = 10$ Hz, $R = 1$ km, H) vs $\mathbf{m}_1$ showing variation of focal depths	202
Figure 7.7a Turkey: Apparent source spectral level A1 ($f = 1$ Hz, $R = 1$ km, H) vs $\mathbf{m}_1$ showing variation of focal depths	203
Figure 7.7b Turkey: Apparent source spectral level A2 ($f = 2$ Hz, $R = 1$ km, H) vs $\mathbf{m}_1$ showing variation of focal depths	204
Figure 7.7c Turkey: Apparent source spectral level A5 ($f = 5$ Hz, $R = 1$ km, H) vs $\mathbf{m}_1$ showing variation of focal depths	205
Figure 7.7d Turkey: Apparent source spectral level A10 ($f = 10$ Hz, $R = 1$ km, H) vs $\mathbf{m}_1$ showing variation of focal depths	206
Figure 7.8a B.C: Apparent source spectral level A1 ($f = 1$ Hz, $R = 1$ km, H) vs $\mathbf{m}_1$ showing variation of focal depths	207
Figure 7.8b B.C: Apparent source spectral level A2 ($f = 2$ Hz, $R = 1$ km, H) vs $\mathbf{m}_1$ showing variation of focal depths	208
Figure 7.8c B.C: Apparent source spectral level A5 ($f = 5$ Hz, $R = 1$ km, H) vs $\mathbf{m}_1$ showing variation of focal depths	209
Figure 7.8d B.C: Apparent source spectral level A10 ($f = 10$ Hz, $R = 1$ km, H) vs $\mathbf{m}_1$ showing variation of focal depths	210
Figure 7.9 Horizontal apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 3.5 (\pm 0.2)$	211
Figure 7.10 Vertical apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 3.5 (\pm 0.2)$	212
Figure 7.11 Horizontal apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 4.0 (\pm 0.2)$	213
Figure 7.12 Vertical apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 4.0 (\pm 0.2)$	214
Figure 7.13 Horizontal apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 4.5 (\pm 0.2)$	215
Figure 7.14 Vertical apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 4.5 (\pm 0.2)$	216
Figure 7.15 Horizontal apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 5.0 (\pm 0.2)$	217
Figure 7.16 Vertical apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 5.0 (\pm 0.2)$	218
Figure 7.17 Horizontal apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 5.5 (\pm 0.2)$	219
Figure 7.18 Vertical apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 5.5 (\pm 0.2)$	220

Figure 7.19 Horizontal apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 6.0 (\pm 0.2)$	221
Figure 7.20 Vertical apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 6.0 (\pm 0.2)$	222
Figure 7.21 Horizontal apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 6.5 (\pm 0.2)$	223
Figure 7.22 Vertical apparent source spectra ($R = 1$ km), $\mathbf{m}_1 = 6.5 (\pm 0.2)$	224
Figure 7.23a Apparent source spectral amplitude (H) as function of $\mathbf{m}_1$ for Japan, Mexico, Turkey, California, B.C., and ENA, $f = 1$ Hz	225
Figure 7.23b Apparent source spectral amplitude (H) as function of $\mathbf{m}_1$ for Japan, Mexico, Turkey, California, B.C., and ENA, $f = 2$ Hz	226
Figure 7.23c Apparent source spectral amplitude (H) as function of $\mathbf{m}_1$ for Japan, Mexico, Turkey, California, B.C., and ENA, $f = 5$ Hz	227
Figure 7.23d Apparent source spectral amplitude (H) as function of $\mathbf{m}_1$ for Japan, Mexico, Turkey, California, B.C., and ENA, $f = 10$ Hz	228
Figure 7.24a Apparent source spectral amplitude (V) as function of $\mathbf{m}_1$ for Japan, Mexico, Turkey, California, B.C., and ENA, $f = 1$ Hz	229
Figure 7.24b Apparent source spectral amplitude (V) as function of $\mathbf{m}_1$ for Japan, Mexico, Turkey, California, B.C., and ENA, $f = 2$ Hz	230
Figure 7.24c Apparent source spectral amplitude (V) as function of $\mathbf{m}_1$ for Japan, Mexico, Turkey, California, B.C., and ENA, $f = 5$ Hz	231
Figure 7.24d Apparent source spectral amplitude (V) as function of $\mathbf{m}_1$ for Japan, Mexico, Turkey, California, B.C., and ENA, $f = 10$ Hz	232

List of Appendixes

Appendix 1

Catalog of strong motion earthquake records, $R \leq 100$ km, Japan (3 components)	
.....	266

Appendix 2

Catalog of strong motion earthquake records, $R \leq 100$ km, Mexico (3-comp.)	
.....	271

Appendix 3

Catalog of strong motion earthquake records, $R \leq 100$ km, Turkey (3 components)	
.....	276

Appendix 4

Fourier acceleration spectrum databases for Japan, Mexico, and Turkey (disk #1: H and V components)	279
--	-----

Appendix 5

Integrated database of FA for Japan, Mexico, Turkey, California, B.C., and ENA	
.....	281
A. Horizontal component	281
B. Vertical component	370

Chapter 1

Introduction

1.1 Conceptual review

The earthquake source spectrum is an important topic of both engineering and theoretical significance in modern seismology. The topic's scope involves issues of seismic wave propagation, kinematics and dynamics of earthquakes, seismometry, and seismotectonics.

Recordings of ground motion as a function of time provide seismologists with the basic data to study elastic waves within the Earth. During the propagation of waves from the source to a site, many changes in the waveform along the path will occur. Multiple reflections and refractions may result in many signal phases; attenuation causes frequency-dependent reduction of the amplitudes and phase shifts; scattering produces complicated superpositions of wavelets with different paths; reverberation in shallow sedimentary layers will cause frequency-dependent amplification; and finally, the recording system and the sampling process produce additional signal distortions (Scherbaum, 1994). All of these factors can be regarded as filters or transfer functions along the path in the sense of signal processing. The propagation (path) filter, sometimes called the Earth transfer function (Lay and Wallace, 1995), is the most complex filter in seismic waveform modeling. This function accounts for all propagation effects such as

reflections, triplications, diffractions, scattering, attenuation ($1/Q$), mode conversions, and geometric spreading. It is extremely difficult to eliminate all of the effects of path on the recorded ground motion. Site effects are also complex, depending on local geological conditions, and possibly on the level of shaking (due to nonlinearity). To understand the source spectra, we have to separate or remove the composite filter effects.

Time-domain and frequency-domain analyses are useful approaches in the modeling of seismograms, and provide valuable insight into source characteristics. The frequency domain technique is often more convenient because the convolution operator in the time-domain is just a multiplication operator in the frequency domain. As shown in Lay and Wallace (1995), for example:

$$\mathcal{F}(S(t)*I(t)) = \hat{S}(\omega) \hat{I}(\omega) \quad (1.1)$$

where,

$$S(t)*I(t) = g(t) = \int_{-\infty}^{\infty} S(\tau)I(t-\tau)d\tau \quad (1.2)$$

represents the convolution of input signal $S(t)$ and filter $I(t)$ in the time-domain, and $\hat{S}(\omega)$ and $\hat{I}(\omega)$ are the corresponding Fourier spectra in the frequency domain, respectively. A similar statement can be found in Scherbaum (1994), among others. Thus filter effects on a recorded signal can be conveniently separated from source effects by spectral division in the frequency domain.

1.2 Research areas and objectives

The main objective of this thesis is to compare apparent earthquake source spectra, based on a large amount of data analysis, across different tectonic regions. The regions, chosen because data are readily available, include Japan, Mexico, Turkey, California, British Columbia (B.C.), and eastern Canada/eastern North America (ENA). The work is based on analysis of digital time series databases to separate source, path and site effects to the extent possible, to enable comparisons of the apparent earthquake source radiation. Fourier spectral analysis is a fundamental tool, as the analyses are performed in the frequency domain. A catalog of Fourier spectra and apparent (inferred) source spectra is compiled from the analyses. A general model to explain the gross features of these spectra and their regional variability is developed.

The above objectives are important because ground motion relations, upon which engineering seismic hazard analyses are based, depend critically on the earthquake source spectrum. Current controversies deal with the comparison of ENA source spectra to California spectra (e.g., Atkinson and Boore, 1998): ENA motions may be stronger than California motions at high frequencies due to postulated differences in source spectra, for example. There is no definitive work as to whether there are any real differences in “source spectra” between regions. The study regions represent different tectonic and seismogenic environments, thus providing an opportunity for us to look at various gross features of the source spectra, and develop a model to explain those features that may be

correlated with specific tectonic characteristics. The expected results will be beneficial to both theoretical and engineering seismology, in particular to seismic hazard assessment for design of engineered structures.

1.3 Recent progress on earthquake source

1.3.1 Source spectrum and mechanism

It has been noted from observations that direct S waves at short distances (< 100 km), followed by Lg or surface waves at large distances (several hundred km), constitute the strongest part of ground motion signals in most cases. This part of the signal is often referred to as the “shear window”. A theoretical Fourier amplitude spectrum model is often used to describe the amplitudes of ground motion in the shear window as function of source strength and distance, with the Brune (1970, 1971) “ ω^2 ” source model being a classic example. Including the effects of anelastic and geometrical attenuation on a simple Brune source model, McGuire and Hanks (1980) and Hanks and McGuire (1981) estimated the amplitude spectrum of the horizontal shear wave window to predict the root mean square (rms) and peak accelerations for California earthquakes. Boore (1983) extended this work by generating suites of synthetic accelerograms of filtered Gaussian white noise whose amplitude spectrum approximates the acceleration spectrum given by physical/seismological models for California. Anderson and Hough (1984) and Anderson (1986) proposed an additional attenuation parameter, kappa (κ), to modify the spectral model by considering high-frequency near-surface effects that reduce spectral amplitudes

at high frequencies. The model of shear wave spectra at short distance was also extended to describe Lg waves at regional distances (Street et al., 1975; Herrmann and Kijko, 1983).

In recent years, many seismological and engineering methods have been proposed for simulating and modeling ground motions. These methods range from deterministic modeling (Bolt, 1987; Atkinson and Somerville, 1994), stochastic modeling (Boore, 1983; Boore and Atkinson, 1987; Atkinson and Boore, 1995; Atkinson and Somerville, 1994), to entirely empirical modeling (Fukushima, 1996; Anderson and Lei, 1994; Youngs et al., 1995; Joyner and Boore, 1981; Campbell, 1985; Campbell and Bozorgnia, 1994; Nuttli and Herrmann, 1987; Sabetta and Pugliese, 1996). Such models are important in engineering seismology for their role in predicting the ground motion from future events for which the magnitude and location may be constrained, but little is known about the details of the rupture process.

The deterministic models used in the seismological approach to estimating ground motions from future events (Bolt, 1987; Somerville et al., 1990; 1991) rely on determining the motion based on the rupture process of a fault of specified dimensions and orientation or from a point source. These models usually require knowledge of many parameters characterizing the source rupture process and the travel path of seismic waves, which are often unavailable or indeterminate and usually unfamiliar to engineers. On the other hand, the strictly empirical models utilized in the engineering approach (Saragoni and Hart, 1974; Nau et al., 1982; Faccioli and Tagliani, 1987) range from

filtering and windowing Gaussian noise to generating accelerograms by linear difference equations. These models need not make use of specific geophysical parameters, but the resulting time histories are in general poorly correlated with physical earthquake scaling parameters, such as magnitude and distance from the source. The stochastic approach (Boore, 1983; Boore and Atkinson, 1987; Atkinson and Boore, 1995) strikes a middle ground between these two, combining simple physical parameters with the stochastic character of high-frequency ground motions.

Many seismologists have now studied the source, path and site effects in order to model and predict strong ground motions for the needs of earthquake engineering (e.g., Anderson and Lei, 1994; Atkinson and Boore, 1995; Boore and Joyner, 1997; Chin and Aki, 1991; Boatwright, 1994; Carver and Hartzell, 1996; Castro et al., 1995; Ou and Herrmann, 1990; Burger et al., 1987; Frankel et al., 1990; Pezzo et al., 1995; Hatzidimitriou, 1995; Theodulidis et al., 1996; Su et al., 1996; Frankel et al., 1999; Atkinson and Cassidy, 2000). Most work of this type is, however, either on local scales, or at regional scales. Global comparisons of fundamental parameters such as source spectra are lacking, leaving us without a comprehensive picture. Undoubtedly, a systematic and more integral investigation on a global scale is highly needed.

In terms of faulting mechanics, several specific source models have been proposed to describe the high-frequency characteristics of ground motion. These include the asperity model (Boatwright, 1988), the barrier model (Papageorgiou and Aki, 1983a, 1983b), the kinematic models (Hutchings, 1994; Haddon, 1996), the Haskell model

(Haskell, 1964; List, 1982; Lay and Wallace, 1995), and a dynamic model for far-field acceleration (Boatwright, 1982). Deterministic methods based on detailed source slip functions and theoretical modeling of crustal structure effects have been extended to relatively high frequencies (Song and Helmberger, 1996; Thio and Kanamori, 1996; Wald et al., 1996; Olsen and Archuleta, 1996; Somerville et al., 1996). Composite source models for computing realistic synthetic strong ground motion expressed as Green's functions have also been proposed (Frankel, 1991, 1995; Zeng et al., 1994; Boatwright, 1988). These models deal with the physical mechanisms of the source on the basis of the shear-faulting model, supported by the source mechanism solutions of natural earthquakes around the world. The double-couple source mechanism is currently accepted by most seismologists in earthquake seismology (e.g., Dahlen and Tromp, 1998; Lay and Wallace, 1995; Doyle, 1995), and it is employed in engineering seismology for ground motion spectral analyses (e.g., Reiter, 1990). Some candidates for nondouble couple source mechanism are most likely to be mining-induced small- or micro-earthquakes (Gibowicz et al., 1990; Chen, 1991, 1996).

One of the fundamental problems in modern seismology has been the inverse problem of describing the seismic source from observed ground motion recordings and other data. Previous results from spectral analysis have shown a difference in both stress parameters (source) and ground motion attenuation between eastern North America (ENA), California and western Canada (WNA) (Atkinson and Boore, 1995; Atkinson, 1996). The decay of ground motion amplitudes with distance is less rapid in ENA than in California or western Canada. The stress parameters of ENA earthquakes, characterizing

the strength of the high-frequency radiation, appear to be about a factor of two greater than western stress parameters. But conclusions are complicated by differing crustal structures, which imply differences in amplification through the crustal velocity gradient.

Regional attenuation differences are readily interpreted in terms of differing crustal structure. But does any real difference in source spectra exist? If so, what drives regional differences in source spectra? One of our most important goals is to find the answer to this question. Despite the fact that there are a number of publications related to the source spectra in local or regional domains, it is a new topic to comprehensively compare source spectra around the world, to find a generalized model that may explain whether or not regional variability exists in source spectra, and to explain what this might mean in terms of underlying physical parameters.

1.3.2 Tectonic environments: Earthquake classifications

Regional tectonic environments may be simply classified as intraplate and interplate tectonic background, which include the convergent, divergent and transcurrent margins (plate boundaries). Based on tectonic background, the interplate and intraplate earthquakes were classified in terms of spatial distributions of earthquakes (e.g., Lay and Wallace, 1995). This simplified classification of earthquakes is entirely justified by the plate boundaries. The boundaries are, however, somewhat complicated by various subclassifications in terminology (e.g., Thompson and Melson, 1972; Taylor et al., 1994; Kearey and Vine, 1996; Fowler, 1996; Condie, 1997). Even in the same tectonic region,

one may find different types of structural patterns and tectonic evolution histories. Therefore, any attempt to connect earthquake source to tectonic issues should proceed with caution.

In the study regions of this thesis, three general tectonic environments may be identified, i.e., A. subduction zones such as Japan, Mexico (Guerrero), B.C. (western coast of Canada), and the southwestern margins of Turkey; B. transform fault systems such as California, northwestern margins of Mexico, and the major part of Turkey; and C. intraplate regions like eastern Canada. The tectonics of Turkey is quite complicated because it is associated with several different environments within the Eurasian-African continental collision regime; subduction occurs along the Mediterranean Sea subduction zone, continental transform extends east-westwards on both the north and south borders, which may join with the subduction zone in the southwestern part. This framework describes an anticlockwise motion of Turkey (Walcott and White, 1998), showing a variety of focal mechanisms in the region (Udias, 1982) and low P_n velocity (< 7.9 km/s) beneath much of the Turkish-Iranian Plateau and the Aegean Sea (Hearn and Ni, 1994). If there are indeed differences in source spectra due to tectonic regime, these should be identifiable across the very different tectonic environments addressed in this study.

Viewing the complexity and variability of tectonic environments, one may wonder whether and how earthquake source spectra vary with factors such as crustal structure, the manner of its movements, tectonic history, slip characteristics, etc. On one hand, source depth and crustal structure may profoundly influence the observed ground

motions (Ou and Herrmann, 1990). On the other hand, broadbrush studies suggest a surprising consistency in basic source parameters, such as stress drop (Kanamori and Anderson, 1975; Hanks and McGuire, 1981). It is not easy to compile a robust and consistent catalogue of earthquake source parameters for different regions, due to the difficulty of separating source effects from those of path and site. This is challenging, but also important in seismology.

1.4 Outline of the dissertation

The thesis begins with a general discussion of the earthquake source, then develops some specific issues such as data analysis, the concept of “apparent” source spectra, magnitude scales, and physical and mechanical interpretations of the source spectra. Chapter 1 introduces key issues on earthquake source, important concepts, tectonic and earthquake classifications, and the state-of-the-art in source spectrum studies. Chapter 2 describes the strong-motion data set, and develops a catalogue of earthquakes for spectral analysis. Chapter 3 describes the analysis methods and the Fourier spectrum databases over the six regions. Chapter 4 develops the method of determining source spectra and regional models. Chapter 5 focuses on “R1” spectra (spectra corrected for attenuation to a reference distance of 1 km) and source-related magnitude scales, including a new magnitude m_l , and existing scales m_{hf} and moment magnitude, M , derived from the long period level of the displacement spectrum. Chapter 6 develops the H/V ratio technique to estimate crustal and site amplification for generic rock/soil sites. Chapter 7 provides regional comparisons of apparent source spectra with

physical models. Chapter 8 explores important issues and recommends future studies on the relationship between source spectra and source mechanism, as well as the relationship between horizontal and vertical component, based on a general discussion. Finally, concluding remarks are summarized in Chapter 9.

1.5 Other notes

A cgs unit system has been used in most cases, but some quantities may be expressed using the traditional (popular) units of the literature. Examples are seismic velocity expressed by km/s, distance by km, and stress drop in bars (MPa may be noted in text). The symbols $\log$ in the text and equations denote logarithm to the base 10, unless otherwise specified. Illustrations (figures) are separated from the text and references are all given at the end of the thesis.

Chapter 2

Strong motion data sets and analysis

2.1 Data sources

2.1.1 Data access and formats

Earthquake strong motion data (acceleration records) are useful for seismological and engineering applications, but often cumbersome to acquire. The online Internet server has certainly made the acquisition easier. There are currently many on-line data sources and archives such as KNET (Kyoshin Net, Japan), USGS/NSMP (U.S. Geological Survey National Strong Motion Instrumentation Program), and CDMG (California Division of Mines and Geology). However, there is a lack of straightforward tools for providing the desired data to the end users. There are limited choices on file names and there is no practical way to choose subsets of data based on specified event or site parameters. A further difficulty is that there is no standard format for strong motion data at this time; there are nearly as many data formats as there are data sources (Wald, 1997). Thus although it is today much easier to get the strong motion data than it was even two years ago, it is a major task to sort out and organize the required information for the specific needs of particular users and specific applications.

An initial search of data sources for the thesis found the NGDC (National Geophysical Data Center, USA) three-volume strong motion CD-ROM collection. However, there were not enough data for the regions and site conditions of interest. The electronic seismologist (e.g., Malone, 1997) provided us with helpful information for further search and studies on data sets (again, see Wald, 1997).

2.1.2 Acceleration records of Japan, Mexico, and Turkey

Thousands of acceleration records for Japan, Mexico, and Turkey were collected and reorganized from their corresponding databases on web sites. Some of the Japanese data were also selected from the CD collections of the National Research Institute for Earth Science and Disaster Prevention (1997). All strong motion records include 2 orthogonal horizontal, and one vertical, component. A total of 3936 acceleration records were collected for Japan, for the period from October, 1996 to February, 1998; 1197 records for Mexico were collected for the period from January, 1995 to August, 1997; 852 records for Turkey were collected for the period from August, 1976 to January, 1997 (Table 2.1). The corresponding web sites can be, respectively, referred to <http://www.bosai.go.jp>, or <http://www.k-net.bosai.go.jp>, National Research Institute for Earth Science and Disaster Prevention, Japan; <http://www.seismo.unr.edu/ftp/zeng/GUERRERO/guerrero.html>, Instituto de Ingenieria (UNAM) and U. Nevada, Reno Seismological Laboratory – Guerrero Accelerograph Network; and <ftp://ftp.deprem.gov.tr/pub/sma>, Earthquake Research Department, Ankara, Turkey.

The magnitude range in the datasets is 3.7-6.6 (JMA) for Japan, 3.3-7.3 (regional magnitude M_{rg}) for Mexico, and 2.7-6.8 (M_{rg}) for Turkey. Some events have no magnitude listed in the original database. Only those events with sufficient information on such basic parameters were selected for analyses. Recordings within distance of 100 km will be used for source spectral studies (see later chapters).

2.1.3 Data of California, BC and ENA

For California, B.C., and ENA, strong-motion and seismograph data were collected and processed by others during the past years. Details may be found in Atkinson and Mereu (1992) and Atkinson and Boore (1995) for ENA, Atkinson (1996) for BC, and Atkinson and Silva (1997) for California. The data of BC and ENA are largely vertical-component seismographic data, whereas only the horizontal data from California were used.

Table 2.1 Acceleration records of Japan, Mexico, Turkey, Calif., B.C. and ENA.

Region	# of H comp.	# of V comp.	Magnitude range				Period of time
			2-3	3-5	5-7	7- <8	
Japan	2624 (516)	1312 (258)	0	504 (110)	2120 (406)	0	1996.10- 98.02
Mexico	798 (494)	399 (247)	0	498 (430)	126 (60)	40 (4)	1995.01- 97.08
Turkey	568 (282)	284 (141)	54 (8)	408 (212)	106 (62)	0	1976.08- 97.01
Calif.	1204 (1074)		0	47 (47)	1029 (981)	128 (46)	1952.07- 94.01
B.C.		832 (150)	0	715 (146)	117 (4)	0	1980.06- 94.02
ENA		1761 (174)	0	1601 (171)	160 (3)	0	1980.03- 94.03

Note: Numbers in parentheses are records for $R \leq 100$ km.

2.2 Catalogue of strong motion earthquakes

The strong motion data are catalogued for Japan, Mexico, and Turkey, in Appendixes 1 to 3 respectively, in reverse chronological order. (The data from other regions are available through the previous publications referred to in Section 2.1.3).

The epicentral distance, r , and hypocentral distance, R , for each record was calculated based on the focal depth, and geographic coordinates of the event and station, for the records of Japan, Mexico and Turkey.

There are different distance measures in earthquake seismology (e.g., Abrahamson and Shedlock, 1997), which include the closest distance (J-B distance) to the surface projection of the rupture, the closest distance to the rupture surface, the

closest distance to the seismogenic rupture surface, and the hypocentral distance. Most of the events in the data sets used are small to moderate earthquakes. For these small to moderate earthquakes, the hypocentral distance is a good approximation of the closest distance to the fault surface. The closest distance to the fault surface was used for large earthquakes where available (e.g., California).

2.3 Data analysis

2.3.1 Distribution of epicenters and recording stations

The spatial distribution of epicenters and recording stations is shown in Figures 2.1 to 2.3 for Japan, Mexico, and Turkey, respectively. There is fairly good coverage of earthquake events and stations over all the regions, which provide a relatively extensive sample of ray paths through the regional media. This allows for robust average corrections for attenuation effects.

Epicentral distances are generally within about 200 km for most of the data, although the Japanese data set contains records out to 1000 km. Mexico and Turkey's data sets have a more concentrated data distribution within about 200 km. For most of the data sets, the available distance measure is epicentral or hypocentral distance. This is equivalent to the closest distance to the fault rupture (slant distance to rupture) for small to moderate ($m \leq 6.5$) events, such as those in all data sets except California. For California, the distances are the closest (slant) distances to the fault rupture.

Figure 2.4 shows the distribution of data in magnitude and distance for stations within 100 km.

2.3.2 Regional magnitudes

Different magnitude scales are used in catalogues for different regions. The JMA scale is used for Japan, the scales M_C , M_a , M_e , m_b are used for Mexico, and the scales M_s , M_L , and m_b are used for Turkey. Among these magnitude scales, M_s , m_b , and M_L are commonly-known surface wave, body-wave, and local magnitude scales, while M_C is a coda-wave magnitude scale. The JMA scale used in Japan is similar to the M_s scale (S. Kinoshita, 1998, personal communication), and the M_a and M_e used in Mexico are the magnitudes determined particularly by Mexican seismologists (local magnitude in Mexico: Y. Zeng, 1999, personal communication).

2.3.3 Depth distribution of earthquakes

A total of 21 study events for Japan have known depths ranging from 3 to 483 km, of which 9 events are located in the crustal depth range. For Mexico and Turkey, there are respectively 139 and 132 events with depth parameters available, where 121 and 125 events are within the crustal depth ranges, respectively. The crustal thicknesses for Japan, Mexico and Turkey are 30 to 35, 40 to 45 and 30 to 36 km, respectively (see

Chapter 4; also see Chen, 1983, 1995 for Japan; Pinar, 1998; Walcott and White, 1998 for Turkey). The minimum and maximum depths for Mexico and Turkey in the databases range from 1 to 98 km and nearly 0 to 111 km, respectively.

For B.C., about 77% of the earthquakes studied are within the 0-30 km depth range. For California and ENA all events are within this depth range. In general, a high percentage of earthquakes (43%, 75%, 90%, 77%, 100% and 100%) are located within the top 30-km-thick-layer of the lithosphere (Table 2.2). The rest of the events are related to subduction.

Table 2.2 Percentage of earthquakes within given depth ranges.

Depth range (km)	Japan (%)	Mexico (%)	Turkey (%)	Calif (%)	B.C. (%)	ENA (%)
0-30	43	75	90	100	77	100
30-60	23	18	7	-	23	-
60-100	5	7	2	-	-	-
100-200	14	-	1	-	-	-
200-300	5	-	-	-	-	-
300-400	5	-	-	-	-	-
400-500	5	-	-	-	-	-

Hypocentral profiles across the subduction zones show the oceanic slabs subducting beneath the island arc of Japan and the continental margins along the western coast of Mexico and the southern arc-faulting boundary of Turkey (Figures 2.5 to 2.7). In Turkey, the seismic zones are not simply linear belts along the southern boundary, but surround the Anatolian Block (see Figure 2.2). Views of the cross-sections along S-N and W-E directions cutting through the Anatolian Block appear to show double deep-faulting zones dipping north and east, respectively (Figures 2.7 and 2.8). The deep faults are situated in both the southern and northern boundaries of the Block, while the maximum focal depth (111 km) is observed on the southwestern border. Tectonically, Turkey is an anticlockwise rotational block of recent motion (see Walcott and White, 1998), implying fundamentally a shear-faulting mechanism along the major boundary faults occurring there. It is extremely complicated in SW Turkey (see Figure 1 in Pinar, 1998), where the Hellenic Arc, Florence Rise and Cyprus Arc squeeze into or against the Anatolian Block through the Isparta Angle as a sharp-angled wedge, strongly pushed by the African Plate northwards to the Eurasian Plate.

All data sets feature a predominant midcrust seismogenic zone (above the subduction zones in some cases). Considering just crustal events, cumulative percentages of 71%, 61%, and 78% are respectively observed within the upper 20km for Japan, Mexico and Turkey. Overall, the vast majority of earthquakes occur within the top 30-km, with rates of 67%, 75%, 90%, and 77% for Japan, Mexico, Turkey, and B.C., respectively. California and ENA events are all within the category of crustal earthquakes. A top layer of about 3-km-thick appears to be an upper-crustal earthquake

cutoff depth (e.g., Scholz, 1990; Blanpied et al., 1995; Boatwright and Cocco, 1996; Chen, 1998) for Japan, while about 27% of the crustal earthquakes listed as occurring within the top 4-km in Turkey. Over the Mexican Guerrero subduction zone, 7% of crustal earthquakes occur within the top 4-km. Thus the study earthquakes appear to be largely concentrated in the crust, over a wide range of depths.

2.4 Discussion

Most continental (intraplate) earthquakes are confined in a thin crustal layer between about 1-3 and 12-16 km depths and exhibit an upper and lower depth cutoff. The upper and lower cutoffs are associated, respectively, with the upper stability transition, from velocity strengthening to velocity weakening, and the lower stability transition, from velocity weakening to velocity strengthening (Ranalli, 1995; Scholz, 1988, 1990; Chen, 1992, 1998a, 1998b; Tse and Rice, 1986; Boatwright and Cocco, 1996; Blanpied et al., 1991, 1995; Ben-Zion, 1996; Meissner, 1986; Wyss, 1991; Lamontagne and Ranalli, 1997; Lio, 1996). The lower friction stability transition occurs at the onset of ductility and defines the greatest depth at which earthquakes can nucleate, i.e., the base of the seismogenic zone. The transition depends on temperature and pressure conditions, or crustal geotherms. A typical model (California model) of quartzo-feldspathic crust given for the San Andreas fault, California, marks the onset of quartz plasticity at 11 km, or 300°C, and the semibrittle-plastic transition at 22 km, or 450°C (see Scholz, 1990). The top stability layer is generally at depths about 2 to 3-4 km. The top and lower transitions limit the midcrust seismogenic zone in which earthquakes can nucleate, but they do not

bind the region in which earthquakes can propagate, and hence earthquakes may propagate to some greater depth than the lower transition and may propagate dynamically through the top transition and even breach the surface. Furthermore, the transition may be not a sharp boundary (Ranalli, 1995), and so we may not expect a clear cutoff of earthquakes beyond the transitions. This is the case actually in the study regions discussed in the above section (Section 2.3.3). The California model appears to be applicable to the crustal zone of earthquakes in all regions.

A systematic summary on the topic over various tectonic environments worldwide was given in Chen (1998b); further discussion is given by Hyndman et al. (1995); Ni and Barazangi (1984); Pandey et al. (1995); Chen (1990, 1992); Wilhelm et al. (1989); Cooke et al. (1989). This is beyond the scope of this thesis. It is relevant to source issues, however, that there appear to be similar constraints on the depth of seismogenic processes over a wide range of tectonic environments.

Fig. 2.1 Epicentral distribution of Japan
with location of seismic stations

Fig. 2.2 Epicentral distribution of Mexico
with location of seismic stations

Fig. 2.3 Epicentral distribution of Turkey
with location of seismic stations

Figure 2.4 Data distribution in magnitude and distance. The epicentral or hypocentral distance for most regions is equivalent to the slant distance of California for small to moderate earthquakes. Moment magnitude M was used for California.

Figure 2.5 Hypocentral Distribution across Japanese Trench and Island Arc

Figure 2.6 Hypocentral Distribution of Guerrero Subduction Zone, Mexico

Figure 2.7 Hypocentral Distribution across Turkey in S-N Direction

Figure 2.8 Hypocentral Distribution across Turkey in W-E Direction

Chapter 3

Fourier acceleration spectra

3.1 Data processing procedures

3.1.1 Parameter retrieval and S window of time series

All digital strong motion records for Japan, Mexico and Turkey, as listed in Table 2.1, were processed to obtain Fourier acceleration spectra (FA). Relevant information and parameters as listed in the time series data files including site conditions (rock or soil), coordinates, focal depth, magnitude, etc., were retrieved routinely from record to record for each region. In addition, other sources were searched for supplementary parameters as required (as for example, focal depths for events in Turkey).

A signal window was defined by an energy criterion, which contains approximately 5% to 90% of the total cumulative energy in the whole time history for each record. This window characterizes overwhelmingly the main shear-wave energy in the signal, and is thus called the S window. It is illustrated in Figures 3.1a and 3.1b for a horizontal and vertical component respectively. The cumulative energy in a selected record, E , is approximately described by

$$E \propto \sum_{i=1}^n V_i^2 \quad (3.1)$$

where V is the velocity amplitude of the i th sample of the record. Because our records are acceleration time series, we base the S-window on squared acceleration amplitudes instead of velocity.

A similar S window was applied to the data sets for California, BC, and ENA to estimate the Fourier spectra. The S window may contain all significant shear phases including S, such as the direct arrival of S wave at near distances, S_m , the Moho reflections and the internal crustal interfaces at greater distances, as well as S_n and L_g phases at distances of several hundred km. A “snapshot” of the overall shear-wave spectrum is obtained by consistently including all discernable S phases.

Digital acceleration time series may require baseline corrections to remove any trends that may bias the long period spectrum. In particular, when dc offsets occur in the time series, the S window appears to contain much more long-period energy, lifting the low-frequency spectral levels by this noise signal. Therefore, the overall offsets, if any, were routinely removed from the time series records. Digital acceleration spectra are generally insensitive to the method of baseline correction.

3.1.2 Calculations of Fourier acceleration

The FORTRAN FFT subroutine of Boore (1996) was implemented to compute the Fourier acceleration spectrum (FA) for all records including horizontal and vertical components, for the S-window as described above. Beyond the two ends of the S window for each of the recordings, a certain number of zeros were packed for filling an integral number of data points to the next-highest power of 2, which is required for the FFT manipulations. The resulting acceleration spectra were logarithmically averaged over frequency intervals of 0.1 log units to tabulate FA for each record at $\log f = -1.0, -0.9, \dots, 1.7$ Hz (from $f = 0.1$ Hz to $f = 50$ Hz).

In California, B.C, and ENA, the frequency intervals used to tabulate results were different from those used for Japan, Mexico, and Turkey, i.e., $dfl \neq 0.1$ log units. The lowest (low-cut) frequencies for the regions, $fl1$ (log units) are also somewhat different. For these regions, linear interpolation was used as required to obtain the FA values at the desired frequency points. Table 3.1 summarizes the Fourier spectrum databases available for all the six regions.

Table 3.1 Available records of the Fourier acceleration spectra and their frequency intervals in log units. The FFT files for California, B.C, and ENA are from Atkinson (personal communication).

Region	fl1 (log units)	dfl (log units)	# of records	
			H comp.	V comp.
Japan	-1.0	0.1	2624	1312
Mexico	-1.0	0.1	798	399
Turkey	-1.0	0.1	568	284
California	-1.0	0.15	1204	0
B.C.	-0.2	0.1	0	832
ENA	-0.3	0.12	0	1761

3.2 Fourier acceleration databases

As part of the thesis objectives, the Fourier acceleration spectra databases were established for Japan, Mexico, and Turkey. For each component of each acceleration recording (3-D), the database file contains two lines (in terms of computer language):

- 1) A header line which includes file name, event (year, month, day), magnitude, magnitude type, station, component, epicentral distance, focal depth, and site condition (rock or soil, if any), where the distance and depth are in log units.

- 2) The 28 points of acceleration spectral amplitudes in log-units with frequency intervals of 0.1 log units.

Missing pieces of information are assigned a flag number of 9.99 or 99.99.

The final FA results for all acceleration recordings of Japan, Mexico, and Turkey, as shown in Table 3.1, were summarized within the frequency range from 0.1 Hz to 20 Hz in Appendix 4 (disk #1 attached to this thesis).

The previous FFT results for California, B.C, and ENA are also included in the appendixes and were used for further source spectral analyses in the following chapters. These three databases are extracted from Atkinson and Silva (1997) (California), Atkinson (1995) (B.C.), and Atkinson and Mereu (1992) (ENA). Conversions of FFT results between H and V components for the three regions are carried out in this study (see next chapter).

3.3 Analysis of results

A set of sample acceleration spectra randomly picked from the databases, showing typical records at different magnitude levels and distances (within 100 km), for each region of Japan, Mexico, Turkey, and California is shown on Figure 3.2. These spectra have been corrected for geometrical spreading through a multiplication by R, which adjusts the vertical level of the spectra but does not change their shape.

In general, amplitudes tend to decay rapidly above about 20 Hz (due to anelastic attenuation). Low-frequency amplitudes may not be reliable for some of the small-to-moderate events due to noise problems. The appropriate low frequency cut-off appears to be 0.2 to 0.3 Hz for most records in Japan, Mexico, Turkey, and California. For B.C. and ENA the low-cut frequency is about 0.5 to 0.6 Hz (these were recorded on short-period seismometers).

The FA databases were summarized in the form of log average FA values at the specified log intervals as shown in Table 3.1. The log average spectra are reasonably stable, which is well demonstrated by comparing them with both the unsmoothed FFT results and 3-point smoothed spectra (Figures 3.3 to 3.6). The 3-point smoothed spectra are based on a weighted-average over every three points (except the first and last point, where a two-point weighted average applies).

The log-average spectra are very stable, compared to both the 3-point smoothed and unsmoothed, giving a useful view on the overall spectral behaviour, including appropriate cut frequencies at the low and high frequency portions of the spectrum. The slope changes of spectral amplitude with frequency suggest the appropriate low- and high-cut frequency. A range of about 0.2 to 0.5 Hz for the low-cut frequency and approximately 10 to 20 Hz for the high-cut frequency are suggested from Figures 3.3 to 3.6. As a generalization, the spectra are reliable in the approximate frequency range from 0.5 to 10 Hz.

3.4 Recommendation on Strong motion data formatting

Strong motion data (SMD) are very useful for both theoretical and engineering seismologists. If an internationally standardized format in data acquisition, editing or collections could be used, it would be much more convenient for the end users. The current practice appears that most of the SMD collections contain two parts in a file: the header and the body of digital recordings. The header information could be better compiled with certain standards. These may include, for example, what information should be contained in the header, how many records (lines) the information should be written on (i.e., the length of the header), how many parameters should be written on each record, and the rules to make up a file name, the length of file names, etc.. The body of the file should consistently contain all the 3-component records in one file or consistently separate them as different files. These criteria should be able to be well regulated from data standardization viewpoints. SMD formatting is a major concern at the present time, as it involves a huge amount of data compiling or editing work. There are no accepted standards for SMD formats, and many pieces of information are not routinely included in the data files. This limits the usefulness of these data to researchers wishing to undertake broadly-based studies.

Fig. 3.1a S window of H component

Fig. 3.1b S window of V component

Figure 3.2 Regional FA samples: corrected for geometrical spreading (1/R).

- Japan: 022198, 5.0JMA, GNM006, R=91km
- Japan: 021098, 4.3JMA, AIC002, R=50km
- Mexico: 011197, 7.3Me, CALE, R=21km
- Mexico: 071596, 6.5Me, PAPN, R=26km
- Turkey: 081976, 5.0Ms, DNZ\+L, R=26km
- Turkey: 100395, 4.3ML, DIN\+L, R=37km
- California: 072152, 7.4M, KERN\TAF111, R=41km
- California: 062866, 6.1M, PARKF\C02065, R=1km

Figure 3.3 FACCN sample spectrum, 00I0986a.dnz: log-average vs unsmoothed and smoothed spectrum

Figure 3.4 FACCN sample spectrum, 00t0986a.dnz: log-average vs unsmoothed and smoothed spectrum

Figure 3.5 FACCN sample spectrum, 0812756a.hty: log-average vs unsmoothed and smoothed spectrum

Figure 3.6 FACCN sample spectrum, 08t2756a.hty: log-average vs unsmoothed and smoothed spectrum

Chapter 4

Method of determining source spectra and regional models

4.1 A perspective

The ground motion signal recorded at a seismic station on the Earth's surface differs considerably in amplitude, frequency content and overall appearance from the seismic signal that originated at the source. This is because the recorded ground motions are a combined system response which is comprised of many response “filters”, or transfer functions (e.g., Lay and Wallace, 1995; Scherbaum, 1994), describing wave propagation from the source to the site.

We can generally categorize the transfer functions as source, path and site effects. The propagation (path) filter is the most complex filter in seismic waveform modeling. This function accounts for all propagation effects such as geometric spreading, anelastic attenuation and scattering ($1/Q$), reflections/refractions, and diffractions. Some of these factors, such as geometric spreading, or scattering and absorption, can be considered as distance (R) and/or frequency dependent (Chin and Aki, 1991). Path effects due to crustal velocity and Q structure, Moho reflections, source depth and focal mechanism have been taken into account individually in various studies (Ou and Herrmann, 1990; Burger et al., 1987; Frankel et al., 1990; Pezzo et al., 1995; Hatzidimitriou, 1995). However there is no generally preferred or consensus approach to the simulation of overall path effects on

ground motions. Site effects are also much more complex than most seismologists have considered (Chin and Aki, 1991), particularly in shallow surface soil sites, where the travel time in the shallow thin layer(s) can not be ignored. Many publications emphasize some particular aspect of path and/or site effects in a specific area, while systematic, integrated and broadly-based research is undoubtedly needed.

Current research interests mostly relate to local or regional scales. Global consideration of source, path, and site effects is a useful complement to locally-based studies, and provides much-needed context.

This study proceeded with the source spectral analyses over the six tectonic regions, i.e., Japan, Mexico, Turkey, California, and British Columbia (B.C.), and eastern North America (ENA). The observed Fourier acceleration spectra were corrected systematically for geometric spreading, anelastic scattering, high-frequency attenuation (κ), and crustal amplifications, including near-surface generic rock/soil amplifications as described in the following chapters. The physical parameters of the Earth's crust over the regions have been carefully studied to obtain reasonable estimates of the effects of regional crust on apparent source spectra. It is a difficult task to clearly separate path, site and source effects on the spectrum. For example, the attenuation parameter κ may be attributed to site effects ($f_{\max}$, Hanks, 1982), source processes (Papageorgiou and Aki, 1983a), or both (see Atkinson, 1996; Humphrey and Anderson, 1992). It is hardly possible to get all necessary information on site conditions for every single station over such a large span of tectonic regions studied, even though local soil

amplification could be a significant effect. However, by correcting for crustal amplification via a generic rock/soil profile approach (Boore and Joyner, 1997), it may not be necessary to specify the details of the site soil conditions. We accept that a simplified approach to path and site effects will result in random errors in the apparent source spectra, which will be manifested by large variability. This may limit our ability to discriminate amongst competing hypotheses.

The horizontal-to-vertical spectral ratio (H/V) should provide useful information on regional site effects. It may be a simple, but stable, indicator of the overall site effects (Theodulidis et al., 1996). Yuncha and Luzon (2000) demonstrated that the H/V ratio works well in sedimentary basins if no strong impedance contrast exist. The agreement between the observed H/V ratio and the theoretical amplification function suggests that the H/V ratio may indeed be largely explained by amplification of horizontal-component motions in the near-surface velocity gradient (Atkinson and Cassidy, 2000), thus providing an estimate of site effects. The H/V spectral ratios will thus be helpful in identifying rock/soil site classes, especially for Japan, Mexico, and Turkey, where such data are not always available. Some interesting publications on H/V ratio are available for ENA and western Canada (Atkinson, 1993a; Atkinson and Boore, 1997; Atkinson and Cassidy, 2000), as well as for California (Theodulidis et al., 1996). The Fourier spectral data of B.C. and eastern Canada provided by Atkinson are largely from vertical components. To convert them to horizontal components, the H/V ratios obtained in the two areas (cf. Atkinson and Cassidy, 2000; Atkinson, 1993a) were applied to each case accordingly.

For sake of convenient reference, Fourier spectra corrected only for regional attenuation (geometric spreading and Q) to $R = 1$ km (no crustal or near-surface site amplification corrections) will be referred to as “1-km spectra” or “R1 spectra”, while spectra that are completely corrected, for geometric spreading, κ and anelastic attenuation, as well as crustal/ near-surface amplifications, will be referred to as apparent source spectra, or simply source spectra (for hard rock sites). Apparent source spectra will be developed in Chapter 7, after a detailed study on site effects in Chapter 6. Chapter 5 will focus on R1 spectra. This study was restricted to records within 100 km of the source. For these records the direct-S wave is generally dominant, simplifying the treatment of path effects to a correction for geometric spreading of body waves ($1/R$) and anelastic attenuation (Q).

One of the important applications of the study of R1 spectra is to define a new magnitude scale m_1 , which is analogous to m_{hf} (Atkinson and Hanks, 1995), but describes 1-Hz spectral amplitudes rather than high-frequency amplitudes (see Chapter 5). This scale is developed from the R1 spectra as described in this chapter.

4.2 Source spectral models

There have been several source models of the acceleration spectrum proposed for earthquakes of moderate-to-large magnitudes (e.g., Atkinson and Boore, 1998, review many of these). These models are referred to as “apparent source spectra” or “effective

source spectra” because they are descriptions based on far-field observations, which do not represent physical models of source processes. They are phenomenological models of the effect that the source processes have on ground motions observed at sites on the Earth’s surface, far removed from the source processes.

The typical Brune (1970, 1971) acceleration spectrum (horizontal component) near the source in terms of moment magnitude and stress drop is given by (Boore, 1983)

$$A(f) = CM_0(2\pi f)^2 S(f) \quad (4.1)$$

in which M_0 is seismic moment, and $S(f) = 1/[1+(f/f_0)^2]$ is the displacement source spectrum. The constant C is given by $C = \mathfrak{R}_p P_f F_s / (4\pi R \rho \beta^3)$, where $\mathfrak{R}_p$ is the radiation pattern ($= 0.55$ for S waves), P_f the partition factor onto two horizontal components ($= 1/\sqrt{2}$), F_s the free surface amplification ($= 2$), R the hypocentral distance, ρ the density, and f_0 , the source corner frequency, is given by

$$f_0 = 4.9 \times 10^6 \beta (\Delta\sigma/M_0)^{1/3} \quad (4.2)$$

for M_0 in dyne-cm, β (shear-wave velocity) in km/s, and $\Delta\sigma$ is the stress drop in bars.

The ω^{-2} model (Brune model) spectrum of radiated energy is attenuated by the high frequency decay parameter kappa (κ), which is the decay slope of the Fourier

spectrum of acceleration at near-source distance (Anderson and Hough, 1984; Anderson, 1986). Equation 4.1 is thus modified to

$$A(f) = CM_o(2\pi f)^2 e^{-\pi\kappa f} / [1 + (f/f_o)^2] \quad (4.3)$$

by Humphrey and Anderson (1992,1994).

Combining the kappa attenuation with other factors such as geometric spreading, anelastic scattering, and crustal amplification, we can write equation 4.1 in an even more general form

$$A(f) = CM_o(2\pi f)^2 S(f) R^{-1} e^{-\pi\kappa f} e^{-\gamma R} X_{\text{crust}} \quad (4.4)$$

in which $\gamma = (\pi f)/(Q\beta)$, where $Q = Q_o f^\eta$, and X_{crust} is crustal amplification (see later discussion in this chapter). The Q factor (regional quality factor) is proportional to a fractional power η of frequency f , Q_o is a reference value (e.g., Nuttli, 1986). Usually we have $0 \leq \eta \leq 1$; there is, however, an example of $\eta > 1$ (e.g., $\eta = 1.01$, see Castro and Munguia, 1993; Castro et al., 1995).

The source spectra, $S(f)$, need not always be described by the single-corner-frequency Brune (1970, 1971) model (B70). It may in general involve one or two corner frequencies (f_a , f_b) and a relative weighting parameter ϵ , where $0 \leq \epsilon \leq 1$.

The two-corner model can be written (Atkinson, 1993b):

$$A_o(f) = C (2\pi f)^2 M_o \{ (1 - \epsilon) / [1 + (f/f_a)^2] + \epsilon / [1 + (f/f_b)^2] \} \quad (4.5)$$

where the constant C and moment M_o were described in equation 4.1, f_a is the low-corner frequency, and f_b is the frequency at which the spectrum attains $1/2$ of the high-frequency amplitude level. For $\epsilon = 1$, a two-corner model is identical to the Brune single-corner model (e.g., Atkinson and Boore, 1998; Atkinson, 1993b).

Boatwright and Choy (1992) (BC92) used teleseismic data to derive an empirical model for the source spectra of large intraplate earthquakes, characterized by two corner frequencies, which was presented as an ENA source model.

Atkinson and Silva (2000) (AS00) developed a 2-corner source model based on finite-fault modeling, and showed that it matched California strong-motion data. Figure 4.1 compares the Brune (B70) and two-corner (AS00) models. The two-corner model converges with the Brune model for $M = 4.0$. For larger magnitudes, it features lower amplitudes at intermediate-to-low frequencies relative to those implied by the Brune model. The two-corner model provides a demonstrably better description of California strong-motion data at large magnitudes than does the Brune model (Atkinson and Silva, 2000). The two-corner model is also a better fit to the source spectra of large historical earthquake in southeastern Canada (Atkinson and Chen, 1997).

In developing the two-corner source spectrum model, finite-fault simulations were used to define the shape and amplitude level of the radiated spectrum at near-fault distances, as a function of moment magnitude ($\mathbf{M}$). The spectra from the simulations were then used to determine the parameters f_a , f_b , and ϵ of equation 4.5. The finite-fault simulation method has been described by Schneider et al. (1993) and Beresnev and Atkinson (1997, 1998). An earthquake fault is modeled as a plane whose length and width are determined by an empirical relationship based on past earthquake dimensions (e.g., Wells and Coppersmith, 1994). The earthquake fault is discretized as an array of subfaults, each of which is modeled as a stochastic ω^2 point source (i.e., the subsources are Brune (1970, 1971) point sources). The time history at an observation point is obtained by summing the contributions from all subfaults. The size of the subfaults controls the spectral shape at intermediate frequencies. The optimal subfault size is related to earthquake magnitude (Beresnev and Atkinson, 1999). The number of subfaults to be summed is fixed by the constraint that the total seismic moment must equal the target moment for the total fault dimensions (Atkinson and Silva, 2000).

The spectra described by either the one-corner or two-corner source model attenuate with distance from the radiation source due to the combination of geometric attenuation and anelastic attenuation (path effects). Figure 4.2 illustrates these effects by plotting the spectral shapes for $\mathbf{M} = 5$ at $R = 10$ km, 100 km, and 500 km, respectively, for two regions (California and ENA). For this illustration, $1/R$ geometric spreading is assumed at all distances. In reality, however, geometric attenuation becomes complicated at distances greater than 100 km, due to multiple reflections and refractions. Hence the

distances from source are restricted to $R < 100$ km for source spectral analyses in this study.

4.3 Regional model parameters

4.3.1 Introduction

Existing regional models can be used to describe all parameters in equation 4.4, except the source spectra ($S(f)$). We may summarize these regional parameters into three broad categories: (source) material constants, regional path properties, and local site properties, though there is some overlap between these. A tentative search, investigation, and careful analysis of the parameters of equation 4.4 was carried out over all the six regions studied to provide the necessary information on these parameters, so that we might isolate source effects ($S(f)$) to the maximum degree possible.

4.3.2 Material constants

The material properties β and ρ represent shear wave velocity and density in the near-source region. Table 4.1 summarizes these and other parameters used for the regions.

The study events are mainly crustal earthquakes, in particular for California and ENA (entirely crustal earthquakes) (see description in Section 2.3.3). Though there are

deeper events included in the databases for the subduction zones of Japan, Mexico, B.C., and the complex tectonic zone of Turkey (subduction/transform), the percentage of crustal events is always high when the restriction $R < 100$ km applies because this limitation will exclude some deep earthquakes. (Recall that the $R < 100$ km restriction is applied in order to simplify the treatment of path effects.) Under this restriction on distance, only a very limited number of deeper events are used, and the depth effects are therefore not large for the data sets (see Chapter 7). Thus the source material parameters β and ρ at midcrustal depths represent an overall average for the study events.

Six representative crustal models were examined for Japan in order to assess β and ρ (Figure 4.3; also see Sato et al., 1998a: Tables 4_HNG, 7_LS, 8_SND, 9_Y1&Y2, 10_LK; 1998b: Table 3_GIF). The average values of β and ρ for Mexico were obtained based on five crustal models, including the values employed by others (Figure 4.4; Humphrey and Anderson, 1992, 1994; Castro et al., 1995; Valdes et al., 1986; also see Anderson's velocity model on his web site: Zeng/Guerrero/blind.html). The Turkish crustal models are mainly referred to its adjacent areas (Figure 4.5), where a similar tectonic background appears to be a reasonable basis for doing so. Three of the models were considered for an average P wave velocity (α) (Gallart et al., 1995; Kutas et al., 1998; Hatzfeld et al., 1997), while β was converted assuming $\alpha/\beta = \sqrt{3}$ (implying Poisson's ratio of 0.25). The corresponding source density ρ for Turkey was derived using an empirical relationship from α (e.g., Christensen and Mooney, 1995; Christensen, 1996) because of the lack of density information in the region. For the rest of the regions such as California, B.C. (western Canada) and eastern Canada (ENA), the values of β and

ρ are mainly optimized from the existing and most recent regional literature after a careful examination (see Table 4.1).

Table 4.1 Summary of regional model parameters

Region	β (km/s) (mid-crust)	ρ (g/cm ³) (mid-crust)	κ value	Q function (whole path)
Japan	3.6	2.8	0.035	$Q = 130f^{0.7}$ ⁺
Mexico	3.6	2.8	0.035	$Q = 278f^{0.92}$ ⁺⁺
Turkey	3.5	2.8	0.035	$Q = 88f^{0.9}$ [⊕]
California	3.5 ^x	2.8 ^x	0.035 ^x	$Q = 180f^{0.45}$ [*]
B.C.	3.7	2.8	0.011 [⊗]	$Q = 380f^{0.39}$ ^{**}
(ENA	3.8 [†]	2.8 [†]	0.002 [*]	$Q = 680f^{0.36}$ [‡]

+ Kinoshita (1994); ++ Castro et al. (1990); ⊕ this Q function is referred to data from neighboring region Greece (Margaris and Boore, 1998); * Raoof et al. (1999); x Boore and Joyner (1997); ** Atkinson (1995); ⊗ Atkinson (1996); ‡ Atkinson and Boore (1995); † typical source property parameters for eastern North America (e.g., Atkinson and Boore, 1995; Atkinson and Hanks, 1995).

4.3.3 Regional path properties

4.3.3.1 General remarks

Path properties involve the frequency-dependent Q structure of the crust, geometric spreading from source to site, and duration of ground motions. The duration plays an important role in predictive ground-motion relations derived from a stochastic model (Boore, 1983), and has long been discussed for determination of the peak ground motions and response spectral amplitudes for a given Fourier spectrum (e.g., Herrmann, 1985; Boatwright and Choy, 1992; Atkinson, 1993a, 1995; Atkinson and Boore, 1995, 1998). In this section, duration will be discussed for completeness, but it is not directly related to the separation of source, path and site effects on Fourier spectra.

The magnitude of path-effect corrections required increases with distance. To minimize the importance of path corrections (and their complexity), only data recorded within 100 km of the earthquake source are considered, for which the spectra are dominated by direct-wave arrivals and the geometrical-spreading correction is therefore simple.

4.3.3.2 Geometric spreading

The amplitude of a wave from a point source in a homogeneous elastic medium falls off with distance as the seismic energy is spread out uniformly over the area of the spherical wavefront in wave transmission. The energy per unit area of the wavefront depends on the refraction of the rays. Refraction causes focusing of the rays and distorts the wavefront to be nonspheric, as is the case in heterogeneous and anisotropic media of the Earth (Gubbins, 1990; Aki and Richards, 1980).

A simple model of R^{-1} for geometrical spreading was adopted for all the six regions. This is justified by the distance restriction of the data to $R \leq 100$ km, for which body-wave spreading generally applies (e.g., Burger et al., 1987). The appropriateness of the attenuation used is verified by showing that there is no distance-dependence of the implied source spectra after corrections for geometric spreading and anelastic attenuation (Section 4.4).

4.3.3.3 Q models

Q is the quality factor describing regional anelastic attenuation. $1/Q$ measures the attenuation character of scattering media of the Earth. This has constituted a special topic of seismic wave propagation and scattering in the heterogeneous media (see Sato and Fehler, 1998). The effect of Q on recorded spectra is given in equation 4.4 as $e^{-[\pi f R / (\beta Q(f))]}$, where Q is in general frequency-dependent, given as $Q(f) = Q_0 f^\eta$. The Q models for the study regions are shown in Table 4.1. These models have been well established individually for the regions based on empirical analyses (e.g., Kinoshita, 1994; Castro et al., 1990; Margaris and Boore, 1998; Atkinson, 1995, 1996; Atkinson and Boore, 1995, 1998; Raoof et al., 1999). Due to the lack of a Q model for Turkey, a reference model was employed from its neighboring region of Greece (Margaris and Boore, 1998). The maximum frequency range from about 0.2 Hz (or 0.5 Hz for B.C. and ENA) to 20 Hz for this study does not require significant extrapolation of any of the Q models.

4.3.3.4 Duration

The duration of S-wave envelopes are found to be larger than the source duration at larger distances, due to the scattering characteristics of wave propagation with increasing distance (e.g., Sato, 1989; Toro and McGuire, 1987; EPRI, 1988). The duration of the shear-wave phases is generally represented as $T = T_o + bR$. T_o is the source duration, estimated from the Brune corner frequency as $1/f_o$, or $1/(2f_a)$, where f_a is the lower corner frequency in the two-corner frequency source spectrum (see Boatwright and Choy, 1992). The second term (bR) describes the increase of duration with distance due to the effects of dispersion and scattering (typically, $b = 0.05$). Therefore, its specific expression is often given by, for example (e.g., Herrmann, 1985; Atkinson, 1993a, 1995; Atkinson and Boore, 1995, 1998)

$$T = 1/f_o + 0.05R \quad (4.6)$$

The duration estimate is required only for time domain parameters such as peak amplitudes or response spectra, whereas for Fourier spectra, there is no need to consider the effects of duration explicitly.

4.3.4 Site properties

4.3.4.1 Crustal amplification

In contrast to the attenuation effects associated with regional geometric spreading, Q structure, and site kappa, the frequency-dependent crustal amplification is a factor that enlarges the spectral amplitudes observed at sites. Fourier acceleration spectra calculated from strong motion records reflect the combined effects of attenuation and amplification. To separate the source spectra from the path and site responses, both of these effects must be removed from the Fourier spectra. Crustal amplifications for generic rock/soil sites are dependent on the shear wave velocity and density profiles as functions of depth. The product of the velocity and density ($\beta\rho$) describes a physical property of the impedance of crustal material; interfaces (boundaries) between layers constitute impedance contrasts. When there are sharp changes in impedance properties (e.g., rock/soil interface), the seismic wave amplitude may be greatly amplified at certain frequencies by resonance effects, with the resonant frequency being dependent on the depth of the soil layer. We do not deal with resonance effects in this work, as they are very site specific.

In the more general case, the crustal amplification from a gradual change in seismic impedance can be estimated using the quarter-wavelength approximation method (Boore and Joyner, 1997; Boore, 1996). The amplification X_{crust} in equation 4.4 is given by

$$X_{\text{crust}}(f) = \sqrt{\rho_s \beta_s / \bar{\rho}(z) \bar{\beta}(z)} \quad (4.7)$$

where the subscript s represents values in the vicinity of the source, and $\bar{\rho}(z)$ and $\bar{\beta}(z)$ are the time-averaged values of ρ and β over a depth corresponding to a quarter wavelength.

The quarter wavelength principle describes the frequency-dependent nature of the impedance phenomenon. Aki (1988), Singh et al. (1988), and Takahashi and Hirano (1941) derived a relationship between the wave amplitude and the seismic impedance for vertically propagating harmonic waves in the frequency domain. For a particular frequency, the amplification is given by the square root of the ratio between the seismic impedance averaged over a depth corresponding to a quarter wavelength, and the seismic impedance at the depth of the source. This method was introduced by Joyner et al. (1981). Some theoretical justification has been advanced by Day (1996). It does not produce the peaks and valleys in the response that are due to the interference of multiply reflected waves, and the approximation is relatively insensitive to discontinuities of seismic velocity. Boore and Joyner (1997) argue that the lack of consideration of resonant effects is an advantage for a smoothed regional amplification function.

The crustal amplification coefficients, as functions of frequency, for Japan, Mexico, and Turkey, were calculated based on the quarter-wavelength method (Figures 4.6- 4.8), using the program of Boore (1996). Various optimized crustal models (Figures 4.3- 4.5) were used, while the frequency-dependent amplifications are averages for generic rock or soil generic sites. Crustal amplifications are significant only when velocity gradients exist in the top several kilometers of depth. In Turkey, for example,

velocity model 3 would imply almost no amplifications, because of its oversimplified two-layered crust (Figures 4.5 and 4.8) (no resolution of upper crustal structure). In this case, the amplification corresponding to the more realistic model 1 was used for Turkey. For California, ENA and B.C., the amplification factors (Boore and Joyner, 1997; Atkinson and Cassidy, 2000) are shown in Figure 4.9, in which the amplifications are based on generic rock profiles with near-surface $\beta = 600$ m/s, 2900 m/s, and 1500 m/s, respectively.

These theoretical amplification functions and their large variability, show the importance of crustal amplifications on recorded ground motions. I will return to this topic in more detail in next chapter.

4.3.4.2 Kappa values

Anelastic attenuation has a major influence on the high-frequency portion of the spectrum. Kappa is a robust parameter for estimating the effects of near-surface attenuation in ground motion simulations. Anderson and Hough (1984) suggested that, for frequencies above the corner frequency, the acceleration spectrum could be approximated by an exponential decay function of $e^{-\pi\kappa f}$, where κ (kappa) is the spectral decay parameter. This decay parameter is most likely controlled by the near-surface attenuation (Hough et al., 1988), although a source origin has also been proposed (Papageorgiou and Aki, 1983a).

Anderson (1991) characterizes κ as the sum of a site-dependent term and a distance-dependent variable increasing smoothly from an initial value of zero, i.e.,

$$\kappa(r, S) = \kappa_0(S) + \kappa(r) \quad (4.8)$$

where r is epicentral distance, S the site. Different techniques for the estimation of κ yield similar results (e.g., Humphrey and Anderson, 1992; Singh et al., 1989; Anderson and Hough, 1984, among others). In this study we are really interested only in κ_0 , since distance-dependent attenuation is modeled with the Q factor. Margaritis and Boore (1998) also used κ_0 , instead of κ , for the decay function of $e^{-\pi\kappa f}$. Therefore the use of κ in this thesis really refers to κ_0 , and I use the symbols interchangeably.

A general approach to estimate κ_0 is a linear regression - fitting the trend of the near-source Fourier-amplitude spectrum versus frequency, for frequencies above the corner (spectral shapes can be referred to in Figures 3.3 to 3.6). In Anderson and Hough's (1984) terminology, the absolute value of the slopes of the fitted lines, divided by π , is the parameter κ , i.e.

$$\kappa_i(r, S) = \text{abs}(\text{slope}(i)) / \pi \quad (4.9)$$

where the subscript i represents station number. Margaritis and Boore (1998) used Anderson and Hough's procedure to adjust κ to κ_0 by correcting the measured κ for the effect of the site amplification and whole-path attenuation (a difference in κ from that of

a model spectrum was used in fact). The same general approach is used in this study. I first correct the observed spectra for distance-dependent attenuation, and then do a linear fit to get the kappa value for each site from the R1 spectra ($\kappa_0 = \text{abs}(\text{slope})/\pi$ applies). Note that no corrections are made to account for the frequency-dependent crustal amplification effects. This may result in some inaccuracies in the assessed kappa values, particularly for the horizontal component, which will be addressed later. Each component for both the horizontal and vertical data sets of Japan, Mexico and Turkey was considered separately. According to Su et al. (1996), the distance-dependent term $\kappa(r)$ in equation 4.8 is actually related to $1/Q\beta$, which we have considered as a separate factor in Q models (see equation 4.4 and Section 4.3.3.3).

From vertical recordings, the average κ values are respectively 0.034, 0.041, and 0.040 for Japan, Mexico, and Turkey; while from horizontal recordings they are respectively 0.033, 0.044, and an exceptional high value of 0.083 (almost double typical values). The Turkey results are similar to those of Margaris and Boore (1998) for Turkey's neighboring region Greece, where κ and κ_0 varies individually from 0.034 to 0.075 and 0.035 to 0.076 over 10 sites. Their average κ_0 values of 0.035, 0.05 and 0.06 are approximately corresponding to the site classes A, B (rock) and C (soil or soft rock), but it is not yet conclusive (Boore et al., 1993). Note that for some events recorded under certain conditions kappa values of the vertical component may be smaller than the kappa values of the horizontal component. This will be discussed further in Chapter 7.

The adopted kappa values for all the six regions are shown in Table 4.1. We simply take an average kappa value of 0.035 for Japan, Mexico and Turkey, to be consistent with that applied to California (Atkinson and Silva, 1997) and in overall agreement with the results above. In eastern Canada (ENA), for hard rock sites, there is little near-surface attenuation and thus the kappa value is very small (0.002), while in western Canada $\kappa = 0.011$ (Atkinson, 1996).

The lowest kappa value is corresponding to the hard ENA sites in a stable intraplate environment, while in active tectonic environments such as the subduction zones of Japan, Mexico, and B.C., the continental transform zones (California) or the complex subduction/transform zones like Turkey, the kappa values are generally high. An intermediate kappa value (0.011) for B.C., is likely due to the intermediate values of near-surface shear-wave velocity for rock sites in this region (1.5 km/s for B.C., compared to 2.8 km/s for ENA, and 600 m/s for California). Physically, high kappa indicates high attenuation. This characteristic is generally comparable to the $1/Q$ factors in the corresponding regions, where high Q (low attenuation) is associated with the stable tectonic units (ENA) and low Q (high attenuation) is related to the active tectonic environments (the subduction and transform zones).

4.3.4.3 Other input parameters

Other parameters needed to isolate the source from recorded motions include the average value of the radiation pattern, $\mathfrak{R}_p$, the partition factor, P_f , and the free surface

factor, F_s of equation 4.4. These parameters act as a scaling factor of the radiated source spectrum via the constant C , combined with hypocentral distance R and the source properties β and ρ (see equations 4.1 through 4.4). They were taken as constant over all the regions. Adopted values are $\mathfrak{R}_p = 0.55$, (an average for S waves), $P_f = 1/\sqrt{2}$ (0.71), and $F_s = 2$ (see Atkinson and Boore, 1995, 1998). Note that these input parameters may be given somewhat different values (e.g., Humphrey and Anderson, 1992,1994).

Figure 4.1 Comparison of the 1-corner and 2-corner source models

Figure 4.2 Attenuation of source spectra with distance ($M = 5$)

Figure 4.3 S Velocity and Density vs Depth, Japan

Figure 4.4 S Velocity and Density vs Depth, Mexico

Figure 4.5 S Velocity and Density vs Depth, Turkey

Figure 4.6 Amplification as Function of Frequency, Japan

Figure 4.7 Amplification as Function of Frequency, Mexico

Figure 4.8 Amplification as Function of Frequency, Turkey

Figure 4.9 Amplification as Function of Frequency for California, B.C. and ENA

Chapter 5

R1 spectra and magnitude scales

5.1 Introduction

The purpose of this chapter is to generalize R1 source spectra (spectra corrected for geometric and anelastic attenuation to a reference distance of 1 km) over various tectonic environments in the world, based on the large Fourier acceleration spectral database established in Chapter 3. To reach this goal, path effects must be removed, as completely as possible, from the observed Fourier acceleration spectra (FA). Comparison of the R1 spectra between regions can only be made on the basis of results derived from a standardized set of data analysis procedures. The R1 spectra represent the apparent effects of the earthquake source and any crustal or near-surface amplification effects on ground motion, once the major path effects have been removed. In subsequent chapters, the crustal and near-surface amplification effects will be removed from the R1 spectra to study apparent source spectra.

5.2 New magnitude scale m_1 and its relation to M , m_{hf} and regional magnitudes (M_{rg})

5.2.1 Introduction

Moment magnitude M (Hanks and Kanamori, 1979) is a magnitude scale based on seismic moment M_0 (see Section 4.2). It is the most useful magnitude, as it is both a spectral parameter, describing the low-frequency amplitude of the source spectrum, and a physical measure of earthquake size, related to fault area. The high frequency magnitude, m_{hf} , was defined to describe the high frequency end of the source spectrum, and thus complement M (Atkinson and Hanks, 1995). It was defined such that $m_{hf} = M$ for events of average stress drop, based on a standard Brune (1970, 1971) source model. In this section I define m_1 , as measured by the amplitude of the Fourier acceleration spectrum at near-source distances, for a frequency of 1 Hz. This frequency is intermediate to that described by M and m_{hf} . The three magnitudes (m_1 , m_{hf} , and M) will be systematically calculated for the six regions. The relation amongst magnitude scales, including the regional magnitude scales (M_{rg}), in different regions will be discussed.

The reason for defining a new magnitude scale is the desire to have a homogeneous catalog with a uniform standard magnitude measure for comparisons of the source spectra across all of the study regions. Many of the earthquakes in the strong-motion databases we used are smaller than local magnitude 5.0; the moment magnitudes are not generally available for this magnitude range. Secondly, the magnitude scales used in the various regions, such as JMA, M_L , M_b , M_S , M_C , and M_e , are not equivalent, leading

to uncertainty when comparing events across regions. We need a unified magnitude in order to discern relative differences in source spectra over different regions. In the following sections, the new scale $\mathbf{m}_1$ will be defined and its relationship to $\mathbf{M}$ and $\mathbf{m}_{\text{hf}}$ established. It will be shown that $\mathbf{m}_1$ is approximately equivalent to $\mathbf{M}$. $\mathbf{m}_1$ will be used as a magnitude scale for the earthquake events over all the regions studied. Based on this study, $\mathbf{m}_1$ may also be estimated using an empirical relationship, which will be derived from the regional magnitudes ($\mathbf{M}_{\text{rg}}$).

5.2.2 Moment magnitude

Among various magnitude scales, the moment magnitude is the only magnitude scale that does not encounter saturation problems for great earthquakes, because it is a direct measure of the size of the rupture, rather than of the recorded amplitudes of seismic waves of a given period. This is clearly manifested by its definition (Hanks and Kanamori, 1979):

$$\mathbf{M} = \log M_0 / 1.5 - 10.7 \quad (5.1)$$

The seismic moment, M_0 (dyne-cm), is related to the energy released by earthquakes. $\mathbf{M}$ is tied to M_S in level, but it will not saturate (Kanamori, 1977). Determination of M_0 is more complicated than typical magnitude measurements although modern seismic analyses are routinely providing M_0 for global events larger than $\mathbf{M} = 5.0$ (Lay and

Wallace, 1995). Note that the moment magnitude may be referred to as M_w in some publications (e.g., Kanamori, 1977; Papazachos et al. 1997; Lay and Wallace, 1995).

In this study, the moment M_o was estimated for each record, where the low-cut frequency allowed, from the long period level (Ω_o) of the displacement spectrum ($FD(f) = FA(f)/(2\pi f)^2$) using the Brune (1970,1971) model

$$\Omega_o = CM_o \quad (5.2)$$

where $C = \Re_p P_f F_s / (4\pi R \rho \beta^3)$, in which $\Re_p = 0.55$, $P_f = 0.71$, $F_s = 2$; Ω_o represents the long period level (LPL) of FD ; R is distance, ρ = density, and β = shear-wave velocity. Ω_o is estimated at a frequency near 0.2 Hz for Japan, Mexico, Turkey, and California; at about 0.6 Hz to 0.8 Hz for B.C., and about 0.5 Hz to 0.8 Hz for ENA, based on the low-cut frequencies. These frequencies are a reasonable basis to estimate Ω_o for small to moderate events, but will underestimate the low-frequency spectral level for large events. All the calculated results of $\mathbf{M}$ for each event over the six regions studied will be compared with magnitude m_l , m_{hf} , and M_{rg} later (also see Appendix 5: A, B). I refer to these estimated values of $\mathbf{M}$ by the term $\mathbf{M}_{lp}$ as they may not be entirely equivalent to $\mathbf{M}$, depending on the frequency-band limitations of the data.

5.2.3 m_l and m_{hf} scales

A high-frequency magnitude scale ($\mathbf{m}_{\text{hf}}$, or sometimes $\mathbf{m}$) was proposed by Atkinson and Hanks (1995):

$$\mathbf{m}_{\text{hf}} = 2 \log A_{\text{hf}} + 3 \quad (5.3)$$

where A_{hf} is the high-frequency level of the Fourier amplitude spectrum of acceleration (in cm/s) for the average or random horizontal component, at a hypocentral or closest fault distance of 10 km. The definition was arranged such that high-frequency levels for $\mathbf{m}_{\text{hf}} = 5$ and $\mathbf{m}_{\text{hf}} = 7$ are approximately equal to those produced by corresponding events of $\mathbf{M} = 5$ and $\mathbf{M} = 7$ for a standard Brune model with stress drop of 150 bars for ENA, or 70 bars for California, respectively.

To apply $\mathbf{m}_{\text{hf}}$ more generally to a wide range of moment magnitudes, values of $\mathbf{M}$ from 2.5 to 8.5, in magnitude intervals of 0.5, were used to define more precisely the relationship between $\mathbf{m}_{\text{hf}}$ and A_{hf} for the specified underlying standard model. This was done based on the Brune (1970, 1971) model with stress drop $\Delta\sigma = 150$ bars, $\beta = 3.8$ km/s, $\rho = 2.8 \text{ g/cm}^3$, hypocentral distance at $R = 10$ km (no crustal amplifications, corresponding to a very hard rock ENA site). A slightly refined relationship of $\mathbf{m}_{\text{hf}}$ versus $\log (A_{\text{hf}})$ (Figure 5.1) is then described by

$$\mathbf{m}_{\text{hf}} = 1.9202 \log A_{\text{hf}} + 3.0959 \quad (5.4)$$

which is approximately the same as the original definition of $\mathbf{m}_{\text{hf}}$ in equation 5.3. Differences between equations 5.3 and 5.4 are significant only at small magnitudes ($\mathbf{m} < 3.5$) or for $\mathbf{m} > 7$. Equation 5.4 allows application of the $\mathbf{m}_{\text{hf}}$ scale over a wider range of magnitudes.

Based on the same standard Brune (1970) model ($\Delta\sigma = 150$ bars, $\beta = 3.8$ km/s, $\rho = 2.8$ g/cm³), and for the same range of $\mathbf{M} = 2.5$ to 8.5, $\mathbf{m}_1$ is defined by

$$\mathbf{m}_1 = 4.4665 + 0.7817 \log A_1 + 0.1399 (\log A_1)^2 + 0.0351 (\log A_1)^3 \quad (5.5)$$

where A_1 is the Fourier spectral amplitude of acceleration at 1 Hz and $R = 10$ km. In other words, for events following the standard model, $\mathbf{m}_1 = \mathbf{M} = \mathbf{m}_{\text{hf}}$. This relationship is well demonstrated for model amplitudes in Figure 5.2. In practice, A_1 is obtained from the apparent source spectra corrected for geometric spreading and Q to $R = 10$ km. Thus

$$A_1 = 0.1 \text{ FA}_1 R e^{(\pi R/Q\beta)} \quad (5.6)$$

where FA_1 is the Fourier spectral amplitude of acceleration at 1 Hz for each station (record), R is hypocentral distance or the slant distance (e.g., California). Note that the item of frequency for $f = 1$ Hz is omitted in the corresponding exponential functions of equation 5.6.

For stable estimates of $\mathbf{m}_1$, the value of A_1 is obtained from a weighted average of the values for A in the frequency bins at 0.8, 1.0, and 1.3 Hz, using the weights $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{1}{4}$ respectively. Finally, an average $\mathbf{m}_1$ was taken based on all A_1 values (e.g., all stations) for each event.

As will be discussed in the next chapter, the vertical component of ground motion is relatively unaffected by crustal and near-surface amplification effects, which may vary regionally. To minimize such effects on inter-regional comparisons, the $\mathbf{m}_1$, $\mathbf{m}_{\text{hf}}$ and $\mathbf{M}$ are determined from vertical-component spectra.

5.2.4 Comparisons between magnitude scales

Theoretically, we have $\mathbf{m}_1 = \mathbf{m}_{\text{hf}} = \mathbf{M}$ based on the above definitions of $\mathbf{m}_1$ and $\mathbf{m}_{\text{hf}}$ (Figure 5.2), provided that the standard Brune (1970) model and applied path parameters are exactly correct. The fact is that the real source and real crust would differ from the standard model, and therefore we could not expect this relationship to hold exactly for real data. Deviations from the theoretical relationship may be indicative of deviations of source spectra from the Brune model, or of regional crustal amplification effects.

The new magnitudes $\mathbf{m}_1$ and $\mathbf{m}_{\text{hf}}$ were estimated from the R1 source spectra obtained for all events with $R \leq 100$ km within the study regions. $\mathbf{M}_{\text{lp}}$ was estimated from the long period level for the same data sets. Therefore, the scales $\mathbf{M}_{\text{lp}}$, $\mathbf{m}_1$, and $\mathbf{m}_{\text{hf}}$

represent magnitudes estimated for low, intermediate and high frequency levels, respectively. Comparisons between these magnitudes and regional magnitude scales are shown in Figures 5.3 to 5.5, where $\mathbf{m}_1$, $\mathbf{m}_{\text{hf}}$ and $\mathbf{M}_{\text{lp}}$ were in turn taken as the independent variable. All magnitude estimates plotted were restricted to events having at least 3 recordings. From these figures it is clear that the regional magnitudes track $\mathbf{m}_1$ most closely. There are regional differences in the $\mathbf{M}_{\text{rg}}\text{-}\mathbf{m}_1$ relationship, but this is expected, as the scales are not equivalent. From Figures 5.3 to 5.5 we conclude that most regional magnitude scales measure the amplitude for frequencies near 1 Hz.

Figures 5.6 – 5.8 compare the $\mathbf{m}_1$, $\mathbf{m}_{\text{hf}}$, and $\mathbf{M}_{\text{lp}}$ scales to each other. The $\mathbf{m}_1$ scale is closely related to $\mathbf{M}_{\text{lp}}$, whereas there is both large scatter and regional variability in the relationship between $\mathbf{m}_{\text{hf}}$ and $\mathbf{M}_{\text{lp}}$. Note, however, that $\mathbf{M}_{\text{lp}}$ is an unreliable measure of $\mathbf{M}$, at least for moderate-to-large events ($\mathbf{M} \geq 5$), due to the bandwidth limitations of the data.

The actual moment magnitudes ($\mathbf{M}$) were searched from the Harvard CMT catalog (CMT). They are known for all of the California events, for which the relationship $\mathbf{m}_1 = \mathbf{m}_{\text{hf}} = \mathbf{M}$ is approximately followed. For the other five regions of Japan, Mexico, Turkey, B.C., and ENA, only a few of them are available for the database in this study, due to the small magnitudes of most of the events. Figure 5.9 compares $\mathbf{M}_{\text{lp}}$ to actual $\mathbf{M}$. While $\mathbf{M}_{\text{lp}}$ approximates $\mathbf{M}$ in many cases, it appears to be an unreliable measure of $\mathbf{M}$, especially at large $\mathbf{M}$, where bandwidth limitations of the data are evident. Figure 5.10 compares $\mathbf{m}_1$ to moment magnitude $\mathbf{M}$. Unlike $\mathbf{M}_{\text{lp}}$, $\mathbf{m}_1$ appears to be a good

estimate of $\mathbf{M}$, although curvature in the apparent relationship occurs at $\mathbf{M} > 5.5$; for $\mathbf{M} > 5.5$, $\mathbf{m}_1$ underestimates $\mathbf{M}$, suggesting complexity in source spectral shape (i.e., 2-corner spectrum versus Brune spectrum). In other words, the magnitude $\mathbf{m}_1$ tracks $\mathbf{M}$ well, but there are problems with $\mathbf{M}_{lp}$ due to the bandwidth limitations of the data (we cannot define Ω_0). Therefore, the $\mathbf{m}_1$ will be used as a unified scale in this study, instead of using $\mathbf{M}_{lp}$.

The relationship between $\mathbf{m}_1$ and $\mathbf{M}$ is further explored for the Japanese data by exploiting a recent empirical relationship (Moya et al., 2000) that shows that for moderate events:

$$\text{Log } M_0 = 1.54 M_{JMA} + 15.8 \quad (5.7)$$

where M_{JMA} is the Japanese magnitude scale. This relationship is used to estimate $\mathbf{M}$ for each of the Japanese events. Figure 5.10 includes the estimated $\mathbf{M}$ values. From Figure 5.10, it is concluded that $\mathbf{m}_1$ tracks $\mathbf{M}$ well for moderate ($\mathbf{M} < 5.5$) events, but the $\mathbf{m}_1$ - $\mathbf{M}$ relationship flattens at large magnitudes. Figure 5.11 shows a quadratic relationship fitted to the $\mathbf{m}_1$ - $\mathbf{M}$ data, constrained such that $\mathbf{m}_1 = \mathbf{M}$ at $\mathbf{M} \leq 3.5$.

The relationship between $\mathbf{m}_{hf}$ and $\mathbf{M}$ is shown in Figure 5.12. Overall, $\mathbf{m}_1$ estimates appear to be closer to both the moment magnitudes and the regional magnitudes than $\mathbf{m}_{hf}$. In many cases, $\mathbf{m}_{hf}$ shows higher estimates than $\mathbf{m}_1$. This could be partly due to

the source model used, which is related to the shape of the source spectra. This will be discussed further in a later section.

Various empirical relationships between the different magnitudes will be derived here. The work is based on the above-calculated results of $\mathbf{m}_1$, $\mathbf{m}_{\text{hf}}$, and $\mathbf{M}$ over all the 6 regions studied.

Three groups of statistical relations between $\mathbf{M}$ and the new scale $\mathbf{m}_1$, $\mathbf{m}_{\text{hf}}$, as well as $\mathbf{M}_{\text{rg}}$ are respectively described as follows.

(1) $\mathbf{m}_1$ as a function of $\mathbf{M}_{\text{rg}}$ (Figure 5.13) given by

$$\mathbf{m}_1 = 0.8349\mathbf{M}_{\text{rg}} + 0.8602 \quad (5.8)$$

(2) $\mathbf{m}_{\text{hf}}$ as a function of $\mathbf{m}_1$ (Figure 5.14) given by

$$\mathbf{m}_{\text{hf}} = -0.1641\mathbf{m}_1^2 + 2.7461\mathbf{m}_1 - 3.8588 \quad (5.9)$$

and

(3) $\mathbf{m}_1$ as a function of $\mathbf{M}$ (see Figure 5.11) given by

$$\mathbf{m}_1 = -0.0314(\mathbf{M} - 5)^2 + 0.8845(\mathbf{M} - 5) + 4.9622 \quad (5.10)$$

($R^2 = 0.9769$). For this relationship, we constrained $\mathbf{m}_1 = \mathbf{M}$ for $\mathbf{M} \leq 3.5$.

In summary, $\mathbf{m}_1$ gives a good linear fit to $\mathbf{M}_{rg}$. The $\mathbf{m}_{hf}$ is a quadratic function of $\mathbf{m}_1$, possibly due to the quadratic relationship between $\mathbf{m}_1$ and $\mathbf{M}$. The values of $\mathbf{m}_1$ are in good agreement with $\mathbf{M}$ for small to medium size earthquakes ($\mathbf{M} \leq 5.5$) in general, but underestimate $\mathbf{M}$ for larger magnitudes. This is evidence of the presence of 2 corners in the source spectrum. This can be appreciated by referring to Figure 4.1, in which it can be seen that the 2-corner model predicts lower 1 Hz amplitudes than the Brune model for $\mathbf{M} > 5.5$, and thus predicts $\mathbf{m}_1 < \mathbf{M}$ for $\mathbf{M} > 5.5$. Overall, $\mathbf{m}_1$ is a stable magnitude scale. It has the advantage that it is approximately equivalent to $\mathbf{M}$, at least for moderate events, when moment information is not available.

The relationships between the magnitudes $\mathbf{M}$, $\mathbf{m}_1$ and $\mathbf{m}_{hf}$ are physically suggestive of the seismic energy distribution over different frequency bins of low, intermediate, and high frequency respectively. $\mathbf{m}_1$ is about equivalent to $\mathbf{M}$ for small to moderate earthquakes; thus we can make interregional comparisons of the relative energy distribution over a broad frequency band by comparing the $\mathbf{m}_{hf}$ vs $\mathbf{m}_1$ relations. In terms of the Brune model, $\mathbf{m}_{hf} > \mathbf{m}_1$ implies a stress drop higher than that in the standard model (150 bars for ENA model), at least for small events ($\mathbf{M} < 5.5$) for which $\mathbf{m}_1 = \mathbf{M}$.

5.3 Analysis of distance and depth dependence of results

Figure 5.15 shows the data distribution in magnitude m_l and hypocentral distance R over the study regions.

We can test the effectiveness of the attenuation correction by plotting residuals of the magnitude calculation against distance. (The residual is the difference between the magnitude estimate for an individual station and the corresponding average magnitude value for the event.) Figures 5.16 to 5.18 show, respectively, the residuals of m_l , M_{lp} and m_{hf} as a function of hypocentral distance. There is no distance-dependent trend identifiable across the regions. Note that attenuation variability is much larger at high frequencies.

Figures 5.19 – 5.21 show the residuals of m_l for depth ranges of $h = 0 - 30$ km, $30 - 60$ km, and > 60 km, respectively. There are few data points at $h > 60$ km due to the restriction of $R < 100$ km. Again, there are no apparent depth-dependent trends.

I conclude that the m_l residuals are in general independent of distance and depth, suggesting that the R^{-1} geometric spreading and Q models applied here are reasonable for the data sets. Depth effects on source spectra will be further investigated in Chapter 7.

5.4 R1 source spectra

R1 source spectra were defined in Section 4.1. Recall that the R1 spectra include any crustal and near-surface amplification effects. Both horizontal (H) and vertical (V)

R1 source spectra were computed for the six regions studied. The R1 spectra are shown against magnitude m_1 , respectively, in Figures 5.22a – 5.22d for H-component and Figures 5.23a – 5.23d for V-component. A1, A2, A5, and A10 represent the corresponding R1 spectral levels at frequencies 1 Hz, 2 Hz, 5 Hz, and 10 Hz, respectively. To plot the line corresponding to the Brune model, the relationship between m_1 and M (equation 5.10) was used to convert M to m_1 .

The plots were generally restricted to data with at least 3 stations (recordings). For completeness of the outputs, two sets of original plots (without restriction on station numbers) are also shown in Figures 5.24a – 5.24d and 5.25a – 5.25d, respectively, for H and V components. Note the greater scatter in these plots.

5.4.1 Spectral amplitude vs magnitude m_1

The spectral amplitudes A1, A2, A5 and A10 of the R1 source spectra at frequencies 1, 2, 5 and 10 Hz, described in turn as a function of m_1 , were compared with Brune's (1970, 1971) model given the standard stress drop of 150 bars (15 MPa), and hard rock conditions. The Brune model, given in terms of M , was converted to the equivalent model for m_1 , based on equation 5.10. The spectral shape and levels are generally consistent with the model for both H and V components (see Figures 5.22 to 5.25). As expected, A1 vs m_1 shows the best fit to the model and the least interregional scatter in both H and V components.

From overall comparison between the two components, vertical R1 spectra show a better fit to the model and less interregional scatter than the horizontal R1 spectra. The horizontal R1 spectra break out regional differences in the spectral amplitudes for the same magnitude range. For example, Japan and California (as soil or soft rock sites) indicate crustal/near-surface amplification in the H component that remains uncorrected; ENA, B.C., and Mexico (hard rock or rock sites) show little or no such amplification. Turkey (overall soft rock) shows an intermediate amplification that is also expected. This primary site classification implied in the R1 source spectra will be verified by the H/V ratio analysis in the next chapter.

At higher frequencies of 5 to 10 Hz, the R1 spectral levels appear to be attenuated with respect to the standard model, as shown in both H and V components. This is most likely related to the high frequency kappa effects. However, we cannot exclude the possibility of a certain degree of source attenuation as well. This will be discussed in Chapter 8.

5.4.2 Apparent difference in R1 spectra

A group of typical events with magnitude $m_1 = 5.5 \pm 0.2$ was selected to compare the regional difference in R1 spectra as functions of frequency. Figures 5.26 and 5.27 show the results for horizontal and vertical R1 spectra, respectively. There is no $m_1 > 5.0$ for the ENA data set. To make use of the results to the maximum extent possible, R1

spectra for events of $m_1 = 5.0 \pm 0.2$ were plotted in Figure 5.28 (H component) and Figure 5.29 (V component).

For the events of $m_1 = 5.0 (\pm 0.2)$, R1 spectra of both H and V components show a distinguished difference between ENA and the other five regions: ENA may suggest higher radiation than the other regions at high frequencies, as the ENA hard rock conditions undoubtedly reduce the crustal and near-surface site amplification effects. However, there are fewer records available for ENA within this group of events; and thus no firm conclusion can be made in this situation. Note the apparent influence of kappa on the spectra at high frequencies, which varies regionally.

The horizontal R1 spectra show higher spectral amplitudes, in general, than the vertical R1 spectra, which implies the presence of greater crustal and near-surface site amplifications in the horizontal component. There are apparent difference in horizontal R1 spectra that may identify regional site conditions (e.g., soil versus rock): Japan and California sites amplify H component the most (soil or soft rock conditions); Mexico and B.C. show the least amplification (hard rock sites). Turkey shows an intermediate amplification (soft rock sites) relative to the hard rock and soil conditions. Generally speaking, the apparent difference in horizontal R1 source spectra may be due to crustal amplification and site effects. Further discussion (Chapter 7 Apparent Source Spectra) will address this topic.

5.5 Conclusions and discussion

Corrections for geometric spreading and anelastic scattering were made to Fourier acceleration spectra for the six regions of Japan, Mexico, Turkey, California, B.C., and ENA. Further study on near-surface site effects and crustal amplifications, especially for soil conditions, will be carried out in Chapter 6 and applied in Chapter 7 to obtain apparent source spectra.

The R1 spectra derived here depend mainly on magnitude. It is not evident that they are influenced by distance or depth, indicating that the assumed attenuation corrections were successful in removing path effects. A primary conclusion can be drawn that the R1 spectra for H component differ between tectonic environments, which needs to be verified after the near-surface site effects and crustal amplification are fully removed. For the vertical component, there is no obvious difference in R1 spectra, implying that it is less affected by the crustal amplification and site effects.

A new magnitude scale m_1 was proposed based on the R1 spectra. The m_{hf} , initially proposed by Atkinson and Hanks (1995), was slightly adjusted to include a wide range of events for moment magnitude from $M = 2.5$ to 8.5. Empirical relations between various magnitude scales were derived, which are helpful in converting them one to another.

Figure 5.1 m_hf as function of A_hf

Figure 5.2 m1 as function of log (A1)

Figure 5.3 Mrg vs m1, derived from vertical component

Figure 5.4 Mrg vs m_hf, derived from vertical component

Figure 5.5 Mrg vs M_lp, derived from vertical component

Figure 5.6 m_{hf} vs m_1 , derived from vertical component

Figure 5.7 M_{lp} vs m_1 , derived from vertical component

Figure 5.8 m_{hf} vs M_{lp} , derived from vertical component

Figure 5.9 M_{lp} vs CMT moment mag M

Figure 5.10 m_1 vs moment mag M (CMT and the inferred M)

Figure 5.11 m_1 as a function of M (CMT)

Figure 5.12 m_{hf} vs CMT moment mag M

Figure 5.13 m1 as a function of regional magnitude Mrg, Nstn >= 3. California M values were shown but not included in the regression relationship.

Figure 5.14 m_{hf} as a function of m_1 , $N_{stn} \geq 3$.

Figure 5.15 Distribution of m1 and hypocentral distance

Figure 5.16 Residuals of m1 vs hypocentral distance

Figure 5.17 Residuals of M_{lp} vs hypocentral distance

Figure 5.18 Residuals of m_{hf} vs hypocentral distance

Figure 5.19 Residuals of m1 vs hypocentral distance, $h < 30$ km.

Figure 5.20 Residuals of m_1 vs hypocentral distance, $h = 30 - 60$ km.

Figure 5.21 Residuals of m1 vs hypocentral distance, $h > 60$ km.

Figure 5.22a Horizontal R1 spectral level A1 ($f = 1$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{strn} \geq 3$.

Figure 5.22b Horizontal R1 spectral level A2 ($f = 2$ Hz, $R = 1$ km) vs magnitude m_1 , Nstn ≥ 3 .

Figure 5.22c Horizontal R1 spectral level A5 ($f = 5$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$.

Figure 5.22d Horizontal R1 spectral level A10 ($f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$.

Figure 5.23a Vertical R1 spectral level A1 ($f = 1$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$.

Figure 5.23b Vertical R1 spectral level A2 ($f = 2 \text{ Hz}$, $R = 1 \text{ km}$) vs magnitude m_1 , $N_{\text{stn}} \geq 3$.

Figure 5.23c Vertical R1 spectral level A5 ($f = 5$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} >= 3$.

Figure 5.23d Vertical R1 spectral level A10 ($f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$.

Figure 5.24a Horizontal R1 spectral level A1 ($f = 1$ Hz, $R = 1$ km) vs magnitude m_1 , all records.

Figure 5.24b Horizontal R1 spectral level A2 ($f = 2\text{ Hz}$, $R = 1\text{ km}$) vs magnitude m_1 , all records.

Figure 5.24c Horizontal R1 spectral level A5 ($f = 5$ Hz, $R = 1$ km) vs magnitude m_1 , all records.

Figure 5.24d Horizontal R1 spectral level A10 ($f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , all records.

Figure 5.25a Vertical R1 spectral level A1 ($f = 1\text{ Hz}$, $R = 1\text{ km}$) vs magnitude m_1 , all records.

Figure 5.25b Vertical R1 spectral level A2 ($f = 2$ Hz, $R = 1$ km) vs magnitude m_1 , all records.

Figure 5.25c Vertical R1 spectral level A5 (f = 5 Hz, R = 1 km) vs magnitude m1, all records.

Figure 5.25d Vertical R1 spectral level A10 ($f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , all records.

Figure 5.26 Horizontal R1 source spectra ($R = 1$ km), $m1 = 5.5$ (± 0.2).

Figure 5.27 Vertical R1 source spectra ($R = 1$ km), $m1 = 5.5$ (± 0.2).

Figure 5.28 Horizontal R1 source spectra ($R = 1$ km), $m1 = 5.0$ (± 0.2).

Figure 5.29 Vertical R1 source spectra ($R = 1 \text{ km}$), $m1 = 5.0$ (± 0.2).

Chapter 6

Horizontal-to-vertical (H/V) spectral ratio and site effects

6.1 Introduction

Site effects on strong ground motion is an important topic in engineering seismology; it is a key factor in determining the degree of damage caused by earthquakes. Understanding site effects is also one of the key steps towards better understanding of earthquake source spectra, as observed records represent a convolution of source, path, and site effects. Site response has been extensively studied during the last two decades (e.g., Chin and Aki, 1991; Aki, 1993; Castro et al., 1995; Theodulidis et al., 1996; Carver and Hartzell, 1996; Boore and Joyner, 1997; Amirbekian and Bolt, 1998; Atkinson and Cassidy, 2000; Yuncha and Luzon, 2000).

The basic methods applied to estimate site amplification, also called ground-response functions or site-transfer functions (see Borchardt, 1970), lie in three broad categories: (i) the reference-site method, based on comparison of motions recorded on soil to those at a nearby reference rock site, (ii) the “H/V” technique, introduced by Nakamura (1989) and Lermo and Chavez-Garcia (1993), which assumes that the vertical component of ground motion is not significantly influenced by the local site conditions, so that the horizontal-to-vertical component ratio of ground motion is an estimate of the transfer function for the horizontal component; this is comparable with the receiver-

function method initially used for studying the upper mantle and crust from teleseismic records (Langston, 1979); and (iii) theoretical methods, based on propagating seismic waves through the soil.

The reference-site method is a traditional approach to studying site amplification problems. It requires a pair of instruments to be located, respectively, at the study site (generally on alluvium or soil site) and a nearby rock site; both instruments must simultaneously record the ground motion of a number of events (Borcherdt, 1970; Rogers et al., 1984; Aki, 1993). This method has some limitations in practice: 1) it is difficult to find sites on bedrock that are close enough to alluvium or soil sites; 2) outcrops of bedrock sites are usually weathered, eroded or irregularly shaped by other geological processes, and the resulting superficial velocity gradient may influence the “reference” ground motion. In addition, rock responses are variable, so that biased results may be obtained if an atypical reference rock site is selected. To overcome these shortcomings, more advanced approaches have developed in recent years.

The H/V ratio is a simple and effective indicator of site effects. As described by Lermo and Chavez-Garcia (1993), the H/V technique was first proposed by Nakamura (1989) for microtremor studies to analyze Rayleigh waves, but can be generalized to study S-wave amplifications, with both theoretical and empirical evidence supporting the approach (Siddiqi, 2000). Lermo and Chavez-Garcia’s work explained why the H/V technique is applicable to study the intense S-wave part in earthquake records, and demonstrated that site effects can be obtained using records of only one station, without

the need for a “reference” station. Their results suggest that the H/V spectral ratio evaluates an average response of a simple plane-layer stratigraphy to plane waves incident from different angles, and that site effects, on soil stations, have more importance than any effect related to the source, even in the near field.

A downhole array case study was conducted to allow for a direct comparison of the responses between the superficial layers and the underlying bedrock (Theodulidis et al. 1996). Results from this array study show a good agreement of the H/V spectral ratio shape with the actual response function. The H/V amplification estimate is in good agreement with the predictions based on the local geological structure, and is insensitive to the source location and mechanism. However, source properties may influence the absolute level of the response, which needs further study.

For rock sites in B.C., Atkinson and Cassidy (2000) showed that observed H/V ratios are very similar to the theoretical site amplification function for the horizontal component, as computed using the quarter-wavelength approach. This conclusion was also reached by Siddiqi (2000), for rock sites in various regions of Canada. Thus the use of H/V ratios to represent amplification effects is a sound approach, which I shall exploit in this work.

This chapter will focus on the relationship between the H/V ratio and amplification. Regional comparisons of H/V ratios to the theoretical amplifications

described in Chapter 4 will be made, using the Fourier spectra databases developed in Chapter 3.

6.2 Site classification

The site geological condition is an important and often complicated issue in dealing with site response computations. This is partly due to the fact that even the definitions of rock and soil may differ from different viewpoints, and different terms are often used by geologists and engineers. A traditional engineering classification of site geology gives simply a binary rock/soil classification. In anticipation of recent more refined building code classifications, new site classifications, based on the average shear-wave velocity in the upper 30 m, have been proposed by different authors: such as the A/B/C/D definition by Boore et al. (1993), the NEHRP classes (BSSC, 1994; also see Boore et al., 1997), and the Geomatrix classification (Abrahamson and Silva, 1997). Table 6.1 lists the Geomatrix site classification used in the California database. These classes are similar, but not identical, to the Boore et al. and NEHRP classifications. Approximate ranges of shear wave velocity are associated with each class, where the velocity is time-averaged over the top 30 m. Abrahamson and Silva (1997) combined the Geomatrix site classes C and D into a single deep soil site category, the Geomatrix A and B classes were combined into a single “rock” site category. The combined site classes A/B and C/D are applied to California for estimating site effects. A similar classification is used for the Japanese site conditions (Atkinson, 1999, personal communication), except we use class C for all sites with V_s in the range from 180-360 m/s, as no

information on the topography is readily available. We have added an additional class to Table 6.1; A_0 is very hard rock site conditions, as found in B.C. and ENA, with $V_s > 1500$ m/s.

Table 6.1 Site classification

Site class	Definition
A_0	Hard rock ($V_s > 1500$ m/s)
A	Rock ($V_s > 600$ m/s), or very thin soil (< 5 m) over rock
B	Shallow soil: soil 5-20 m thick over rock (V_s 360 – 600 m/s)
C	Deep soil in narrow canyon: soil > 20 m thick, canyon < 2 km wide (V_s 180 – 360 m/s)
D	Deep soil in broad canyon: soil > 20 m thick, canyon > 2 km wide (V_s 180 – 360 m/s)
E	Soft soil ($V_s < 150$ m/s)

For those regions where velocity in the top 30 m is not available, but geological information is available in the strong motion data files or from other sources, the site conditions were primarily taken as described, and further classified by the H/V ratios obtained. For example, the seismograph sites that recorded the B.C. and ENA data are known to be on hard rock, with $V_{s30} > 1500$ m/s. Mexico appears to have rock-like site conditions. In Turkey the site conditions are considered as overall soft rock, based on interpretation of site geological descriptions and readings of geological maps of the site areas (e.g., IMRE, 1961-1964).

6.3 Regional H/V ratio with respect to site amplification

6.3.1 Methodology

The H/V ratio is an important parameter for several reasons. First, it is useful for estimating horizontal component motions from vertical component records, as most older seismograph stations record only vertical component. Second, it is very useful to help classify site conditions. The regional H/V ratio reflects the near surface geologic and seismic velocity structure, and hence is a useful tool in identifying site classes when these are not available from geological information.

For Japan, Mexico and Turkey, the H/V ratios are derived for each site class using the corresponding subset of the database. Among the 578 stations in Japan, there are four site classes, grouped by A/B/C/E (Table 6.1). Mexico's 30 stations and Turkey's 50

stations might be classified as overall hard rock (A_0) and soft rock (A/B) sites, respectively. California site conditions are classified into A/B/C/D (Table 6.1). The H/V ratio was calculated as a function of frequency from the Fourier spectra for the log-averaged horizontal component and the corresponding vertical component in log units, using

$$\text{Log (H/V)} = (\log H_1 + \log H_2)/2 - \log V \quad (6.1)$$

where H_1 and H_2 represent the two horizontal components, and V is the vertical component. All these spectral components are expressed as functions of frequency, f . The H/V ratio is a stable site parameter when averaged over many events at a site, although it shows variability from event to event. When H/V ratios are averaged over all the stations of the same site class within a region, they show a stable characteristic corresponding to the site type. Information on H/V ratios in ENA and B.C. regions were extracted from Atkinson (1993a), Atkinson and Cassidy (2000), and Siddiqi (2000), respectively.

In the next section, modified generic rock/soil models are developed to explain the relationship between the H/V ratio and amplification. This justifies the application of the H/V ratio as an estimate of regional site effects.

6.3.2 Regional evaluation of H/V ratios

The computed H/V ratios for the records from all six regions are plotted in Figure 6.1, according to site category. The low H/V ratios for B.C., ENA and Mexico are consistent with their description as hard rock sites. Japan's B/C soils match well with California's A/B; the California C/D sites show larger H/V ratios at low frequency, consistent with a deeper, softer profile. In Turkey, the H/V ratio is intermediate to the California A/B class ratio and the hard rock (B.C., Mexico) ratio; thus it is best described as "soft rock". The class E sites of Japan show generally low H/V ratios, implying less amplification in the horizontal component; alternatively there may be some vertical amplification for the specific site conditions. The class A sites in Japan show a peak in H/V at high frequency (about 10 Hz), which is suggestive of a shallow soft layer over rock. For the 45 stations of the class A in the Japan data set, an average shear wave velocity over the top 30m is about 738 m/sec, with an average layer thickness (over rock) of about 10.8m.

Some general characteristics of the regional H/V ratios can be outlined as follows:

- 1) The soft sites (soil) show higher amplitudes of the H/V ratio than the hard sites (rock);
- 2) The peak frequency of the H/V ratio shifts towards lower values with increasing softness of the site conditions (such as soil); and
- 3) The H/V ratio decays at high frequencies, generally greater than 6 Hz for rock/soft rock sites while attenuation starts earlier ($f < 6$ Hz) for the softer site conditions.

These general characteristics appear to be consistent with the amplification trends that would be expected for these site conditions.

Standard deviation and 90% confidence limits are calculated for the mean H/V ratios for different site classes in the study regions (Figures 6.2.a to 6.2.j). California's H/V ratios are based on the response spectral ratios (Atkinson, personal communication), which may be slightly different from that of the Fourier spectra. Much scattering about the mean ratios exists, but the mean trends are well defined for most classes. Some classes appear to be not distinctly different from others and can be combined (e.g., California A/B), as will be described later.

6.3.3 Comparison of H/V ratio and site amplification

Boore and Joyner (1997) developed generic amplification functions for western North America (mostly California) based on the quarter-wavelength approximation. The controlling layer parameter is the seismic impedance ($\beta\rho$), the product of shear wave velocity and density, as expressed by equation 4.7 (see Section 4.3.4.1). The algorithm is based on the following:

- 1) S wave travel time as a function of depth is computed based on a shear-wave velocity profile ($S_{tt}(z)$);
- 2) The average velocity to depth, $\bar{\beta}(z)$, is then $z/S_{tt}(z)$, where the frequency is also expressed as a function of depth ($f(z) = 1/[4S_{tt}(z)]$);
- 3) The travel-time-weighted average is taken of the density, $\bar{\rho}(z)$; and
- 4) Then the amplification, $\text{Amp}(f(z))$, is expressed as a function of $f(z)$, using the square-root of the ratio between the seismic impedance at the source and that averaged over a depth corresponding to a quarter wavelength. Computations are made with the SITE_AMP program of Boore (1996). The velocity, density, and the thickness of each layer are adjustable in order to reflect different site conditions.

I used a least-squares trial technique to match the H/V ratios to plausible corresponding amplification functions by adjusting S velocity, density, and the corresponding layer thickness. The main aim of this simulation was to determine whether there is a relationship between the H/V ratio and expected amplification for typical rock and soil generic site profiles. This is actually a typical inversion problem in geophysics, in that the solution is non-unique; there may be more than one profile that will produce amplifications that match the H/V functions. What is interesting, however, is that it is indeed a new approach to use the H/V ratio to invert for subsurface structure. The aim is not so much to determine this structure, but rather to see if there is a plausible structure that explains the H/V ratios.

The modified profiles as functions of depth (z) and the corresponding site amplifications are shown in Figures 6.3 and 6.4, respectively, in comparison with the BJ97 generic rock/soil model amplifications. A satisfactory match (the best-fit) between the amplification and H/V ratio is approached for the site classes (i) AB/California-BC/Japan and (ii) CD/California, which are respectively referred to the modified generic California rock (CAROCK) and the modified generic soil (GENSOIL), as shown in Figures 6.5 and 6.6.

A combination of amplification through the crustal profile and near-surface attenuation due to κ was applied in order to fit the H/V ratios. Therefore, the implied relationship between the amplification and H/V ratio is

$$R_{H/V}(f) = \text{Amp}(f)\exp(-\pi\kappa f) \quad (6.2)$$

where $R_{H/V}(f)$ represents the H/V ratio, $\text{Amp}(f)$ the site amplification, and $\exp(-\pi\kappa f)$ is the κ decay function.

The amplification functions for the generic velocity profiles, given in Tables 6.2 and 6.3, match the H/V ratios very well for both generic rock and soil sites (see Figures 6.5 and 6.6).

**Table 6.2 Velocity model for the modified generic rock site (CAROCK:
AB/California & BC/Japan)**

Depth (km)	S velocity: Model SMR2b (km/s)
$Z < 0.001$	0.179
$0.001 \leq z \leq 1.19$	$2.4312z^{0.3833}$
$1.19 < z \leq 8.00$	$0.0043z^3 - 0.0846z^2 + 0.588z + 2.0045$

**Table 6.3 Velocity Model for the modified generic soil site (GENSOIL:
CD/California)**

Depth (km)	S velocity: Model SMS5i (km/s)
$Z < 0.001$	0.175
$0.001 \leq z \leq 4.00$	$-0.1792z^2 + 1.4469z + 0.3822$
$4.00 < z \leq 8.00$	$-0.0038z^2 + 0.0952z + 2.9793$

Relative to BJ97 and the modified generic rock/soil site amplifications as shown, Figure 6.7 features an intermediate level of H/V ratio for Turkey sites. This suggests that

Turkey sites can be classified into “soft rock” conditions, distinguishing it from hard rock/rock sites and soil sites, which is consistent with geological map reading in the area and the R1 source spectral analyses (Chapter 5).

The H/V ratios for a group of hard rock/rock sites in B.C., ENA and Mexico are also compared to the theoretical or statistical amplification of B.C. and ENA (see Lermo and Chavez-Garcia, 1993; Atkinson and Cassidy, 2000; Atkinson, 1993). Ratios from specific stations (Siddiqi, 2000) are also shown. The observed H/V ratios closely follow the trend of the theoretical amplification (Figure 6.8). This agreement between the H/V and amplification again supports the suggestion that a smoothed H/V ratio can reasonably be used as an estimate of site amplification.

6.4 Conclusions and discussion

The relationship between the H/V ratio and the estimated site amplification is expressed as $R_{H/V}(f) = \text{Amp}(f)\exp(-\pi\kappa f)$, where $\text{Amp}(f)$ includes both crustal amplification (X_{crust}) and any additional near-surface soil amplification. It is suggested that a smooth H/V ratio as a function of frequency can be used to infer $\text{Amp}(f)$ without previous knowledge about near surface geology, and in fact may provide useful general site-condition information. When correction for site amplification is needed, but no site-specific geotechnical information is available, the H/V ratio can be a very useful “stand-in” parameter.

Based on both the shape and the level, regional H/V ratios consistently distinguish between hard rock/rock sites (ENA, B.C., and Mexico), soft rock (Turkey), and soil sites. The soil sites can be identified as firm soil (sites BC/Japan and AB/California), general soil (CD/ California), and maybe a soil-rock mixture (A/Japan). The following features of the H/V ratio are observed, consistent with expectations based on site amplification:

- 1) The amplification peak shifts with site conditions either toward higher frequency for hard rock/rock sites or toward lower frequency for softer soil sites.
- 2) The width of the amplification peak shifts towards a narrower frequency band for hard rock/rock sites, while it is broader in frequency for the softer soil sites.
- 3) The hard rock sites show lower amplification while soil sites show higher amplification.

The H/V results presented here are generally consistent with previous studies (e.g., Amirbekian and Bolt, 1998; Theodulidis et al., 1996). Overall, it is concluded that the regional H/V ratios derived above, with the possible exception of class E of Japan, that appears to be too “soft” (soft soil) for this approach, can be reasonably considered as an estimate of site amplification. This H/V estimate will be applied to the site effect corrections for regional source spectra to be discussed in next chapter. To avoid undue complications, soft soil sites (class E) will not be used. The deduced site amplification factors are given for each site class in Tables 6.4a and 6.4b.

Table 6.4a Node points of amplification for the modified generic rock and soil sites

Japan B/C & California A/B			California C/D		
f (Hz)	Amp (f)	Amp*K	f (Hz)	Amp (f)	Amp*K
0.09	1.12	1.11	0.09	1.27	1.26
0.10	1.13	1.12	0.10	1.32	1.31
0.15	1.22	1.20	0.15	1.60	1.57
0.20	1.29	1.26	0.20	1.84	1.80
0.31	1.45	1.40	0.30	2.14	2.07
0.44	1.62	1.54	0.43	2.39	2.28
0.52	1.72	1.62	0.52	2.55	2.41
0.68	1.88	1.74	0.68	2.79	2.59
0.81	1.99	1.82	0.83	2.95	2.69
1.06	2.17	1.93	0.99	3.07	2.75
1.18	2.25	1.98	1.07	3.11	2.76
1.28	2.31	2.01	1.16	3.16	2.78
1.41	2.39	2.05	1.27	3.21	2.79
1.58	2.48	2.08	1.41	3.27	2.80
1.82	2.60	2.13	1.59	3.33	2.80
2.19	2.77	2.18	1.85	3.40	2.77
2.83	3.02	2.21	2.23	3.48	2.72
3.41	3.21	2.21	2.84	3.58	2.62
3.49	3.23	2.20	2.92	3.59	2.60
3.65	3.28	2.20	3.10	3.61	2.57
3.84	3.34	2.19	3.31	3.64	2.53
4.05	3.39	2.17	3.55	3.67	2.48
4.30	3.46	2.16	3.83	3.70	2.43
4.59	3.53	2.13	4.17	3.73	2.36
4.94	3.61	2.10	4.58	3.78	2.28
5.37	3.71	2.06	5.08	3.83	2.19
5.90	3.81	1.99	5.71	3.89	2.08
6.60	3.94	1.91	6.54	3.96	1.93
7.56	4.10	1.79	7.66	4.07	1.75
8.99	4.30	1.60	9.27	4.22	1.52
11.40	4.56	1.30	11.90	4.44	1.20
16.60	4.94	0.80	17.40	4.79	0.71
43.90	5.33	0.04	45.30	5.21	0.04

Table 6.4b H/V related amplification factors

ENA: hard rock			B.C.: rock		
f (Hz)	Amp (f)	Amp* κ	f (Hz)	Amp (f)	Amp* κ
0.10	0.86	0.86	0.10	1.00	1.00
0.20	0.93	0.93	0.20	1.01	1.00
0.50	1.04	1.04	0.50	1.02	1.00
1.00	1.14	1.13	1.00	1.16	1.12
1.30	1.17	1.16	1.30	1.19	1.14
1.50	1.19	1.18	1.50	1.21	1.15
2.00	1.24	1.22	2.00	1.26	1.17
2.50	1.27	1.25	2.50	1.31	1.20
3.00	1.30	1.28	3.00	1.36	1.22
4.00	1.36	1.33	4.00	1.47	1.28
5.00	1.40	1.36	5.00	1.58	1.33
6.00	1.44	1.39	6.00	1.70	1.38
8.00	1.51	1.44	8.00	1.96	1.49
10.00	1.58	1.48	10.00	2.25	1.59

Japan: A			Mexico: rock		
f (Hz)	Amp (f)	Amp* κ	f (Hz)	Amp (f)	Amp* κ
0.20	1.31	1.28	0.20	0.98	0.96
0.25	1.26	1.23	0.25	1.03	1.00
0.30	1.19	1.15	0.30	1.11	1.07
0.40	1.15	1.10	0.40	1.20	1.15
0.50	1.17	1.11	0.50	1.28	1.21
0.60	1.21	1.13	0.60	1.32	1.24
0.80	1.26	1.15	0.80	1.40	1.28
1.00	1.38	1.24	1.00	1.48	1.33
1.30	1.58	1.37	1.30	1.59	1.38
1.60	1.76	1.48	1.60	1.68	1.41
2.00	2.06	1.65	2.00	1.81	1.45
2.50	2.53	1.92	2.50	1.96	1.49
3.20	3.11	2.19	3.20	2.16	1.52
4.00	3.63	2.34	4.00	2.47	1.59
5.00	4.21	2.43	5.00	2.98	1.72
6.30	5.10	2.55	6.30	3.58	1.79
7.90	6.48	2.72	7.90	4.05	1.70
10.00	8.38	2.79	10.00	4.47	1.49
12.60	10.19	2.55	12.60	5.20	1.30
15.80	11.88	2.09	15.80	6.93	1.22
20.00	16.05	1.78	20.00	10.82	1.20

Turkey: soft rock		
f (Hz)	Amp (f)	Amp* κ
0.20	1.12	1.10
0.25	1.16	1.13
0.30	1.21	1.17
0.40	1.26	1.21
0.50	1.38	1.31
0.60	1.55	1.45
0.80	1.73	1.58
1.00	1.84	1.65
1.30	1.96	1.70
1.60	2.13	1.79
2.00	2.39	1.92
2.50	2.70	2.05
3.20	2.97	2.09
4.00	3.17	2.04
5.00	3.26	1.88
6.30	3.18	1.59
7.90	3.00	1.26
10.00	2.91	0.97
12.60	3.08	0.77
15.80	3.75	0.66
20.00	5.50	0.61

Note: Amp(f) is the amplification due to the impedance gradient.
Amp* κ = Amp*EXP(- $\pi*\kappa*f$), the combined effects of Amp and near-surface attenuation, kappa.
 κ = 0.035 for Japan, Mexico, Turkey, and California;
 κ = 0.011 for B.C.;
 κ = 0.002 for ENA.

Figure 6.1 Comparison of H/V ratio between regions.

Figure 6.2 a) - j) Samples of H/V ratio for different site classes.

a) Japan: site class A

Figure 6.2 b) Japan: site class B

Figure 6.2 c) Japan: site class C

Figure 6.2 d) Japan: site class E

Figure 6.2 e) Turkey: overall soft rock

Figure 6.2 f) Mexico: overall rock site

Figure 6.2 g) California: Site class A

Figure 6.2 h) California: Site class B

Figure 6.2 i) California: Site class C

Figure 6.2 j) California: Site class D

Figure 6.3 Generic site velocity models.

Figure 6.4 Amplifications derived from generic rock/soil sites. Amplification for BJ97 generic soil was adjusted based on BJ97 generic rock.

Figure 6.5 H/V ratio matches with amplification for the modified generic rock model (CAROCK).

Figure 6.6 H/V ratio matches with amplification for the modified generic soil model (GENSOIL)

Figure 6.7 Soft rock sites (Turkey) show an intermediate H/V ratio between BJ97 and the modified generic sites.

Figure 6.8 H/V ratio compared with theoretical amplification for hard rock/rock sites of B.C., ENA and Mexico.

Chapter 7

Apparent source spectra of earthquakes

7.1 Methodology

Apparent source spectra of earthquakes studied in the six regions are obtained by correcting the observed Fourier spectra for all known path and site effects as discussed in the preceding chapters, including geometrical spreading (distance-related attenuation), anelastic scattering (whole path) attenuation, and crustal/site amplifications (including kappa). These apparent source spectra represent our best estimate of the overall source radiation.

Attenuation-corrected spectra were defined, in Chapters 4 and 5, as “R1 spectra”. The regional H/V function for each region and site class (Chapter 6) is applied to correct for crustal and near-surface site amplification effects, to produce apparent source spectra. This is done by dividing the horizontal component spectra by the appropriate amplification function, as represented by the H/V ratio (Table 6.4).

In Chapter 6, the H/V ratio and its relation to site amplification was systematically studied for different site classes. With the availability of the regional H/V ratios and site amplification models for both the generic rock and soil conditions, it is reasonable that

the corrected source spectra closely reflect the radiated energy, and may be indicative of overall source properties.

The amplification function as modeled by H/V contains both crustal amplification and near surface effects. Referring to equation 6.2, by application of this amplification factor, the high frequency κ decay effects may be removed as well. A clear-cut distinction between the crustal and near-surface site effects could perhaps be made. However, it is problematic to separate clearly these contributions to the observed seismic response, and no attempt to do so is made in this work. Instead, I refer to the combined site-crustal amplification (considering down to 8-km-depth of the crust (seismogenic zone) plus the top-30-m near surface) as estimated by the H/V ratio.

The procedure applied to each site class to correct for the site-crustal effects is as follows. For site types B/C (soil) in Japan, A/B (rock), and C/D (soil) in California, the smoothed amplification models for the corresponding generic rock and soil were used to correct for the corresponding site amplifications (the horizontal component data were divided by the factors in Table 6.4). Site class A of Japan and all other sites in Mexico, Turkey, B.C, and ENA (rock sites) were corrected using the corresponding region-specific H/V ratio for rock sites to model the amplification (Table 6.4). For the vertical component, corrections are made only for κ effects to obtain the apparent source spectra, under the assumption that crustal/near-surface amplifications are negligible. Note that the H/V ratio or amplification is a function of frequency.

7.2 Regional characteristics of source spectra

7.2.1 Spectral level versus magnitude m_1

The resulting regional apparent source spectra are plotted, for both horizontal and vertical components, with respect to m_1 at frequencies of 1, 2, 5, and 10 Hz, respectively (Figures 7.1 and 7.2). A_1 , A_2 , A_5 , and A_{10} accordingly, define spectral levels in log units. The magnitude m_1 is a reasonable approximation to moment magnitude, M , as shown in Chapter 5, for events of $M < 5.5$. The empirical relation (equation 5.10) was used to convert M to m_1 for plotting the Brune model predictions for all plots, since $m_1 < M$ at large magnitudes. The results shown in the plots are limited to events with recordings on more than 3 stations. Given the possible uneven data distribution in magnitude ranges due to the restriction on number of recordings, Figures 7.3(a,b,c,d) and 7.4(a,b,c,d) provide with two complete sets of results for both H and V components, showing the spectral amplitudes (A_1 , A_2 , A_5 , and A_{10}) as functions of m_1 for all records of events studied (e.g., without restriction to events with 3 or more records). The data points on Figures 7.1 to 7.4 show less scatter than the corresponding R1-spectra plots of Chapter 5, indicating that the removal of amplification effects has been at least partly effective.

Based on the apparent source spectra, the estimates of the high-frequency attenuation parameter, κ , were refined for each region. In particular, we estimate a ‘residual’ κ value required in order to obtain a constant spectral amplitude at high frequencies (where the total effects of κ include the original κ estimate plus the

residual). Kappa residuals for horizontal spectra in each region are reestimated, in Table 7.1, for each group of events with magnitude interval 0.5 ± 0.2 (e.g. 3.5 ± 0.2 , 4.0 ± 0.2 , 4.5 ± 0.2 , 5.0 ± 0.2 , 5.5 ± 0.2 , 6.0 ± 0.2 , and 6.5 ± 0.2), under the restriction of $R < 100$ km. Vertical kappa values (total kappa) are also listed. The overall initial average estimate of kappa has been given in Chapter 4, which is a first approximation to the large databases (e.g., without the limitation of $R < 100$ km). The effects on source spectra of the kappa residuals (H component) and the smaller vertical kappa for each region were corrected, in order to obtain the apparent source spectra more accurately (see discussion in Chapter 8). A complete set of the spectra for the different groups of events will be shown in the following section. In Table 7.1, note the intriguing dependence of κ_H on magnitude. This may be indicative of nonlinearity of soil response at large magnitudes. A detailed study of these effects is beyond the scope of this thesis.

Table 7.1 Kappa estimate for different groups of events ($R < 100$ km)

Reg.	κ_V	κ_H	$\kappa_{res(H)} (m_1)$							AVG $\kappa_{res(H)}$
			3.5	4.0	4.5	5.0	5.5	6.0	6.5	
Japan	0.016	0.035	-	0.002	-	0.017	0.02	0.01	0.035	0.017
Mex.	0.014	0.035	0.01	0.01	0.012	0.02	0.02	-	0.02	0.015
TK	0.031	0.035	0.04	0.03	0.022	0.025	0.025	0.03	0.04	0.030
Calif.	0.025	0.035	-	-	0.015	0.025	0.025	0.02	0.035	0.024
B.C.	0.011	0.011	0.002	0.006	0.008	0.01	0.002	-	-	0.006
ENA	0.002	0.002	0.	0.	0.	0.	-	-	-	0.

Note: m_1 values listed represent the ranges of $m_1 \pm 0.2$.

7.2.2 Effect of depth on source spectra

Is source radiation dependent on earthquake depth? To answer this question, the source spectra are grouped by three classes: shallow earthquakes ($h < 30$ km), intermediate earthquakes ($30 < h < 60$ km), and deep earthquakes ($h > 60$ km). Among the six regions, Japan, Mexico, Turkey, and B.C. earthquakes provide a range of focal depths; the remaining two regions, California and ENA, are entirely within the category of crustal (shallow) earthquakes.

For the three classes of earthquakes defined, the spectral levels A1, A2, A5, and A10 are shown as a function of m_1 on Figures 7.5(a,b,c,d) – 7.8(a,b,c,d) for each earthquake. The average source level and its standard error are shown. No depth effects on the source spectra can be identified. Observed variations are within the scatter of the data. This observation is most evident when a large number of earthquakes with depth information are plotted, such as for Mexico, Turkey, and B.C.. In some cases, such as Japan, the deeper earthquakes appear to yield a slightly higher spectral amplitude at an intermediate to higher frequency of 2 or 5 Hz. However, there were fewer events used in the analysis for Japan and the depth span is not as homogeneous as that of Mexico and Turkey. Thus the apparent discrepancies are not compelling, although they may be real.

7.2.3 Source spectra and tectonic implications

Events are grouped by ± 0.2 magnitude bins. Figures 7.9 to 7.22 show the corresponding average spectra and their standard errors, for horizontal and vertical components, for events of $m_1 = 3.5$ to 6.5 (with interval 0.5). Brune's (1970, 1971) one-corner model and Atkinson and Silva's (2000) two-corner model (AS00) are also shown in the figures. The moment magnitude, M , is converted to m_1 for both models (refer to equation 5.10). Overall, the two-corner model shows good agreement with the actual spectra within data errors. It provides a better match than the Brune model at large magnitudes. Overall spectral levels for both components suggest a stress drop of 70 bars (7 MPa) to 150 bars (15 MPa), as defined by a standard Brune model. There is no remarkable difference in apparent source spectral levels between the interplate tectonic boundaries of the subduction and transform types (this group contains only interplate earthquakes such as events of Japan, Mexico, Turkey, California and B.C.). The H-component spectra indicate an elevated spectral level for Mexico at low frequencies (< 1 Hz), which may be indicative of unresolved crustal amplification effects, as it is not as apparent as the vertical component.

There is no compelling difference of source spectra between the interplate and intraplate earthquakes, although some degree of scattering may appear for small earthquakes that is due likely to the noise problem in signal processing (Figures 7.9-7.14 and 7.19-7.22). The role of crustal constants, such as shear velocity β , density ρ , and stress drop $\Delta\sigma$, is also examined. The Brune's ENA model ($\Delta\sigma = 150$ bars, $\beta = 3.8$ km/s,

$\rho = 2.8 \text{ g/cm}^3$), California model ($\Delta\sigma = 70 \text{ bars}$, $\beta = 3.5 \text{ km/s}$, $\rho = 2.8 \text{ g/cm}^3$), and the Brune model of 30 bars, 3.5 km/s and 2.8 g/cm^3 are shown in the figures as well. There is little influence of the given velocity and density values, while the main controlling Brune model parameter is the stress drop (a different view on the term stress drop will be discussed in Chapter 8). It is concluded that there is no significant overall contrast discernible amongst the various regions. The vertical spectrum is a better first approximation to the apparent source radiation, and it is relatively easy to approach due to its simplicity of procedure in data processing. This is because it need only be corrected for kappa effects based on the R1 spectra; no crustal and near-surface site amplification effects are directly involved, as discussed in Chapters 4 and 5.

7.3 Empirical models: Apparent source spectra as functions of magnitude

m_1

7.3.1 General expressions

Now that distance effects have been corrected through geometrical spreading and anelastic attenuation, and since there are no significant depth effects or regional on source spectra observed for the data sets, the (apparent) source spectra can be expressed empirically as simple functions of magnitude m_1 . Empirical functions for $m_1 = 3 - 7.5$ are given below for frequencies of 1, 2, 5, and 10 Hz. A general empirical model is described, respectively, for H and V component over all regions studied, for the

corresponding frequencies. Data used for regression were limited to the events with more than 3 records, except Turkey where this criterion was too restrictive.

As a general description for horizontal and vertical apparent source spectra, empirical functions of $A_i(\mathbf{m}_1)$ ($i = 1, 2, 5, \text{ and } 10$) for all study regions are given in Figures 7.23 (a,b,c,d) and 7.24 (a,b,c,d). They represent an average empirical model for H and V component, respectively, at the corresponding frequencies of 1, 2, 5, and 10 Hz.

The empirical functions for H component spectra are written as function of $(\mathbf{m}_1 - 5)$ for numerical stability:

$$\text{Log } A1 = -0.1817(\mathbf{m}_1 - 5)^2 + 1.068(\mathbf{m}_1 - 5) + 1.538 \quad (7.1)$$

$$\text{Log } A2 = -0.1759(\mathbf{m}_1 - 5)^2 + 0.9142(\mathbf{m}_1 - 5) + 1.7978 \quad (7.2)$$

$$\text{Log } A5 = -0.1454(\mathbf{m}_1 - 5)^2 + 0.6908(\mathbf{m}_1 - 5) + 1.9946 \quad (7.3)$$

$$\text{Log } A10 = -0.107(\mathbf{m}_1 - 5)^2 + 0.5382(\mathbf{m}_1 - 5) + 2.0804 \quad (7.4)$$

where $A1$, $A2$, $A5$, and $A10$ are the same as noted previously.

The empirical descriptions for V component spectra are given below:

$$\text{Log } A1 = -0.2174(\mathbf{m}_1 - 5)^2 + 1.0585(\mathbf{m}_1 - 5) + 1.6213 \quad (7.5)$$

$$\text{Log } A2 = -0.1811(\mathbf{m}_1 - 5)^2 + 0.9192(\mathbf{m}_1 - 5) + 1.8197 \quad (7.6)$$

$$\text{Log } A5 = -0.1358(\mathbf{m}_1 - 5)^2 + 0.6755(\mathbf{m}_1 - 5) + 2.0054 \quad (7.7)$$

$$\text{Log } A10 = -0.0993(\mathbf{m}_1 - 5)^2 + 0.539(\mathbf{m}_1 - 5) + 2.0768 \quad (7.8)$$

Both the H and V empirical relationships show good agreement with a standard Brune's ENA model, for small to moderate events, of stress drop 150 bars (15 MPa), or an amplified California model of 70 bars (7 MPa). For large earthquakes, the Brune model may overestimate spectral amplitudes. The R1 vertical spectra show directly a first approximation to the source model without the need of crustal/near-surface site amplification corrections, while the horizontal spectra would have suggested lower amplitudes than the model at high frequencies if the site amplification effects had not been removed.

In the following sections, an individual empirical relationship for each region will be described (refer to Figures 7.5 – 7.8). A couple of them may be omitted as $R^2 < 0.5$, and in such a case it implies a poor fit. The amplitudes A1, A2, A5, and A10 can be expressed directly as functions of $\mathbf{m}_1$. In order to ensure numerical stability, the empirical relationships were written as functions of $(\mathbf{m}_1 - 5)$.

7.3.2 Japan

$$\text{Log A1} = -0.1943(\mathbf{m}_1 - 5)^2 + 1.0966(\mathbf{m}_1 - 5) + 1.5151 \quad (7.9)$$

$$\text{Log A2} = -0.2075(\mathbf{m}_1 - 5)^2 + 0.8929(\mathbf{m}_1 - 5) + 1.8501 \quad (7.10)$$

$$\text{Log A5} = -0.1646(\mathbf{m}_1 - 5)^2 + 0.6311(\mathbf{m}_1 - 5) + 2.0807 \quad (7.11)$$

$$\text{Log A10} = -0.0932(\mathbf{m}_1 - 5)^2 + 0.4963(\mathbf{m}_1 - 5) + 2.181 \quad (7.12)$$

7.3.3 Mexico

$$\text{Log A1} = -0.1466(\mathbf{m}_1 - 5)^2 + 1.1086(\mathbf{m}_1 - 5) + 1.5453 \quad (7.13)$$

$$\text{Log A2} = -0.1128(\mathbf{m}_1 - 5)^2 + 0.9879(\mathbf{m}_1 - 5) + 1.774 \quad (7.14)$$

$$\text{Log A5} = -0.0708(\mathbf{m}_1 - 5)^2 + 0.7176(\mathbf{m}_1 - 5) + 1.8775 \quad (7.15)$$

$$\text{Log A10} = -0.012(\mathbf{m}_1 - 5)^2 + 0.5407(\mathbf{m}_1 - 5) + 1.9883 \quad (7.16)$$

7.3.4 Turkey

$$\text{Log A1} = -0.2153(\mathbf{m}_1 - 5)^2 + 1.0977(\mathbf{m}_1 - 5) + 1.6564 \quad (7.17)$$

$$\text{Log A2} = -0.1944(\mathbf{m}_1 - 5)^2 + 0.988(\mathbf{m}_1 - 5) + 1.8314 \quad (7.18)$$

$$\text{Log A5} = -0.2085(\mathbf{m}_1 - 5)^2 + 0.7475(\mathbf{m}_1 - 5) + 2.1031 \quad (7.19)$$

$$\text{Log A10} = -0.1535(\mathbf{m}_1 - 5)^2 + 0.5725(\mathbf{m}_1 - 5) + 2.1222 \quad (7.20)$$

7.3.5 California

$$\text{Log A1} = -0.1276(\mathbf{m}_1 - 5)^2 + 0.9989(\mathbf{m}_1 - 5) + 1.5185 \quad (7.21)$$

$$\text{Log A2} = -0.1869(\mathbf{m}_1 - 5)^2 + 0.9714(\mathbf{m}_1 - 5) + 1.7371 \quad (7.22)$$

$$\text{Log A5} = -0.1971(\mathbf{m}_1 - 5)^2 + 0.8354(\mathbf{m}_1 - 5) + 1.9037 \quad (7.23)$$

$$\text{Log A10} = -0.1785(\mathbf{m}_1 - 5)^2 + 0.7256(\mathbf{m}_1 - 5) + 1.965 \quad (7.24)$$

7.3.6 British Columbia (B.C.)

$$\text{Log } A1 = -0.272(\mathbf{m}_1 - 5)^2 + 1.0349(\mathbf{m}_1 - 5) + 1.5508 \quad (7.25)$$

$$\text{Log } A2 = -0.2218(\mathbf{m}_1 - 5)^2 + 0.908(\mathbf{m}_1 - 5) + 1.9569 \quad (7.26)$$

$$\text{Log } A5 = -0.1858(\mathbf{m}_1 - 5)^2 + 0.5484(\mathbf{m}_1 - 5) + 1.9484 \quad (7.27)$$

$$\text{Log } A10 = 0.041(\mathbf{m}_1 - 5)^2 + 0.6547(\mathbf{m}_1 - 5) + 1.934 \quad (7.28)$$

7.3.7 Eastern North America (ENA)

$$\text{Log } A1 = -0.1683(\mathbf{m}_1 - 5)^2 + 1.1411(\mathbf{m}_1 - 5) + 1.5434 \quad (7.29)$$

$$\text{Log } A2 = -0.5445(\mathbf{m}_1 - 5)^2 + 0.0305(\mathbf{m}_1 - 5) + 1.2493 \quad (7.30)$$

$$\text{Log } A5 = -0.4938(\mathbf{m}_1 - 5)^2 - 0.0343(\mathbf{m}_1 - 5) + 1.6897 \quad (7.31)$$

$$\text{Log } A10 = -0.3015(\mathbf{m}_1 - 5)^2 + 0.2111(\mathbf{m}_1 - 5) + 2.0413 \quad (7.32)$$

7.3.8 Summary

The above empirical functions (7.9 to 7.32) describe spectral amplitudes for crustal earthquakes (few deep earthquakes in the data sets). Due to the fact that no depth effects are observed for the data sets, they could be reasonably used to describe the deeper earthquakes (up to about 100 km) as well. A modification to the functions to include depth effects may be needed as more information accumulates for deep earthquakes.

All the empirical relationships, including the general expressions, are consistently described by quadratic functions of $(m_1 - 5)$, which is intended to ensure numerical stability. An overall good fit in regression has been manifested, in general, by $0.8 \leq R^2 \leq 1.0$ (a couple of them give $R^2 = 0.5 - 0.7$). The general empirical functions for both H and V spectra, as described in equations 7.1 – 7.8, show a consistent match, for small to moderate earthquakes, with a standard Brune model of 70 bars to 150 bars. For large earthquakes, a two-corner source model is more appropriate.

7.4 Conclusions and discussion

Apparent source spectra describe the apparent radiated earthquake spectrum near the source (at reference distance of $R = 1$ km). After proper corrections for the major influential factors as discussed in Chapter 4, the inferred source spectra should be independent of distance and depth in general. This has been verified in this study.

Primary analyses from various size earthquakes suggest that apparent source spectra derived from both H and V components are in a good agreement with the two-corner model (Atkinson and Silva, 2000), while the one-corner model (Brune, 1970, 1971) appears to overpredict spectral amplitudes at low-to-intermediate frequencies for large events of $M > 5.5$. The vertical apparent source spectra appear to better reflect the source radiation spectra as a first approximation, while the H spectra appear to be more complex than the V spectra due to crustal/near-surface site amplification effects. After all the site effects were properly removed, the H spectra also agree with the two-corner model for all of the events studied, and with the one-corner model for small to moderate earthquakes.

Earthquakes of a given moment magnitude appear to have similar spectral levels and shape over different tectonic zones. Minor observed differences between regions suggests that some other factors may influence source spectra, although a series of factors have been considered and removed from the original Fourier spectra calculated using the strong motion records. It is likely that the source mechanism is an important factor that we have not studied in this thesis. This is a meaningful topic worthy of further study based on this thesis work.

Figure 7.1a Apparent source spectral level A1 (H comp., $f = 1$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$.

Figure 7.1b Apparent source spectral level A2 (H comp., $f = 2\text{ Hz}$, $R = 1\text{ km}$) vs magnitude m_1 , $N_{\text{stn}} \geq 3$.

Figure 7.1c Apparent source spectral level A5 (H comp., $f = 5$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$.

Figure 7.1d Apparent source spectral level A10 (H comp., $f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$.

Figure 7.2a Apparent source spectral level A1 (V comp., $f = 1$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$.

Figure 7.2b Apparent source spectral level A2 (V comp., $f = 2$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$.

Figure 7.2c Apparent source spectral level A5 (V comp., $f = 5$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{stn} \geq 3$.

Figure 7.2d Apparent source spectral level A10 (V comp., $f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , $N_{\text{stn}} \geq 3$.

Figure 7.3a Apparent source spectral level A1 (H comp., $f = 1$ Hz, $R = 1$ km) vs magnitude m_1 , all records.

Figure 7.3b Apparent source spectral level A2 (H comp., $f = 2\text{ Hz}$, $R = 1\text{ km}$) vs magnitude m_1 , all records.

Figure 7.3c Apparent source spectral level A5 (H comp., $f = 5$ Hz, $R = 1$ km) vs magnitude m_1 , all records.

Figure 7.3d Apparent source spectral level A10 (H comp., $f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , all records.

Figure 7.4a Apparent source spectral level A1 (V comp., $f = 1$ Hz, $R = 1$ km) vs magnitude m_1 , all records.

Figure 7.4b Apparent source spectral level A2 (V comp., $f = 2$ Hz, $R = 1$ km) vs magnitude m_1 , all records.

Figure 7.4c Apparent source spectral level A5 (V comp., $f = 5\text{ Hz}$, $R = 1\text{ km}$) vs magnitude m_1 , all records.

Figure 7.4d Apparent source spectral level A10 (V comp., $f = 10$ Hz, $R = 1$ km) vs magnitude m_1 , all records.

Figure 7.5 a) Japan: Apparent source spectral level A1 ($f = 1$ Hz, $R = 1$ km, H) vs m_1 , showing variation of focal depths..

Figure 7.5 b) Japan: Apparent source spectral level A2 ($f = 2$ Hz, $R = 1$ km, H) vs $m1$, showing variation of focal depths.

Figure 7.5 c) Japan: Apparent source spectral level A5 ($f = 5\text{ Hz}$, $R = 1\text{ km}$, H) vs m_1 , showing variation of focal depths.

Figure 7.5 d) Japan: Apparent source spectral level A10 ($f = 10$ Hz, $R = 1$ km, H) vs $m1$, showing variation of focal depths.

Figure 7.6 a) Mexico: Apparent source spectral level A1 ($f = 1\text{ Hz}$, $R = 1\text{ km}$, H) vs m_1 , showing variation of focal depths.

Figure 7.6 b) Mexico: Apparent source spectral level A2 ($f = 2$ Hz, $R = 1$ km, H) vs m_1 , showing variation of focal depths.

Figure 7.6 c) Mexico: Apparent source spectral level A5 ($f = 5$ Hz, $R = 1$ km, H) vs m_1 , showing variation of focal depths.

Figure 7.6 d) Mexico: Apparent source spectral level A10 ($f = 10$ Hz, $R = 1$ km, H) vs m_1 , showing variation of focal depths.

Figure 7.7 a) Turkey: Apparent source spectral level A1 ($f = 1$ Hz, $R = 1$ km, H) vs m_1 , showing variation of focal depths.

Figure 7.7 b) Turkey: Apparent source spectral level A2 ($f = 2$ Hz, $R = 1$ km, H) vs m_1 , showing variation of focal depths.

Figure 7.7 c) Turkey: Apparent source spectral level A5 ($f = 5$ Hz, $R = 1$ km, H) vs m_1 , showing variation of focal depths.

Figure 7.7 d) Turkey: Apparent source spectral level A10 ($f = 10$ Hz, $R = 1$ km, H) vs m_1 , showing variation of focal depths.

Figure 7.8 a) B.C: Apparent source spectral level A1 ($f = 1$ Hz, $R = 1$ km, H) vs m_1 , showing variation of focal depths.

Figure 7.8 b) B.C: Apparent source spectral level A2 ($f = 2$ Hz, $R = 1$ km, H) vs m_1 , showing variation of focal depths.

Figure 7.8 c) B.C: Apparent source spectral level A5 ($f = 5$ Hz, $R = 1$ km, H) vs m_1 , showing variation of focal depths.

Figure 7.8 d) B.C: Apparent source spectral level A10 ($f = 10$ Hz, $R = 1$ km, H) vs $m1$, showing variation of focal depths.

Figure 7.9 Horizontal apparent source spectra ($R = 1$ km), $m1 = 3.5$ (± 0.2).

Figure 7.10 Vertical apparent source spectra ($R = 1 \text{ km}$), $m1 = 3.5 (+/- 0.2)$.

Figure 7.11 Horizontal apparent source spectra ($R = 1 \text{ km}$), $m1 = 4.0 (+ - 0.2)$.

Figure 7.12 Vertical apparent source spectra ($R = 1 \text{ km}$), $m1 = 4.0 \text{ } (+/- \text{ } 0.2)$.

Figure 7.13 Horizontal apparent source spectra ($R = 1\text{ km}$), $m1 = 4.5 (+ - 0.2)$.

Figure 7.14 Vertical apparent source spectra ($R = 1 \text{ km}$), $m1 = 4.5 (+/- 0.2)$.

Figure 7.15 Horizontal apparent source spectra ($R = 1\text{ km}$), $m1 = 5.0 (+/- 0.2)$.

Figure 7.16 Vertical apparent source spectra ($R = 1 \text{ km}$), $m1 = 5.0 (+/- 0.2)$.

Figure 7.17 Horizontal apparent source spectra ($R = 1 \text{ km}$), $m1 = 5.5 (+/- 0.2)$.

Figure 7.18 Vertical apparent source spectra ($R = 1 \text{ km}$), $m1 = 5.5 (+/- 0.2)$.

Figure 7.19 Horizontal apparent source spectra ($R = 1 \text{ km}$), $m1 = 6.0 (+ - 0.2)$.

Figure 7.20 Vertical apparent source spectra ($R = 1 \text{ km}$), $m1 = 6.0 (+/- 0.2)$.

Figure 7.21 Horizontal apparent source spectra ($R = 1 \text{ km}$), $m1 = 6.5 (+/- 0.2)$.

Figure 7.22 Vertical apparent source spectra ($R = 1$ km), $m1 = 6.5$ (± 0.2).

Figure 7.23a Apparent source spectral amplitude (H) as function of m1 for Japan, Mexico, Turkey, California, B.C., and ENA, f = 1 Hz.

Figure 7.23b Apparent source spectral amplitude (H) as function of m1 for Japan, Mexico, Turkey, California, B.C., and ENA, f = 2 Hz.

Figure 7.23c Apparent source spectral amplitude (H) as function of m1 for Japan, Mexico, Turkey, California, B.C., and ENA, f = 5 Hz.

Figure 7.23d Apparent source spectral amplitude (H) as function of m1 for Japan, Mexico, Turkey, California, B.C., and ENA, f = 10 Hz.

Figure 7.24a Apparent source spectral amplitude (V) as function of m1 for Japan, Mexico, Turkey, California, B.C., and ENA, f = 1 Hz.

Figure 7.24b Apparent source spectral amplitude (V) as function of m1 for Japan, Mexico, Turkey, California, B.C., and ENA, f = 2 Hz.

Figure 7.24c Apparent source spectral amplitude (V) as function of m1 for Japan, Mexico, Turkey, California, B.C., and ENA, f = 5 Hz.

Figure 7.24d Apparent source spectral amplitude (V) as function of m1 for Japan, Mexico, Turkey, California, B.C., and ENA, f = 10 Hz.

Chapter 8

Discussion and future studies

8.1 H/V ratio and crustal/site structure inversion problem

In connection with the relationship between the H/V ratio and site amplification, an inversion problem can be posed for crustal structure and site-related near surface structure. This implies that the H/V ratio may be a useful tool for estimation of underground structure. The reasoning is that horizontal motions are amplified by the change in impedance (decreasing shear-wave velocity) as the waves approach the surface. For vertical motions the amplification effects are balanced by the refraction of the ray paths towards the vertical. The net effect is that amplification of the vertical component is negligible, rendering the H/V ratio a useful index of crustal and site amplification effects. Another implication is that vertical spectra may be a better measure of source radiation than horizontal spectra.

The amplification of the horizontal component is related to the source impedance $\beta_s \rho_s$ divided by the average impedance $\bar{\beta}(z) \bar{\rho}(z)$ at a depth corresponding to a quarter wavelength (Boore and Joyner, 1997). Using least-square methods and taking the difference between the H/V ratio and predicted amplification as an objective function, one may directly estimate the velocity and density structure as a function of depth. However, this is a multi-variable inversion problem in geophysics, and thus it is

anticipated that there are multiple solutions to the problem. To restrict the non-uniqueness in solutions, well-known geological and geophysical profiles will be a good reference for interpretation. Mathematically, it is also practical to reduce the number of variables to limit the number of solutions (Chen, 1989, 1990). A further difficulty is that the quarter wavelength approach does not account for site resonance effects, which are strong if there is a soft layer overlying a layer of much greater impedance (e.g., rock). However, clear resonance peaks in the H/V ratio are generally indicative of this situation, in which case the H/V ratio can then identify the thickness and velocity of the soft layer.

In this study, the H/V ratios were fitted with an amplification function derived from the very near surface to 8-km depth of the crust, though the most sensitive part is in the top several hundred meters for rock sites or up to about 2 km for deep soil sites. Previous work has demonstrated that the H/V ratio can be applied to studies of the upper mantle and crust using teleseismic records (Langston, 1979), which is based on the assumption that the local site conditions do not significantly influence the vertical component of the ground motion. In general, this assumption appears to be reasonable, but we cannot rule out that there are some exceptions where the vertical component could be amplified even more than the horizontal component. For example, there are some observations of $H/V < 1$. These exceptional observations may be relevant to the site locations relative to the faults and to the rupture mechanism. What is most important, however, is that the H/V ratio is evidently a comprehensive indicator of amplification effects from near surface to deep structure. This gives it potential as an inversion tool to

deduce structure. This is a very interesting area in geophysical inversion worthy of continuing study.

Note that the H/V ratio method was based on the assumption of no significant amplification on the vertical component, which appears to hold as a general observation. However, this may not be entirely true. It was found, for example, that for the soft class E of soils in Japan, there is less amplification in the H/V ratio than for other soil sites (E sites were thus excluded from much of this study), which may imply a vertical amplification relative to the horizontal component. In the 1995, Kobe, $M = 6.9$ earthquake, vertical amplification was observed at an array site, which was considered to be mainly associated with incomplete saturation of near-surface soils (Yang and Sato, 2000). However, it was believed that the incomplete saturation of soils causes only substantial amplification of P waves while it does not affect the propagation of S waves. On the other hand, the site amplification or H/V ratios may be influenced by nonlinear response of soils for strong levels of shaking, a topic that was beyond the scope of this study. Further study on these issues would be necessary to develop H/V as a tool for structure inversion.

8.2 Modification of source models

8.2.1 Relationship of m_1 and M

Ideally, the moment magnitude, $\mathbf{M}$, is the preferred measure of earthquake size. The magnitude $\mathbf{m}_1$ is defined and recommended as a close equivalent to $\mathbf{M}$ for small to moderate events ($\mathbf{M} < 5.5$) in this thesis. It is interesting to compare the moment magnitude, $\mathbf{M}$, with $\mathbf{m}_1$.

As shown in Chapter 5, $\mathbf{m}_1 = -0.0314(\mathbf{M} - 5)^2 + 0.8845(\mathbf{M} - 5) + 4.9622$ (5.10).

Alternatively, we can express $\mathbf{M}$ as a function of $\mathbf{m}_1$:

$$\mathbf{M} = -0.002(\mathbf{m}_1 - 5)^2 + 1.0506(\mathbf{m}_1 - 5) + 5.1561 \quad (8.1)$$

($R^2 = 0.974$). Interestingly, deviations from $\mathbf{m}_1 = \mathbf{M}$ are more pronounced at large magnitudes, which could be evidence of source complexity. Overall, the agreement between $\mathbf{m}_1$ and $\mathbf{M}$ supports the applicability of the Brune model as an estimate of spectral amplitudes for small-to-moderate earthquakes. For $\mathbf{M} > 6$, the $\mathbf{m}_1$ - $\mathbf{M}$ relationship suggests that a two-corner spectral model is required.

8.2.2 Source spectra with respect to components (H, V) of ground motion

Apparent source spectra can be estimated from either horizontal or vertical component strong motion recordings, as systematically conducted in this thesis. The V-component spectra appear to better reflect, as a first approximation, the apparent source spectra, after correction only for the path effects of geometrical spreading and anelastic

(Q) scattering, and the site-related kappa effects. For this reason it is a preferable basis for magnitude estimates than is the horizontal component. The H-component spectra are more complicated, as they are more greatly affected by the crustal and near-surface site amplification effects. It may be risky to derive source spectra from the horizontal component of recordings without a thorough investigation of site effects. The horizontal-component apparent source spectra can only be reliable when proper corrections are made, which has been well demonstrated in this study.

By applying the H/V ratios to correct for crustal/near-surface site amplification effects, a residual kappa was inferred for the horizontal component and thus removed for each region studied. It was also inferred that the vertical kappa is less than the horizontal kappa (see Table 7.1). There is an intriguing suggestion of nonlinearity in the apparent magnitude dependence of kappa.

It is not very clear what causes the residual kappa ($\kappa_{\text{res(H)}}$). Probably it is due to the application of the H/V ratios that may underestimate the kappa effects. It may be due partly to source attenuation properties, but this cannot be ascertained with these data. In this study, the residual kappa (H) was, however, added to the description given by Anderson (1991)

$$\kappa = \kappa_r + \kappa_s + \kappa_{\text{res(H)}} \quad (8.2)$$

in which $\kappa_{\text{res(H)}}$ acts as a supplementary correction term to the path (distance-related κ_r) and the site (near-surface κ_s) effects.

It is recommended that the vertical spectra, as a first approximation, better reflect apparent source radiation. Importantly, it is a relatively simple approach to use vertical spectra (we need not to correct for crustal and near-surface site amplification effects, as is required for the H component data).

8.3 Source spectra and earthquake mechanism

The observed source spectra should be considered as an overall average feature of the source on macro-scales. We cannot expect to use gross regional features to explain more detailed mechanism-related problems. The purpose of this section is to develop ideas for future studies in this direction.

There are basically three types of earthquake source mechanisms: thrust, strike-slip, and normal mechanisms. There may be a combination of faulting modes (e.g., an oblique mechanism). A definite relationship between source spectra and the corresponding mechanisms would provide a much clearer picture of source problems, and would have important engineering implications.

Among the few articles related to the topic of mechanism and source spectra, some disagreements appear evident on the influence of mechanism on the spectra, mostly with regards to thrust earthquakes (Abrahamson and Somerville, 1995). Thrust earthquakes occur on dipping faults, and the ground motion is not expected to be the same on both sides of the fault. It is expected that sites located on the hanging wall will have larger motions than sites at the same closest distance located on the footwall because the hanging-wall sites are closer to a larger area of the source than are the footwall sites. Abrahamson and Somerville (1993) found, for sites at closest distances of 8 to 12 km, the median peak accelerations on the hanging wall are up to 50% larger than predicted by attenuation relations for reverse faults, whereas the median peak accelerations on the footwall are up to 30% smaller than predicted by attenuation relations for reverse faults. Somerville et al. (1996) simulated the motions from the Northridge, California earthquake, and found that they are representative of ground motions close to thrust faults. What these observations imply is that there are uncertainties in ground motions attributable to source mechanism and geometry.

Normal faulting effects were recently discussed, based on analysis of a foam-rubber model by Brune and Anooshehpour (1999). Results of particle motion studies in the normal faulting model show that surface horizontal accelerations for normal faulting are systematically lower, by an average factor of about 0.10 ± 0.07 (about 10%), relative to the accelerations representing strike-slip motion. The slip acceleration on the shallow hanging wall fault surface was reduced by a factor of 0.18 ± 0.14 (about 18%). The footwall acceleration, in turn, is about half that for the hanging wall. Unfortunately, for

normal faults there are essentially no near-fault data from large earthquakes to verify the effects seen in the foam-rubber modeling. However, the experimental results are qualitatively supported by numerical modeling (e.g., Shi et al., 1997; Oglesby et al. 1998), and hence, estimates of accelerations for normal faults may need to be scaled down considerably from values based on regression curves or simulations associated with strike-slip geometries (Brune and Anooshehpour, 1999).

Further studies are recommended to: 1) study some typical earthquakes with well-known mechanism solutions from different types of tectonic environments, including subduction zones, transform or strike-slip faults; 2) find relations of source spectra for events with the same source mechanism between different regions and for events with different mechanisms in the same tectonic environment, respectively; 3) provide further quantitative descriptions relating source spectra, earthquake size and rupture areas (size of asperities or barriers); and 4) modify the existing models and define a new source model by more physics-based numerical simulation.

The above objectives should be considered integratively within the global stress regimes of the lithosphere. The stress difference between the maximum and minimum principal stresses increases from normal, strike-slip, to thrust fault at the same depth (Ranalli, 1995), which is consistent with the primary observation of differing spectral amplitudes for the faulting models discussed above. This may be helpful for further understanding of earthquake source spectra and stress drops. Different source

mechanism, for example, non-double-couple mechanism (e.g., Dahlen and Tromp, 1998; Chen, 1991), should also be taken into account in relation to source spectra.

Among many factors influencing source spectra, source mechanism finally may be an important remaining factor after other effects are removed.

Certainly, not all earthquakes were caused by the same mechanism even though they may occur in the same region. Tectonic background is only the very first-order control of crustal structure and evolution. However, the fracture modes may be varying and more complex over certain regions on a broad scale. Earthquakes are directly associated with a dynamic friction mechanism. Different types of faulting and shearing modes may cause some of the apparent differences in source spectra within a region. On the other hand, earthquakes with the same mechanism, but in different tectonic environments, may show similarity of source spectra in both spectral level and shape. Therefore, source spectra for different groups of events may be characterized by both the similarity over different tectonic environments and the contrast within the same tectonic regime. It should be useful to group events across regions by source mechanism, after all other corrections have been made, as shown in this thesis. Such comparisons will become more feasible as further data become available through enhancements to seismic monitoring.

With the possible exception of ENA, for which strong-motion data are lacking, all regions (interplate) studied show an overall average Brune stress drop about 100 – 150

bars (10 – 15 MPa). It should be pointed out that stress drop is not a well-defined parameter for earthquakes but varies within quite a large range of values. For instance, variations of stress drop within subduction zones varies between 0.1 and 100 MPa (Ruff, 1999). This parameter appears to be independent of seismic magnitude following the scaling law of self-similarity for a group of earthquake spectrum $A(f)$, which is also why small mining-induced events of $M_L = 1.2 - 2.3$ can yield a stress drop comparable to the natural earthquakes in the subduction or continental collision zones (e.g. Chen, 1991, 1996).

From energy conservation principles, a large earthquake causing a small stress drop (e.g., low spectral levels) implies that most of earthquake energy may be participating in frictional shearing on the fault plane and may be converted to heat. This may explain thermal anomalies at the plate interface (e.g., Ruff, 1999). For crustal earthquakes this principle remains the same. Importantly, energy participation in friction should bear some relation to the number and size of barriers or asperities on the friction surface. Such physical factors could be important in causing differences in source spectra, especially for earthquakes of the same magnitude observed in different fault zones or tectonic settings. Earthquakes having the same magnitude may not necessarily be characterized by the same spectral level, due to the specific faulting mechanisms. This is definitely an interesting topic for further research. Based on the regional comparison carried out in this thesis, I would highly recommend that a more physics-based numerical simulation on source spectra, but tied to empirical observations, be conducted.

8.4 Interpretation of high-frequency spectral level

With application of the single-corner source model (Brune, 1970, 1971), the term “stress drop” is consistently used in this thesis. In Brune’s simple point-source model, two source parameters were used: seismic moment (M_0) and stress drop ($\Delta\sigma$). The stress drop is related to the scaling of high frequency level ($A_{hf} \sim M_0 f_0^2$, for $f \gg f_0$), by $\Delta\sigma \sim M_0 f_0^3$, where the corner frequency, f_0 , is inversely proportional to the source duration or fault dimension ($f_0 \sim 1/d$). If the fault dimension (d) is recast in terms of stress drop using $M_0 \sim \Delta\sigma d^3$, the high frequency level can also be represented as $A_{hf} \sim M_0^{1/3} \Delta\sigma^{2/3}$. Thus in Brune’s model stress drop replaces the fault dimension in the source description (Atkinson and Beresnev, 1997).

Atkinson and Beresnev (1997) have suggested that this scaling parameter should not be called “stress drop”, and that the term stress drop be reserved for its earlier definition as a measure of fault slip divided by fault dimension. More recently, they described the maximum slip velocity as (Beresnev and Atkinson, 1999)

$$v_m = \frac{yz}{e} \frac{\Delta\sigma}{\rho\beta} \quad (8.3)$$

in which $y = 0.8$ is the ratio of the rupture-propagation velocity to shear velocity β , z is a scaling factor that controls the high-frequency level of the source spectrum, e is the base

of the natural logarithm, and $\Delta\sigma$ is the static stress drop represented by $\Delta\sigma \equiv \mu u(\infty)/L$, where L is the fault dimension, μ is the shear modulus, and ρ is the density. In this formulation, it is z that controls spectral amplitudes, while the static stress drop is fixed at its typical value of 50 bars. Beresnev and Atkinson (2000) show that a nominal “stress parameter” of 100 bars, in the context of the Brune model, (i.e., as used in this study) corresponds to a maximum slip velocity of about 0.5 m/s. The results of this study therefore suggest that slip velocity is a source parameter that is independent of magnitude and tectonic region.

Chapter 9

Conclusions

This thesis evaluated the Fourier spectra of earthquake shear radiation at near-source distances. “R1 spectra” or “1-km spectra” were defined as the Fourier spectra corrected for geometrical spreading and anelastic scattering attenuation to a reference distance of 1 km. “Apparent source spectra” were derived from the R1 spectra by correcting them for crustal/near-surface site amplifications and kappa effects (horizontal component). For the vertical component, only kappa effects need to be removed from the corresponding R1 source spectra to obtain apparent source spectra, under the assumption that crustal and near-surface site amplifications have negligible effects on vertical spectra, an assumption which is supported by real data in this study.

The near-surface site effects were classified by the average S-wave velocity in the top 30-m, while the crustal amplification was considered as the spectral response to the gross crustal structure (no details in the top 30 meters). For hard rock sites, the crustal/site amplification is approximately unity and thus the R1 spectra are approximately equal to the apparent source spectra. However, for soil sites the near-surface site effects cannot be ignored and should be removed to obtain the apparent source spectra.

The H/V ratio ($R_{H/V}$) appears to be a comprehensive indicator of the crustal and near-surface site effects. In this sense, the site amplification implies an integrated effect of the two factors (no need to separate the crustal and near-surface amplification). This has been verified by the fact that the H/V ratio fits generic rock and soil amplification functions down to 8-km depth (including the top 30 meters) for regional smoothed velocity models. The relationship of the H/V ratio ($R_{H/V}(f)$) with site amplification ($Amp(f)$) can be described by $R_{H/V}(f) = Amp(f) \exp(-\pi\kappa f)$. By application of the H/V functions to correct for the crustal/near-surface site amplification, the kappa effects are thus also removed (at least in part). The H/V ratio is a very useful parameter for not only describing site amplification, but also identifying site classes.

Both horizontal and vertical apparent source spectra show similarity for events in different tectonic regions. As a first approximation, the vertical spectra appear to better reflect the apparent source radiation. For this reason, the vertical component is a better basis for magnitude scales. For the horizontal spectra to be representative of source radiation, further corrections for crustal/near-surface site amplification and the residual kappa effects have been made with respect to the vertical spectra. Empirical models describing spectral amplitudes (A_1 , A_2 , A_5 , and A_{10}) as functions of m_1 were provided for each study region. General expressions of the empirical functions ($A_i(m_1)$) for H and V component were given, respectively, for all regions studied. Amplitude spectra as a function of frequency for earthquakes of small-to-moderate magnitude (e.g., $m_1 = 3.5 \pm 0.2$ to 6.0 ± 0.2) are in good agreement with the Brune point-source (1-corner) model (B70), while for larger events a finite-fault (AS00, 2-corner) model is preferred. Based on

the high-frequency spectral scaling relationships, it is inferred that the maximum slip velocity, of about 0.5 m/s, is a region-independent source parameter.

A new magnitude scale m_1 was defined based on the R1 source spectra, and it is a stable measure of the size of earthquakes. The relationship between moment magnitude, M , and m_1 was expressed as $M = -0.002(m_1 - 5)^2 + 1.0506(m_1 - 5) + 5.1561$. m_{hf} defined by Atkinson and Hanks (1995) was slightly modified for including a wide range of magnitudes from $M = 2.5$ to 8.5. All the m_1 , m_{hf} , and M were routinely calculated for the six regions, based on vertical-component spectra. Integrated databases containing the results, with the regional magnitudes (M_{rg}), H/V and/or amplification factor, site classification, and the Fourier spectra at 0.2, 0.5, 1, 2, 5 and 10 Hz, for both the horizontal and vertical components, are available in this thesis. For completeness of the database, conversions between the horizontal and vertical component for California, B.C. and ENA were made, based on studies of the H/V ratio or related amplification functions. This product will be of many potential applications in seismology and geotechnical engineering.

Large Fourier spectrum databases were developed in this study, for both the horizontal and vertical components, over a wide-range of epicentral distance, for strong motions in Japan, Mexico, and Turkey. The databases provide seismologists and engineers with the necessary information for both theoretical and engineering studies in earthquake seismology.

Discussion and recommendations were made in this thesis for further studies on potential inversion methods of site structure based on the H/V ratio, modification of source models, and relationship of source spectra and mechanism.

References

- Abrahamson, N. A. and K.M. Shedlock, 1997. Overview, *Seism. Res. Lett.*, 68, 9-23.
- Abrahamson, N.A. and W.J. Silva, 1997. Empirical response spectral attenuation relations for shallow crustal earthquakes, *Seism. Res. Lett.*, 68, 94-127.
- Abrahamson, N.A. and P.G. Somerville, 1993. Estimation of hanging wall and footwall effects on peak acceleration, *Proc. International Workshop on Strong Motion Data*, Menlo Park, California, Dec.13-17, 1993.
- Abrahamson, N.A. and P.G. Somerville, 1995. Effects of hanging wall and footwall on ground motions recorded during the Northridge earthquake, *Bull. Seism. Soc. Am.*, 86, S93-S99.
- Aki, K., 1988. Local site effects on strong ground motion, in J.L. Von Thun (ed.), *Earthquake Engineering and Soil Dynamics II – Recent Advances in Ground Motion Evaluation*, Geotechnical Special Publ. No. 20, Am. Soc. Civil Engineers, 103-155.
- Aki, K., 1993. Local site effects on weak and strong ground motion, *Tectonophysics*, 93-111.
- Aki, K. and P.G. Richards, 1980. *Quantitative Seismology: Theory and Methods*, W.H. Freeman and Co., New York, Vols. 1 and 2, 932 p.
- Abrahamson, N.A. and W.J. Silva, 1997. Empirical response spectral attenuation relations for shallow crustal earthquakes, *Seism. Res. Lett.*, 68, 94-127.
- Amirbekian, R.V. and B.A. Bolt, 1998. Spectral comparison of vertical and horizontal seismic strong ground motions in alluvial basins, *Earthquake Spectra*, 14, 573-595.
- Anderson, J.G., 1986. Implication of attenuation for studies of the earthquake source, in S. Das, J. Boatwright, and C.H. Scholz (editors.), *Earthquake Source Mechanics*, AGU, Washington, D.C., 311-318.
- Anderson, J.G., 1991. A preliminary descriptive model for the distance dependence of the spectral decay parameter in southern California, *Bull. Seism. Soc. Am.*, 81, 2186-2193.

- Anderson, J. and S. Hough, 1984. A model for the shape of the Fourier amplitude spectrum of acceleration at high frequencies, *Bull. Seism. Soc. Am.*, 74, 1969-1993.
- Anderson, J.G. and Y. Lei, 1994. Nonparametric description of peak acceleration as a function of magnitude, distance, and site in Guerrero, Mexico, *Bull. Seism. Soc. Am.*, 84, 1003-1017.
- Atkinson, G.M. and R.F. Mereu, 1992. The shape of ground motion attenuation curves in Southeastern Canada, *Bull. Seism. Soc. Am.*, 82, 2014-2031.
- Atkinson, G.M., 1993a. Notes on ground motion parameters for eastern North America: Duration and H/V ratio, *Bull. Seism. Soc. Am.*, 83, 587-596.
- Atkinson, G.M., 1993b. Source spectra for earthquakes in eastern North America, *Bull. Seism. Soc. Am.*, 83, 1778-1798.
- Atkinson, G.M., 1995. Attenuation and source parameters of earthquakes in the Cascadia region, *Bull. Seism. Soc. Am.*, 85, 1327-1342.
- Atkinson, G.M., 1996. The high-frequency shape of the source spectrum for earthquakes in eastern and western Canada, *Bull. Seism. Soc. Am.*, 106-112.
- Atkinson, G.M. and P.G. Somerville, 1994. Calibration of time history simulation methods, *Bull. Seism. Soc. Am.*, 84, 400-414.
- Atkinson, G.M. and D.M. Boore, 1995. New ground motion relations for eastern North America, *Bull. Seism. Soc. Am.*, 85, 17-30.
- Atkinson, G.M. and T.C. Hanks, 1995. A high-frequency magnitude scale, *Bull. Seism. Soc. Am.*, 85, 825-833.
- Atkinson, G.M. and D.M. Boore, 1997. Stochastic point-source modeling of ground motions in the Cascadia region, *Seism. Res. Lett.*, 68, 74-85.
- Atkinson, G.M. and I. Beresnev, 1997. Don't call it stress drop, *Seism. Res. Lett.*, 68, 3-4.
- Atkinson, G.M. and S.Z. Chen, 1997. Regional seismograms from historical earthquakes in southeastern Canada, *Seism. Res. Lett.*, 68, 797-807.
- Atkinson, G.M. and W. Silva, 1997. An empirical study of earthquake source spectra for California earthquakes, *Bull. Seism. Soc. Am.*, 87, 97-113.

- Atkinson, G.M. and D.M. Boore, 1998. Evaluation of models for earthquake source spectra in eastern North America, *Bull. Seism. Soc. Am.*, 88, 917-934.
- Atkinson, G.M. and J.F. Cassidy, 2000. Integrated use of seismograph and strong motion data to determine soil amplification: Response to the Fraser River Delta to the Duvall and Georgia Strait earthquakes, *Bull. Seism. Soc. Am.*, 90, 1028-1040.
- Atkinson, G.M. and W. Silva, 2000. Stochastic modeling of California Ground motions, *Bull. Seism. Soc. Am.*, 90, 255-274.
- Ben-Zion, Y., 1996. Stress, slip, and earthquakes in models of complex single-fault systems incorporating brittle and creep deformation, *J. Geophys. Res.*, 101, 5677-5706.
- Beresnev, I. and G. M. Atkinson, 1997. Modeling finite-fault radiation from the ω^n spectrum, *Bull. Seism. Soc. Am.*, 87, 67-84.
- Beresnev, I. and G.M. Atkinson, 1998. FINSIM – a FORTRAN program for simulating stochastic acceleration time histories from finite faults, *Seism. Res. Lett.*, 69, 27-32.
- Beresnev, I. and G.M. Atkinson, 1999. Generic finite-fault model for ground motion prediction in eastern North America, *Bull. Seism. Soc. Am.*, 88, 1392-1401.
- Beresnev, I. and G.M. Atkinson, 2000. Subfault structure of large earthquakes: A ground motion perspective, *Geophys. Res. Lett.*, in press.
- Blanpied, M.L., D. Lockner, and J.D. Byerlee, 1991. Fault stability inferred from granite sliding experiments at hydrothermal conditions, *Geophys. Res. Lett.*, 18, 609-612.
- Blanpied, M.L., D. Lockner, and J.D. Byerlee, 1995. Frictional slip of granite at hydrothermal conditions, *J. Geophys. Res.*, 100, 13,045-13,064.
- Boatwright, J., 1982. A dynamic model for far-field acceleration, *Bull. Seism. Soc. Am.*, 72, 1049-1068.
- Boatwright, J., 1988. The seismic radiation from composite models of faulting, *Bull. Seism. Soc. Am.*, 78, 489-508.

- Boatwright, J., 1994. Regional propagation characteristics and source parameters of earthquakes in northeastern North America, *Bull. Seism. Soc. Am.*, 84, 1-15.
- Boatwright, J. and G. Choy, 1992. Acceleration source spectra anticipated for large earthquakes in northeastern North America, *Bull. Seism. Soc. Am.*, 82, 660-682.
- Boatwright, J. and M. Cocco, 1996. Frictional constraints on crustal faulting, *J. Geophys. Res.*, 101, 13,895-13,909.
- Bolt, B.A., 1987. *Seismic Strong Motion Synthetics*, Academic Press Inc., Orlando, Florida, 328 p.
- Boore, D.M., 1983. Stochastic simulation of high-frequency ground motions based on seismological models of the radiated spectra, *Bull. Seism. Soc. Am.*, 73, 1865-1894.
- Boore, D.M., 1996. SMSIM – Fortran programs for simulating ground motions from earthquakes: Version 1.0 (updated version 1.7/99), U.S. Geol. Surv. Open-File Rept., 96-80-A, 73 p.
- Boore, D.M. and G.M. Atkinson, 1987. Stochastic prediction of ground motion and spectral response parameters at hard-rock sites in eastern North America, *Bull. Seism. Soc. Am.*, 77, 440-467.
- Boore, D.M., W.B. Joyner, and T.E. Fumal, 1993. Estimation of response spectra and accelerations from western North American earthquakes: An interim report, U.S. Geol. Surv. Open-File Rept., 93-509, 1-72.
- Boore, D. M. and W.B. Joyner, 1997. Site amplifications for generic rock sites, *Bull. Seism. Soc. Am.*, 87, 327-341.
- Boore, D.M., W.B. Joyner, and T.E. Fumal, 1997. Equations for estimating horizontal response spectra and peak acceleration from western North American earthquakes: A summary of recent work, *Seism. Res. Lett.*, 68, 128-153.
- Borcherdt, R.D., 1970. Effects of local geology on ground motion near San Francisco Bay, *Bull. Seism. Soc. Am.*, 60, 29-61.
- Brune, J., 1970. Tectonic stress and the spectra of seismic shear waves from earthquakes, *J. Geophys. Res.*, 75, 4997-5009.
- Brune, J., 1971. Correction, *J. Geophys. Res.*, 76, 5002.

- Brune, J.N. and A. Anooshehpour, 1999. Dynamic geometrical effects on strong ground motion in a normal fault model, *J. Geophys. Res.*, 104, 809-815.
- Burger, R., P. Somerville, J. Barker, R. Herrmann, and D. Helmberger, 1987. The effect of crustal structure on strong ground motion attenuation relations in eastern North America, *Bull. Seism. Soc. Am.*, 77, 420-439.
- BSSC, 1994. NEHRP recommended provisions for seismic regulations for new buildings, Part 1 – provisions, FEMA 222A, Federal Emergency Management Agency, 290 pp.
- Burger, R.W., P.G. Somerville, J.S. Barker, R.B. Herrmann, and D.V. Helmberger, 1987. The effect of crustal structure on strong ground motion attenuation relations in eastern North America, *Bull. Seism. Soc. Am.*, 77, 420-439.
- Campbell, K.W., 1985. Strong-motion attenuation relations: a ten-year perspective, *Earthquake Spectra*, 1, 759-804.
- Campbell, K.W. and Y. Bozorgnia, 1994. Empirical analysis of strong ground motion from the 1992 Landers, California, earthquake, *Bull. Seism. Soc. Am.*, 84, 573-588.
- Carver, D. and S.H. Hartzell, 1996. Earthquake site response in Santa Cruz, California, *Bull. Seism. Soc. Am.*, 86, 55-65.
- Castro, R.R., J.G. Anderson, and S.K. Singh, 1990. Site response, attenuation, and source spectra of S waves along the Guerrero, Mexico subduction zone, *Bull. Seism. Soc. Am.*, 80, 1481-1503.
- Castro, R.R. and L. Munguia, 1993. Attenuation of P and S waves in the Oaxaca, Mexico subduction zone, *Phys. Earth Planet. Interiors*, 76, 179-187.
- Castro, R.R., L. Munguia, and J.N. Brune, 1995. Source spectra and site response from P and S waves of local earthquakes in the Oaxaca, Mexico, subduction zone, *Bull. Seism. Soc. Am.*, 85, 923-936.
- Chen, S.Z., 1983. Deep structural features in southeastern China and adjoining seas, *J. Nanjing University (Natural Sciences Edn.)*, 19, 521-536.

- Chen, S.Z., 1989. Lithospheric structure beneath the Lower Yangzi Valley using the direct inverse method of multi-layered variable density, *Acta Geophysica Sinica*, 32, 20-35.
- Chen, S.Z., 1990. Geophysical and geological features of the Meso-Cenozoic Lower Yangtze rift zone, *Acta Geol. Sin.*, 3, 363-378.
- Chen, S.Z., 1990b. Inversion of multi-layered variable density models and study of crustal and upper mantle structure, *Science in China*, 33, 1002-1013.
- Chen, S.Z., 1991. Further Study on Source Parameters at Quirke Mine, Elliot Lake, Ontario, CANMET SP91-2E, Supply and Services Canada, Ottawa, 24p.
- Chen, S.Z., 1992. Crustal structure and dynamic analysis of seismogeny in the Lower Yangtze Valley-South Yellow Sea areas, *Acta Seism. Sin.*, 5, 749-758.
- Chen, S.Z., 1995. Deep structures in China and its adjacent areas: Plate tectonics and its metallogenic significance, *Acta Geol. Sin.*, 8, 223-239.
- Chen, S.Z., 1996. Microseismic characteristics of a failure zone in Ontario's Elliot Lake mines, Canada, in Y. Chen, B. Lu, and Z. Hao (eds.), *China's Postdoctoral Contributions to the 30th International geological Congress*, China Petroleum Industry Press, Beijing, 107-120.
- Chen, S.Z., 1998a. Dynamic friction: I. Experimental observations of rock friction, *Geotectonica et Metallogenia*, 22, 28-41.
- Chen, S.Z., 1998b. Dynamic friction: II. Depth distribution of earthquakes in continental crust, *Geotectonica et Metallogenia*, 22, 105-127.
- Chin, B.-H. and K. Aki, 1991. Simultaneous study of the source, path, and site effects on strong ground motion during the 1989 Loma Prieta earthquake: A preliminary result on pervasive nonlinear site effects, *Bull. Seism. Soc. Am.*, 81, 1859-1884.
- Christensen, N., 1996. Poisson's ratio and crustal seismology, *J. Geophys. Res.*, 101, 3139-3156.
- Christensen, N. and W. Mooney, 1995. Seismic velocity structure and composition of the continental crust: A global view, *J. Geophys. Res.*, 100, 9761-9788.

- Condie, K.C., 1997. Plate Tectonics and Crustal Evolution, 4th edn., Butterworth-Heinemann, Oxford, 282 p.
- Cooke, P., P. Maguire, R. Evans, and N. Laffoley, 1989. Seismicity near Lake Bogoria in the Kenya rift valley, in Mereu, R.F., Mueller, S., and D.M. Fountain (eds.), Properties and Processes of the Earth's Lower Crust, AGU, Washington, D.C., 175-177.
- Dahlen, F.A. and J. Tromp, 1998. Theoretical Global Seismology, Princeton University Press, Princeton, New Jersey, 1025 p.
- Day, S.M., 1996. RMS response of a one-dimensional half-space to SH, Bull. Seism. Soc. Am., 86, 363-370.
- Doyle, H., 1995. Seismology, John Wiley & Sons, Chichester, 218 p.
- EPRI, 1988. Engineering model of earthquake ground motion for eastern North America, EPRI NP-6074, Electric Power Research Institute, Palo Alto, California.
- Faccioli, E. and A. Tagliani, 1987. Attenuation of high frequency seismic waves in randomly heterogeneous rock media by finite difference simulations, in Cakmak (ed.), Ground Motion and Engineering Seismology, Elsevier, Amsterdam, 325-337.
- Fowler, C.M.R., 1996. The Solid Earth, Cambridge University Press, Cambridge, New York, 472 p.
- Frankel, A., 1991. High-frequency spectral falloff of earthquakes, fractal dimension of complex rupture, b value, and the scaling of strength on faults, J. Geophys. Res., 96, 6291-6302.
- Frankel, A., 1995. Simulating strong motions of large earthquakes using recordings of small earthquakes: the Loma Prieta mainshock as a test case, Bull. Seism. Soc. Am., 85, 1144-1160.
- Frankel, A., A. McGarr, J. Bicknell, J. Mori, L. Seeber, and E. Cranswick, 1990. Attenuation of high-frequency shear waves in the crust: Measurements from New York State, South Africa, and southern California, J. Geophys. Res., 95, 17,441-17,457.

- Frankel, A., D. Carver, E. Cranswick, M. Meremonte, T. Bice, and D. Overturf, 1999. Site responses for Seattle and source parameters of earthquakes in the Puget Sound region, *Bull. Seism. Soc. Am.*, 89, 468-483.
- Fukushima, Y., 1996. Scaling relations for strong ground motion prediction models, *Bull. Seism. Soc. Am.*, 86, 329-336.
- Gallart, J., N. Vidal, and J.J. Danobeitia, 1995. Multichannel seismic image of the crustal thinning at the NE Iberian margin combining normal and wide-angle reflection data, *Geophys. Res. Lett.*, 22, 489-492.
- Gibowicz, S.J., H.-P. Harjes, and M. Schafer, 1990. Source parameters of seismic events at Heinrich Robert Mine, Ruhr Basin, Federal Republic of Germany: Evidence for nondouble-couple events, *Bull. Seism. Soc. Am.*, 80, 88-109.
- Gubbins, D., 1990. *Seismology and Plate tectonics*, Cambridge University Press, Cambridge, 339 p.
- Haddon, R.A.W., 1996. Use of empirical Green's functions, spectral ratios, and kinematic source models for simulating strong ground motion, *Bull. Seism. Soc. Am.*, 86, 597-615.
- Hanks, T., 1982. $f_{\max}$, *Bull. Seism. Soc. Am.*, 72, 1867-1879.
- Hanks, T. and H. Kanamori, 1979. A moment magnitude scale, *J. Geophys. Res.*, 84, 2348-2350.
- Hanks, T.C. and R.K. McGuire, 1981. The character of high-frequency strong ground motion, *Bull. Seism. Soc. Am.*, 71, 2071-2095.
- Haskell, N.A., 1964. Total energy and energy spectra density of elastic waves from propagating faults, *Bull. Seism. Soc. Am.*, 54, 1811-1841.
- Hatzfeld, D., V. Karakostas, M. Ziazia, G. Selvaggi, S. Leborgne, C. Berge, R. Guiguet, A. Paul, P. Voidomatis, D. Diagourtas, I. Kassaras, I. Koutsikos, K. Makropoulos, R. Azzara, M. Di. Bona, S. Baccheschi, P. Bernard, and C. Papaioannou, 1997. The Kozani-Grevena (Greece) earthquake of 13 May 1995 revisited from a detailed seismological study, *Bull. Seism. Soc. Am.*, 87, 463-473.
- Hatzidimitriou, P.M., 1995. S-wave attenuation in the crust in northern Greece, *Bull. Seism. Soc. Am.*, 85, 1381-1387.

- Hearn, T.M. and J.F. Ni, 1994. Pn velocities beneath continental collision zones: the Turkish-Iranian Plateau, *Geophys. J. Int.*, 117, 273-283.
- Herrmann, R., 1985. An extension of random vibration theory estimates of strong ground motion to large distances, *Bull. Seism. Soc. Am.*, 75, 1447—1453.
- Herrmann, R.B. and A. Kijko, 1983. Modeling some empirical vertical component Lg relations, *Bull. Seism. Soc. Am.*, 73, 157-171.
- Hough, S.E., J.G. Anderson, J. Brune, F. Vernon, J. Berger, J. Fletcher, L. Haar, T. Hanks, and L. Baker, 1988. Attenuation near Anza, California, *Bull. Seism. Soc. Am.*, 78, 672-691.
- Humphrey Jr., J.R. and J.G. Anderson, 1992. Shear-wave attenuation and site response in Guerrero, Mexico, *Bull. Seism. Soc. Am.*, 81, 1622-1645.
- Humphrey, Jr., J.R. and J.G. Anderson, 1994. Seismic source parameters from the Guerrero subduction zone, *Bull. Seism. Soc. Am.*, 84, 1754-1769.
- Hutchings, L., 1994. Kinematic earthquake models and synthesized ground motion using empirical Green's functions, *Bull. Seism. Soc. Am.*, 84, 1028-1050.
- Hyndman, R.D., K. Wang, and M. Yamano, 1995. Thermal constraints on the seismogenic portion of the southwestern Japan subduction thrust, *J. Geophys. Res.*, 100, 15,373-15,392.
- IMRE, 1961-1964. Geological Map of Turkey, 1:500,000, Ankara, Turkey.
- Joyner, W.B. and D.M. Boore, 1981. Peak horizontal acceleration and velocity from strong motion records including records from the 1979 Imperial Valley, California, earthquake, *Bull. Seism. Soc. Am.*, 71, 2011-2038.
- Joyner, W.B., R.E. Warrick, and T.E. Fumal, 1981. The effect of Quaternary alluvium on strong ground motion in the Coyote Lake, California, earthquake of 1979, *Bull. Seism. Soc. Am.*, 71, 1333-1349.
- Kanamori, H., 1977. The energy release in great earthquakes, *J. Geophys. Res.*, 82, 2981-2987.
- Kanamori, H. and D.L. Anderson, 1975. Theoretical basis of some empirical relations in seismology, *Bull. Seism. Soc. Am.*, 65, 1073-1095.
- Kasahara, K., 1981. *Earthquake Mechanics*, Cambridge University Press, Cambridge, London, 248 p.

- Kearey, P. and F.J. Vine, 1996. *Global Tectonics*, 2nd edn., Blackwell Science, Oxford, 333 p.
- Kinoshita, S., 1994. Frequency-dependent attenuation of shear waves in the crust of the southern Kanto area, Japan, *Bull. Seism. Soc. Am.*, 84, 1387-1396.
- Kutas, R.I., V.P. Kobleev, and V.A. Tsvyashchenko, 1998. Heat flow and geothermal model of the Black Sea depression, *Tectonophysics*, 291, 91-100.
- Lamontagne, M. and G. Ranalli, 1997. Faults and spatial clustering of earthquakes near La Malbaie, Charlevoix seismic zone, Canada, *Seism. Res. Lett.*, 68, 337-352.
- Langston, C.A., 1979. Structure under Mount Rainier, Washington, inferred from teleseismic body waves, *J. Geophys. Res.*, 84, 4749-4762.
- Lay, T. and T.C. Wallace, 1995. *Modern Global Seismology*, Academic Press, San Diego, 521 p.
- Lermo, J. and F. J. Chavez-Garcia, 1993. Site effect evaluation using spectral ratios with only one station, *Bull. Seism. Soc. Am.*, 83, 1574-1594.
- Lio, Y., 1996. Depth-dependent change in the focal mechanism of shallow earthquakes: Implications for brittle-plastic transition in a seismogenic region, *J. Geophys. Res.*, 101, 11,209-11,216.
- List, R.D., 1982. The solution of the dynamic field of the Haskell fault model reconsidered, *Bull. Seism. Soc. Am.*, 72, 1069-1083.
- Malone, S., 1997. Foreword: Electronic seismologist, *Seism Res. Lett.*, 68, 766.
- Margaris, B.N. and D.M. Boore, 1998. Determination of $\Delta\sigma$ and χ_0 from response spectra of large earthquakes in Greece, *Bull. Seism. Soc. Am.*, 88, 170-180.
- McGuire, R.K. and T.C. Hanks, 1980. RMS accelerations and spectral amplitudes of strong ground motion during the San Fernando, California, earthquake, *Bull. Seism. Soc. Am.*, 70, 1907-1919.
- Meissner, R., 1986. *The Continental Crust*, Academic Press, Orlando, 426 p.
- Moya, A., J. Aguirre, and K. Irikura, 2000. Inversion of source parameters and site Effects from strong ground motion records using generic algorithms, *Bull. Seism. Soc. Am.*, 90, 977-992.
- Naeim, F. (ed.), 1989. *The Seismic Design Handbook*, VNR, New York, 450 p.

- Nakamura, Y., 1989. A method for dynamic characteristics estimation of subsurface using microtremor on the ground surface, *QR RTRI* 30, 25-33.
- Nau, R.F., R.M. Oliver, and K.S. Pister, 1982. Simulating and analyzing artificial nonstationary earthquake ground motions, *Bull. Seism. Soc. Am.*, 72, 615-636.
- Ni, J. and M. Barazangi, 1984. Seismotectonics of the Himalayan collision zone: Geometry of the underthrusting Indian plate beneath the Himalaya, *J. Geophys. Res.*, 89, 1147-1163.
- Nuttli, O.W., 1986. Yield estimates of Nevada test site explosions obtained from seismic L_g waves, *J. Geophys. Res.*, 91, 2137-2151.
- Nuttli, O.W. and R.B. Herrmann, 1987. Ground motion relations for eastern North American earthquakes, in A.S. Cakmak (ed.), *Ground Motion and Engineering Seismology*, Elsevier, Amsterdam, 231-241.
- Oglesby, D.D., R.J. Archuleta, and S.B. Nielsen, 1998. Earthquakes on dipping faults: The effects of broken symmetry, *Science*, 280, 1055-1059.
- Olsen, K.B. and R.J. Archuleta, 1996. Three-dimensional simulation of earthquakes on the Los Angeles fault system, *Bull. Seism. Soc. Am.*, 86, 575-596.
- Ou, G.-B. and R.B. Herrmann, 1990. A statistical model for ground motion produced by earthquakes at local and regional distances, *Bull. Seism. Soc. Am.*, 80, 1397-1417.
- Pandey, M.R., R.P. Tandukar, J.P. Avouac, J. Lave, and J.P. Massot, 1995. Interseismic strain accumulation on the Himalayan crustal ramp (Nepal), *Geophys. Res. Lett.*, 22, 751-754.
- Papageorgiou, A.S. and K. Aki, 1983a. A specific barrier model for the quantitative description of inhomogeneous faulting and the prediction of strong ground motion: I. Description of the model, *Bull. Seism. Soc. Am.*, 73, 693-722.
- Papageorgiou, A.S. and K. Aki, 1983b. A specific barrier model for the quantitative description of inhomogeneous faulting and the prediction of

- strong motion, part II. application of the model, *Bull. Seism. Soc. Am.*, 73, 953-978.
- Papazachos, B.C., A.A. Kiratzi, and B.G. Karacostas, 1997. Toward a homogeneous moment-magnitude determination for earthquakes in Greece and the surrounding area, *Bull. Seism. Soc. Am.*, 87, 474-483.
- Pezzo, E.D., J. Ibanez, J. Morales, A. Akinci, and R. Maresca, 1995. Measurements of intrinsic and scattering seismic attenuation in the crust, *Bull. Seism. Soc. Am.*, 85, 1373-1380.
- Pinar, A., 1998. Source inversion of the October 1, 1995, Dinar earthquake ($M_S = 6.1$): A rupture model with implications for seismotectonics in SW Turkey, *Tectonophysics*, 292, 255-266.
- Ranalli, G., 1995. *Rheology of the Earth*, 2nd edn., Chapman & Hall, London, 413 p.
- Raoof, M., R.B. Herrmann, and L. Malagnini, 1999. Attenuation and excitation of three-component ground motion in southern California, *Bull. Seism. Soc. Am.*, 89, 888-902.
- Reiter, L., 1990. *Earthquake Hazard Analysis*, Columbia University Press, New York, 254 p.
- Rogers, A., R. Borchardt, P. Covington, and D. Perkins, 1984. A comparative ground response study near Los Angeles using recordings of Nevada nuclear tests and the 1971 San Fernando earthquake, *Bull. Seism. Soc. Am.*, 74, 1925-1949.
- Ruff, L.J. 1999. Dynamic stress drop of recent earthquakes: Variations within subduction zones, *Pure Appl. Geophys.*, 409-431.
- Sabetta, F. and A. Pugliese, 1996. Estimation of response spectra and simulation of nonstationary earthquake ground motions, *Bull. Seism. Soc. Am.*, 86, 337-352.
- Saragoni, G.R. and G.C. Hart, 1974. Simulation of artificial earthquakes, *Earthquake Eng. Struct. Dyn.*, 2, 249-267.
- Sato, H., 1989. Broadening of seismogram envelopes in the randomly inhomogeneously lithosphere based on the parabolic approximation: Southeastern Honshu, Japan, *J. Geophys. Res.*, 94, 17,735-17,747.
- Sato, H. and M.C. Fehler, 1998. *Seismic Wave Propagation and Scattering in the Heterogeneous Earth*, AIP Press, Springer, 308 p.

- Sato, T., D.V. Helmberger, P.G. Somerville, R.W. Graves, and C.K. Saikia, 1998a. Estimations of regional and local strong motions during the great 1923 Kanto, Japan, earthquake (M_s 8.2), Part 1: source estimation of a calibration event and modeling of wave propagation paths, *Bull. Seism. Soc. Am.*, 88, 183-205.
- Sato, T., R.W. Graves, P.G. Somerville, and S. kataoka, 1998b. Estimations of regional and local strong motions during the great 1923 Kanto, Japan, earthquake (M_s 8.2), Part 2: forward simulation of seismograms using variable-slip rupture models and estimation of near-fault long-period ground motions, *Bull. Seism. Soc. Am.*, 88, 206-227.
- Scherbaum, F., 1994. *Basic Concepts in Digital Signal Processing for Seismologists*, Springer-Verlag, Berlin, 158 p.
- Schneider, J.F., W.J. Silva, and C. Stark, 1993. Ground motion model for the 1989 M 6.9 Loma Prieta earthquake including effects of source, path, and site, *Earthquake Spectra*, 9, 251-287.
- Scholz, C.H., 1988. The critical slip distance for seismic faulting, *Nature*, 336, 761-763.
- Scholz, C.H., 1990. *The Mechanics of Earthquakes and Faulting*, Cambridge University Press, Cambridge, New York, 439 p.
- Shi, B., Y. Zeng, and J.N. Brune, 1997. Numerical simulations of earthquake ruptures: A comparison between thrust, normal, and contained strike-slip faulting, *Seism. Res. Lett.*, 68, 333.
- Siddiqi, J., 2000. M.Sc. Thesis, Carleton University, Ottawa.
- Singh, S.K., J. Lermo, T. Dominguez, M. Ordaz, J.M. Espinosa, E. Mena, and R. Quaas, 1988. The Mexico earthquake of September 19, 1985 – A study of amplification of seismic waves in the valley of Mexico with respect to a hill zone site, *Earthquake Spectra*, 4, 653-673.
- Singh, S.K., M. Ordaz, J.G. Anderson, M. Rodriguez, R. Quaas, E. Mena, M. Ottaviani, and D. Almora, 1989. Analysis of near-source strong-motion recordings along the Mexican subduction zone, *Bull. Seism. Soc. Am.*, 79, 1697-1717.
- Somerville, P.G., J.P. McLaren, C.K. Saikia, and D.V. Helmberger, 1990. The 25 November, 1988 Saguenay, Quebec earthquake: source parameters and the

attenuation of strong ground motion, *Bull. Seism. Soc. Am.*, 80, 1118-1143.

Somerville, P.G., M.K. Sen, and B.P. Cohee, 1991. Simulation of strong ground motions recorded during the 1985 Michoacan, Mexico, and Valaparaíso, Chile, earthquakes, *Bull. Seism. Soc. Am.*, 81, 1-27.

Somerville, P., C. Saikia, D. Wald, and R. Graves, 1996. Implications of the Northridge earthquake for strong ground motions from thrust faults, *Bull. Seism. Soc. Am.*, 86, S115-S125.

Somerville, P., C. Saikia, D. Wald, and R. Graves, 1996. Implications of the Northridge earthquake for strong ground motions from thrust faults, *Bull. Seism. Soc. Am.*, 86, S115-S125.

Song, X.J. and D.V. Helmberger, 1996. Source estimation of finite faults from broadband regional networks, *Bull. Seism. Soc. Am.*, 86, 797-804.

Street, R.L., R.B. Herrmann, and O.W. Nuttli, 1975. Spectral characteristics of the Lg wave generated by central United States earthquakes, *Bull. Seism. Soc. Am.*, 41, 51-63.

Su, F., J.G. Anderson, J.N. Brune, and Y. Zeng, 1996. A comparison of direct S-wave and coda-wave site amplification determined from aftershocks of the Little Skull Mountain earthquake, *Bull. Seism. Soc. Am.*, 86, 1006-1018.

Takahashi, R. and K. Hirano, 1941. Seismic vibrations of soft ground, *Bull. Earthquake Res. Inst., Tokyo University*, 19, 534-543.

Taylor, B., K. Crook, and J. Sinton, 1994. Extensional transform zones and oblique spreading centers, *J. Geophys. Res.*, 99, 19,707-19,718.

Theodulidis, N., P.-Y. Bard, R. Archuleta, and M. Bouchon, 1996. Horizontal-to-vertical spectral ratio and geological conditions: The case of Garner Valley downhole array in southern California, *Bull. Seism. Soc. Am.*, 86, 306-319.

Thio, H.K. and H. Kanamori, 1996. Source complexity of the 1994 Northridge earthquake and its relation to aftershock mechanisms, *Bull. Seism. Soc. Am.*, 86, S84-S92.

- Thompson, G. and W.G. Melson, 1972. The petrology of oceanic crust across fracture zones in the Atlantic Ocean: Evidence of a new kind of sea-floor spreading, *J. Geol.*, 80, 526-538.
- Toro, G. and R. McGuire, 1987. An investigation into earthquake ground motion characteristics in eastern North America, *Bull. Seism. Soc. Am.*, 77, 468-489.
- Tse, S.T. and J.R. Rice, 1986. Crustal earthquake instability in relation to the depth variation of frictional slip properties, *J. Geophys. Res.*, 91, 9452-9472.
- Udias, A., 1982. Seismicity and seismotectonic stress field in the Alpine-Mediterranean region, in Berckhemer, H. and K. Hsü (eds.), *Alpine-Mediterranean Geodynamics*, AGU, Washington, D.C., 75-82.
- Valdes, C.M., W.D. Mooney, S.K. Singh, R.P. Meyer, C. Lomnitz, J.H. Luetgert, C.E. Helsley, B.T.R. Lewis, and M. Mena, 1986. Crustal structure of Oaxaca, Mexico, from seismic refraction measurements, *Bull. Seism. Soc. Am.*, 76, 547-563.
- Walcott, C.R. and S.H. White, 1998. Constraints on the kinematics of post-orogenic extension imposed by stretching lineations in the Aegean region, *Tectonophysics*, 298, 155-175.
- Wald, D., 1997. Surfing the Internet for strong-motion data, *Seism. Res. Lett.*, 68, 766-769.
- Wald, D.J., T.H. Heaton, and K.W. Hudnut, 1996. The slip history of the 1994 Northridge, California, earthquake determined from strong-motion, teleseismic, GPS, and leveling data, *Bull. Seism. Soc. Am.*, 86, S49-S70.
- Wells, D. and K. Coppersmith, 1994. New empirical relationships among magnitude, rupture length, rupture width, rupture area, and surface displacement, *Bull. Seism. Soc. Am.*, 84, 974-1002.
- Wilhelm, H., A. Berktold, K.-P. Bonjer, K. Jager, A. Stiefel, and K.-M. Strack, 1989. Heat flow, electrical conductivity and seismicity in the Black Forest crust, SW Germany, in Mereu, R.F., Mueller, S., and D.M. Fountain (eds.), *Properties and Processes of the Earth's Lower Crust*, AGU, Washington, D.C., 215-232.
- Wyss, M., 1991. Increased mean depth of earthquakes at Parkfield, *Geophys. Res. Lett.*, 18, 617-620.

- Yang, J. and T. Sato, 2000. Interpretation of seismic vertical amplification observed at an array site, *Bull. Seism. Soc. Am.*, 90, 275-285.
- Youngs, R.R., N. Abrahamson, F.I. Makdisi, and K. Sadigh, 1995. Magnitude-dependent variance of peak ground acceleration, *Bull. Seism. Soc. Am.*, 85, 1161-1176.
- Yuncha, Z.A. and F. Luzon, 2000. On the horizontal-to-vertical spectral ratio in sedimentary basins, *Bull. Seism. Soc. Am.*, 90, 1101-1106.
- Zeng, Y., J.G. Anderson, and G. Yu, 1994. A composite source model for computing realistic synthetic strong ground motions, *Geophys. Res. Lett.*, 21, 725-728.

Appendixes

(1 – 5)

Appendix 1

Catalog of strong motion earthquake records, $R \leq 100$ km,

Japan (3 components)

yr	mm	dd	magtype	Lat.	Long.	stn	R (km)	h (km)
				□				
1998	2	22	3.9JMA	37.3	138.8	NIG019	20.0	20.0
				□				
1998	2	22	3.9JMA	37.3	138.8	NIG017	26.0	20.0
1998	2	22	3.9JMA	37.3	138.8	NIG020	28.0	20.0
1998	2	22	3.9JMA	37.3	138.8	NIG021	28.0	20.0
1998	2	22	3.9JMA	37.3	138.8	NIG018	34.0	20.0
1998	2	22	3.9JMA	37.3	138.8	NIG022	36.0	20.0
1998	2	22	3.9JMA	37.3	138.8	NIG024	48.0	20.0
1998	2	22	3.9JMA	37.3	138.8	GNM002	64.0	20.0
1998	2	22	3.9JMA	37.3	138.8	FKS030	83.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG019	20.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG017	26.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG020	28.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG021	28.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG018	34.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG022	36.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG023	41.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG016	43.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG024	48.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG013	56.0	20.0
1998	2	21	5.0JMA	37.3	138.8	FKS028	61.0	20.0
1998	2	21	5.0JMA	37.3	138.8	GNM002	64.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG015	64.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG025	69.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG011	70.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG026	71.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NGN001	72.0	20.0
1998	2	21	5.0JMA	37.3	138.8	FKS029	77.0	20.0
1998	2	21	5.0JMA	37.3	138.8	GNM001	79.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NGN003	79.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG005	79.0	20.0
1998	2	21	5.0JMA	37.3	138.8	GNM003	81.0	20.0
1998	2	21	5.0JMA	37.3	138.8	GNM004	81.0	20.0
1998	2	21	5.0JMA	37.3	138.8	FKS030	83.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG004	83.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NGN002	88.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG012	89.0	20.0
1998	2	21	5.0JMA	37.3	138.8	GNM006	90.0	20.0
1998	2	21	5.0JMA	37.3	138.8	TCG004	91.0	20.0
1998	2	21	5.0JMA	37.3	138.8	NIG003	95.0	20.0

1998	2	21	5.0JMA	37.3	138.8NIG002	96.0	20.0
1998	2	21	5.0JMA	37.3	138.8NIG009	96.0	20.0
1998	2	21	5.0JMA	37.3	138.8GNM007	98.0	20.0
1998	2	15	3.7JMA	31.8	130.3KGS007	10.0	10.0
1998	2	15	3.7JMA	31.8	130.3KGS010	14.0	10.0
1998	2	15	3.7JMA	31.8	130.3KGS005	22.0	10.0
1998	2	15	3.7JMA	31.8	130.3KGS011	26.0	10.0
1998	2	15	3.7JMA	31.8	130.3KGS002	34.0	10.0
1998	2	15	3.7JMA	31.8	130.3KGS003	44.0	10.0
1998	2	15	3.7JMA	31.8	130.3KGS016	44.0	10.0
1998	2	15	3.7JMA	31.8	130.3KGS006	47.0	10.0
1998	2	15	3.7JMA	31.8	130.3KMM015	48.0	10.0
1998	2	11	5.0JMA	42.0	142.4HKD106	71.0	60.0
1998	2	11	5.0JMA	42.0	142.4HKD109	75.0	60.0
1998	2	11	5.0JMA	42.0	142.4HKD107	77.0	60.0
1998	2	11	5.0JMA	42.0	142.4HKD110	86.0	60.0
1998	2	11	5.0JMA	42.0	142.4HKD105	88.0	60.0
1998	2	10	4.3JMA	35.7	137.1GIF013	13.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF011	17.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF016	21.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF010	22.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF015	29.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF021	33.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF008	34.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF025	36.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF014	38.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF009	39.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF006	41.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF019	45.0	10.0
1998	2	10	4.3JMA	35.7	137.1AIC002	50.0	10.0
1998	2	10	4.3JMA	35.7	137.1NGN018	51.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF018	52.0	10.0
1998	2	10	4.3JMA	35.7	137.1FKI011	53.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF007	58.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF002	65.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF001	68.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF012	69.0	10.0
1998	2	10	4.3JMA	35.7	137.1AIC009	70.0	10.0
1998	2	10	4.3JMA	35.7	137.1NGN019	71.0	10.0
1998	2	10	4.3JMA	35.7	137.1AIC004	73.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF003	74.0	10.0
1998	2	10	4.3JMA	35.7	137.1GIF004	78.0	10.0
1998	2	10	4.3JMA	35.7	137.1AIC008	86.0	10.0
1998	2	10	4.3JMA	35.7	137.1AIC010	89.0	10.0
1998	2	10	4.3JMA	35.7	137.1AIC012	89.0	10.0
1998	2	10	4.3JMA	35.7	137.1MIE003	97.0	10.0
1998	2	10	4.3JMA	35.7	137.1NGN020	97.0	10.0
1998	2	10	4.3JMA	35.7	137.1NGN025	97.0	10.0
1998	2	10	4.3JMA	35.7	137.1AIC014	99.0	10.0
1998	2	10	4.3JMA	35.7	137.1MIE002	100.0	10.0
1998	2	5	5.1JMA	43.2	145.8HKD074	53.0	50.0
1998	2	5	5.1JMA	43.2	145.8HKD073	56.0	50.0
1998	2	5	5.1JMA	43.2	145.8HKD072	59.0	50.0
1998	2	5	5.1JMA	43.2	145.8HKD070	78.0	50.0
1998	2	5	5.1JMA	43.2	145.8HKD071	78.0	50.0
1998	2	5	5.1JMA	43.2	145.8HKD075	90.0	50.0
1998	2	5	5.1JMA	43.2	145.8HKD069	93.0	50.0

1998	2	4	4.7JMA	41.9	142.3HKD106	77.0	60.0
1998	2	4	4.7JMA	41.9	142.3HKD108	77.0	60.0
1998	2	4	4.7JMA	41.9	142.3HKD109	85.0	60.0
1998	2	4	4.7JMA	41.9	142.3HKD105	92.0	60.0
1998	2	4	4.7JMA	41.9	142.3HKD110	96.0	60.0
1997	5	13	6.2JMA	32.0	130.3KGS002	14.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS004	14.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS005	22.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS007	22.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS001	26.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM015	27.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS010	33.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS003	34.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM022	38.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS008	41.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM020	43.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM018	46.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS006	47.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS011	47.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM013	48.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS036	52.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM016	54.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM021	54.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS012	55.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS009	60.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS016	65.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM012	65.0	8.0
1997	5	13	6.2JMA	32.0	130.3NGS014	69.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM010	71.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS014	72.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM014	73.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS018	75.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM017	75.0	8.0
1997	5	13	6.2JMA	32.0	130.3MYZ010	75.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS037	77.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS019	81.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM008	86.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS020	87.0	8.0
1997	5	13	6.2JMA	32.0	130.3NGS012	87.0	8.0
1997	5	13	6.2JMA	32.0	130.3NGS013	88.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS013	89.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS021	91.0	8.0
1997	5	13	6.2JMA	32.0	130.3MYZ015	91.0	8.0
1997	5	13	6.2JMA	32.0	130.3KGS017	93.0	8.0
1997	5	13	6.2JMA	32.0	130.3KMM011	93.0	8.0
1997	5	13	6.2JMA	32.0	130.3MYZ007	94.0	8.0
1997	5	13	6.2JMA	32.0	130.3NGS010	94.0	8.0
1997	5	13	6.2JMA	32.0	130.3NGS009	98.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS002	14.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS005	15.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS003	23.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS004	24.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS007	24.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM015	25.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS001	33.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS008	34.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS006	36.0	8.0

1997	3	26	6.3JMA	32.0	130.4KGS010	36.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM013	43.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM016	44.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM018	44.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS011	47.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM022	47.0	8.0
1997	3	26	6.3JMA	32.0	130.4MYZ009	47.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM020	48.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS012	49.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS009	51.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM012	61.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM021	62.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS036	63.0	8.0
1997	3	26	6.3JMA	32.0	130.4MYZ010	64.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM014	65.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM017	65.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS014	66.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS016	66.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM010	68.0	8.0
1997	3	26	6.3JMA	32.0	130.4NGS014	71.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS018	72.0	8.0
1997	3	26	6.3JMA	32.0	130.4MYZ012	75.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS013	80.0	8.0
1997	3	26	6.3JMA	32.0	130.4MYZ015	80.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS019	81.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM008	81.0	8.0
1997	3	26	6.3JMA	32.0	130.4MYZ007	84.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS017	85.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS020	85.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM011	86.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS021	87.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS037	87.0	8.0
1997	3	26	6.3JMA	32.0	130.4NGS012	87.0	8.0
1997	3	26	6.3JMA	32.0	130.4KGS015	93.0	8.0
1997	3	26	6.3JMA	32.0	130.4MYZ011	95.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM006	96.0	8.0
1997	3	26	6.3JMA	32.0	130.4NGS013	96.0	8.0
1997	3	26	6.3JMA	32.0	130.4MYZ020	97.0	8.0
1997	3	26	6.3JMA	32.0	130.4KMM009	100.0	8.0
1997	3	26	6.3JMA	32.0	130.4NGS010	100.0	8.0
1997	3	3	5.0JMA	35.0	139.2SZO002	11.0	3.0
1997	3	3	5.0JMA	35.0	139.2SZO001	20.0	3.0
1997	3	3	5.0JMA	35.0	139.2SZO003	26.0	3.0
1997	3	3	5.0JMA	35.0	139.2SZO007	28.0	3.0
1997	3	3	5.0JMA	35.0	139.2KNG013	29.0	3.0
1997	3	3	5.0JMA	35.0	139.2TKY008	32.0	3.0
1997	3	3	5.0JMA	35.0	139.2SZO008	38.0	3.0
1997	3	3	5.0JMA	35.0	139.2SZO009	38.0	3.0
1997	3	3	5.0JMA	35.0	139.2KNG010	41.0	3.0
1997	3	3	5.0JMA	35.0	139.2KNG012	42.0	3.0
1997	3	3	5.0JMA	35.0	139.2TKY009	44.0	3.0
1997	3	3	5.0JMA	35.0	139.2SZO010	45.0	3.0
1997	3	3	5.0JMA	35.0	139.2SZO006	46.0	3.0
1997	3	3	5.0JMA	35.0	139.2KNG004	50.0	3.0
1997	3	3	5.0JMA	35.0	139.2KNG009	52.0	3.0
1997	3	3	5.0JMA	35.0	139.2KNG005	53.0	3.0
1997	3	3	5.0JMA	35.0	139.2SZO004	58.0	3.0

1997	3	3	5.0JMA	35.0	139.2KNG003	59.0	3.0
1997	3	3	5.0JMA	35.0	139.2KNG008	65.0	3.0
1997	3	3	5.0JMA	35.0	139.2SZO012	65.0	3.0
1997	3	3	5.0JMA	35.0	139.2KNG002	68.0	3.0
1997	3	3	5.0JMA	35.0	139.2SZO011	68.0	3.0
1997	3	3	5.0JMA	35.0	139.2TKY005	68.0	3.0
1997	3	3	5.0JMA	35.0	139.2TKY010	70.0	3.0
1997	3	3	5.0JMA	35.0	139.2CHB019	72.0	3.0
1997	3	3	5.0JMA	35.0	139.2YMN002	73.0	3.0
1997	3	3	5.0JMA	35.0	139.2CHB021	79.0	3.0
1997	3	3	5.0JMA	35.0	139.2CHB022	81.0	3.0
1997	3	3	5.0JMA	35.0	139.2KNG001	81.0	3.0
1997	3	3	5.0JMA	35.0	139.2TKY002	81.0	3.0
1997	3	3	5.0JMA	35.0	139.2TKY006	84.0	3.0
1997	3	3	5.0JMA	35.0	139.2TKY003	89.0	3.0
1997	3	3	5.0JMA	35.0	139.2CHB015	90.0	3.0
1997	3	3	5.0JMA	35.0	139.2TKY007	95.0	3.0
1997	2	20	5.6JMA	41.8	142.9HKD110	62.0	50.0
1997	2	20	5.6JMA	41.8	142.9HKD111	62.0	50.0
1997	2	20	5.6JMA	41.8	142.9HKD112	65.0	50.0
1997	2	20	5.6JMA	41.8	142.9HKD109	66.0	50.0
1997	2	20	5.6JMA	41.8	142.9HKD108	80.0	50.0
1997	2	20	5.6JMA	41.8	142.9HKD100	87.0	50.0
1997	2	20	5.6JMA	41.8	142.9HKD107	95.0	50.0
1997	2	20	5.6JMA	41.8	142.9HKD106	98.0	50.0
1997	1	18	6.0JMA	28.9	129.9KGS030	64.0	30.0
1997	1	18	6.0JMA	28.9	129.9KGS031	88.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ013	38.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ014	45.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ016	45.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ008	51.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ011	53.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ006	58.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ018	63.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ012	67.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ015	67.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ005	75.0	30.0
1996	12	3	6.3JMA	31.8	131.6KGS013	77.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ004	77.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ007	78.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ010	79.0	30.0
1996	12	3	6.3JMA	31.8	131.6KGS015	83.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ019	85.0	30.0
1996	12	3	6.3JMA	31.8	131.6KGS022	89.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ020	93.0	30.0
1996	12	3	6.3JMA	31.8	131.6KMM017	95.0	30.0
1996	12	3	6.3JMA	31.8	131.6MYZ009	96.0	30.0
1996	12	3	6.3JMA	31.8	131.6KGS009	98.0	30.0
1996	12	3	6.3JMA	31.8	131.6KGS017	98.0	30.0

Appendix 2

Catalog of strong motion earthquake records, $R \leq 100$ km,

Mexico (3 components)

yr	mm	dd	magtype	Lat.	Long.	stn	R (km)	h (km)
97	8	25	3.9Mc	16.75	100.00	VNTA	29.0	7.0
97	8	14	4.0Mc	16.73	100.19	COYC	30.0	8.0
97	8	14	4.0Mc	16.73	100.19	VNTA	48.0	8.0
97	8	5	4.2Mc	16.75	99.63	COYC	72.0	46.0
97	8	2	4.2Mc	17.20	100.48	ATYC	34.0	33.0
97	7	24	4.3Mc	16.91	100.59	ATYC	44.0	22.0
97	7	24	4.5Mc	16.63	100.70	ATYC	73.0	16.0
97	7	21	4.5Mc	17.17	99.92	NUXC	96.0	24.0
97	7	19	4.5Mc	17.27	100.39	ATYC	45.0	44.0
97	7	19	4.9Mc	17.22	100.43	ATYC	56.0	56.0
97	7	19	4.9Mc	17.22	100.43	CAYR	62.0	56.0
97	7	19	4.9Mc	17.22	100.43	NUXC	67.0	56.0
97	7	19	4.5Mc	17.27	100.39	SLUI	71.0	44.0
97	7	19	4.9Mc	17.22	100.43	COYC	74.0	56.0
97	7	19	4.9Mc	17.22	100.43	SLUI	76.0	56.0
97	7	19	4.5Mc	17.27	100.39	PAPN	84.0	44.0
97	7	19	4.9Mc	17.22	100.43	OCLL	86.0	56.0
97	7	19	4.9Mc	17.22	100.43	PAPN	89.0	56.0
97	7	19	4.9Mc	17.22	100.43	VNTA	94.0	56.0
97	7	16	4.0Mc	16.84	100.10	CPDR	53.0	11.0
97	7	15	4.0Mc	16.81	99.54	CPDR	33.0	31.0
97	7	15	4.0Mc	16.81	99.54	POZU	46.0	31.0
97	7	11	4.3Ma	16.56	99.65	CPDR	25.0	10.0
97	7	11	4.3Ma	16.56	99.65	SMR2	37.0	10.0
97	7	11	4.3Ma	16.56	99.65	VNTA	45.0	10.0
97	7	11	4.3Ma	16.56	99.65	OCLL	60.0	10.0
97	7	11	4.3Ma	16.56	99.65	POZU	61.0	10.0
97	7	11	4.3Ma	16.56	99.65	COYC	67.0	10.0
97	6	28	4.1Mc	16.88	99.63	CPDR	14.0	7.0
97	6	28	4.1Mc	16.88	99.63	VNTA	22.0	7.0
97	6	28	4.1Mc	16.88	99.63	POZU	25.0	7.0
97	6	26	3.9Mc	16.80	99.94	CPDR	36.0	11.0
97	6	24	3.5Mc	16.87	99.92	CPDR	35.0	9.0
97	6	17	4.2Mc	17.48	101.49	PAPN	60.0	29.0
97	6	15	4.0Mc	17.34	100.39	ATYC	34.0	31.0
97	5	29	4.5Mc	18.40	101.80	UNIO	64.0	44.0
97	5	22	5.9Me	18.43	101.79	VILE	89.0	61.0
97	5	21	4.7Mc	18.50	101.83	VILE	76.0	33.0
97	5	19	4.3Mc	17.29	100.23	SUCH	47.0	9.0
97	5	19	4.3Mc	17.29	100.23	NUXC	60.0	9.0
97	5	14	4.2Mc	17.31	100.44	ATYC	31.0	29.0

97	5	8	5.1Me	17.26	100.38ATYC	16.0	14.0
97	5	8	5.1Me	17.26	100.38CAYR	30.0	14.0
97	5	8	5.1Me	17.26	100.38SUCH	32.0	14.0
97	5	8	5.1Me	17.26	100.38NUXC	44.0	14.0
97	5	8	5.1Me	17.26	100.38COYC	48.0	14.0
97	5	8	5.1Me	17.26	100.38SLUI	59.0	14.0
97	5	8	5.1Me	17.26	100.38PAPN	75.0	14.0
97	5	8	5.1Me	17.26	100.38POZU	86.0	14.0
97	5	7	3.6Mc	17.19	101.04PAPN	38.0	35.0
97	4	28	4.1Mc	18.09	99.82TNLP	47.0	37.0
97	4	22	4.0Mc	17.10	100.68ATYC	34.0	16.0
97	4	22	3.5Mc	17.33	100.15ATYC	44.0	28.0
97	4	18	3.7Mc	16.81	100.05SMR2	74.0	20.0
97	3	24	4.3Mc	17.31	100.99PAPN	28.0	27.0
97	3	24	4.3Mc	17.31	100.99SLUI	30.0	27.0
97	3	23	4.7Mc	17.43	100.85SLUI	23.0	15.0
97	3	23	4.7Mc	17.43	100.85PAPN	28.0	15.0
97	3	23	4.7Mc	17.43	100.85NUXC	31.0	15.0
97	3	23	4.7Mc	17.43	100.85SUCH	35.0	15.0
97	3	23	4.7Mc	17.43	100.85PETA	50.0	15.0
97	3	23	4.7Mc	17.43	100.85ATYC	54.0	15.0
97	3	22	4.9Mc	17.03	99.82OCLL	28.0	27.0
97	3	22	4.9Mc	17.03	99.82VNTA	30.0	27.0
97	3	22	4.9Mc	17.03	99.82ACAN	33.0	27.0
97	3	22	4.9Mc	17.03	99.82POZU	35.0	27.0
97	3	22	4.9Mc	17.03	99.82COYC	40.0	27.0
97	3	22	4.9Mc	17.03	99.82CPDR	45.0	27.0
97	3	22	4.9Mc	17.03	99.82OCTT	50.0	27.0
97	3	22	4.6Mc	16.52	100.05VNTA	56.0	22.0
97	3	22	4.6Mc	16.52	100.05CPDR	58.0	22.0
97	3	22	4.9Mc	17.03	99.82SMR2	60.0	27.0
97	3	22	4.9Mc	17.03	99.82ATYC	76.0	27.0
97	3	20	3.9Mc	16.93	101.38PAPN	59.0	11.0
97	3	16	4.1Mc	17.15	99.97VNTA	34.0	15.0
97	3	16	4.1Mc	17.15	99.97ATYC	54.0	15.0
97	3	10	4.3Mc	16.84	100.13NUXC	83.0	16.0
97	3	10	4.3Mc	16.84	100.13SLUI	98.0	16.0
97	3	6	4.2Mc	17.07	100.23COYC	30.0	23.0
97	3	6	4.2Mc	17.07	100.23ATYC	35.0	23.0
97	3	2	4.3Mc	15.94	99.56CPDR	98.0	35.0
97	2	15	4.5Mc	16.97	100.75NUXC	33.0	20.0
97	2	15	4.5Mc	16.97	100.75SLUI	42.0	20.0
97	2	15	4.5Mc	16.97	100.75PAPN	55.0	20.0
97	1	16	5.4Me	18.08	102.69CALE	29.0	28.0
97	1	12	4.7Mc	17.94	102.93CALE	33.0	22.0
97	1	11	7.3Me	18.09	102.86CALE	21.0	17.0
97	1	11	7.3Me	18.09	102.86VILE	75.0	17.0
96	12	28	4.4Mc	17.19	101.37PAPN	40.0	5.0
96	12	28	4.4Mc	17.19	101.37SLUI	54.0	5.0
96	12	28	4.4Mc	17.19	101.37NUXC	68.0	5.0
96	11	20	4.1Mc	17.05	100.01OCLL	81.0	80.0
96	11	20	4.1Mc	17.05	100.01POZU	91.0	80.0
96	11	20	4.1Mc	17.05	100.01CPDR	95.0	80.0
96	11	3	4.1Mc	16.59	99.81CPDR	32.0	16.0
96	10	27	4.4Mc	17.25	100.87SLUI	92.0	92.0
96	10	27	4.4Mc	17.25	100.87NUXC	93.0	92.0
96	10	27	4.4Mc	17.25	100.87PAPN	94.0	92.0

96	10	20	4.3Mc	17.35	101.07PAPN	30.0	30.0
96	10	20	4.3Mc	17.35	101.07SLUI	37.0	30.0
96	10	17	4.9Mc	16.54	98.95COPL	13.0	10.0
96	10	17	4.9Mc	16.54	98.95SMR2	58.0	10.0
96	10	17	4.9Mc	16.54	98.95CPDR	81.0	10.0
96	10	17	4.9Mc	16.54	98.95POZU	99.0	10.0
96	10	1	4.3Mc	16.69	99.99ATYC	88.0	44.0
96	9	22	4.2Mc	17.02	100.44ATYC	26.0	16.0
96	9	3	4.9Mc	16.81	99.81VNTA	14.0	6.0
96	9	3	4.9Mc	16.81	99.81CPDR	21.0	6.0
96	9	3	4.9Mc	16.81	99.81COYC	36.0	6.0
96	8	27	4.5Mc	16.53	99.42SMR2	31.0	16.0
96	8	27	4.5Mc	16.53	99.42CPDR	39.0	16.0
96	8	27	4.5Mc	16.53	99.42POZU	69.0	16.0
96	8	8	3.8Mc	16.93	100.04OCLL	23.0	6.0
96	8	8	3.8Mc	16.93	100.04VNTA	26.0	6.0
96	7	19	4.8Mc	17.37	100.30ATYC	24.0	7.0
96	7	19	4.8Mc	17.37	100.30NUXC	54.0	7.0
96	7	19	4.8Mc	17.37	100.30OCLL	60.0	7.0
96	7	19	4.8Mc	17.37	100.30VNTA	73.0	7.0
96	7	19	4.8Mc	17.37	100.30POZU	80.0	7.0
96	7	19	4.8Mc	17.37	100.30PAPN	82.0	7.0
96	7	19	4.8Mc	17.37	100.30CPDR	100.0	7.0
96	7	18	4.8Mc	17.52	101.30PETA	7.0	6.0
96	7	18	4.8Mc	17.52	101.30PAPN	36.0	6.0
96	7	18	4.8Mc	17.52	101.30NUXC	69.0	6.0
96	7	18	4.8Mc	17.52	101.30UNIO	76.0	6.0
96	7	16	4.1Mc	17.31	101.16PAPN	24.0	20.0
96	7	16	4.8Mc	17.30	101.30PETA	34.0	20.0
96	7	16	4.8Mc	17.30	101.30PAPN	35.0	20.0
96	7	16	4.1Mc	17.31	101.16PETA	35.0	20.0
96	7	16	4.9Mc	17.33	101.40PAPN	45.0	20.0
96	7	15	6.5Me	17.48	101.14PETA	23.0	16.0
96	7	15	4.8Mc	17.49	100.92PAPN	24.0	10.0
96	7	15	6.5Me	17.48	101.14PAPN	26.0	16.0
96	7	15	4.3Mc	17.46	100.93PAPN	28.0	20.0
96	7	15	6.5Me	17.48	101.14AZIH	41.0	16.0
96	7	15	4.1Mc	17.31	100.72PAPN	50.0	35.0
96	7	15	6.5Me	17.48	101.14NUXC	54.0	16.0
96	7	15	6.5Me	17.48	101.14ATYC	86.0	16.0
96	7	15	6.5Me	17.48	101.14UNIO	93.0	16.0
96	7	6	4.2Mc	17.00	100.19OCLL	35.0	4.0
96	7	6	4.2Mc	17.00	100.19CPDR	67.0	4.0
96	6	30	4.6Mc	17.51	101.19PETA	63.0	62.0
96	6	30	4.6Mc	17.51	101.19PAPN	67.0	62.0
96	6	24	3.9Mc	16.87	100.05VNTA	31.0	15.0
96	6	11	3.9Mc	16.69	99.92VNTA	30.0	12.0
96	6	11	3.9Mc	16.69	99.92CPDR	35.0	12.0
96	6	11	3.9Mc	16.69	99.92OCLL	41.0	12.0
96	6	8	4.4Mc	16.61	99.65CPDR	21.0	10.0
96	6	8	4.4Mc	16.61	99.65SMR2	34.0	10.0
96	6	8	4.4Mc	16.61	99.65VNTA	40.0	10.0
96	6	8	4.4Mc	16.61	99.65POZU	55.0	10.0
96	5	8	4.6Mc	16.81	100.23COYC	25.0	7.0
96	5	8	4.6Mc	16.82	100.25COYC	25.0	1.0
96	5	8	4.7Mc	16.87	100.27COYC	27.0	15.0
96	5	8	4.5Mc	17.15	101.14PAPN	27.0	15.0

96	5	8	4.6Mc	16.81	100.23VNTA	49.0	7.0
96	5	8	4.7Mc	16.87	100.27OCLL	50.0	15.0
96	5	8	4.7Mc	16.87	100.27VNTA	53.0	15.0
96	5	8	4.7Mc	16.87	100.27CPDR	74.0	15.0
96	5	6	3.8Mc	17.13	100.97PAPN	41.0	34.0
96	4	29	4.7Mc	17.32	100.72NUXC	32.0	29.0
96	4	29	4.7Mc	17.32	100.72SUCH	32.0	29.0
96	4	29	4.7Mc	17.32	100.72ATYC	45.0	29.0
96	4	29	4.7Mc	17.32	100.72PAPN	46.0	29.0
96	4	23	5.4Mc	17.26	101.18PAPN	31.0	26.0
96	4	23	5.4Mc	17.26	101.18PETA	42.0	26.0
96	4	23	5.4Mc	17.26	101.18ATYC	87.0	26.0
96	4	18	4.9Mc	17.23	101.33PAPN	34.0	5.0
96	3	31	4.7Mc	17.11	101.29PAPN	52.0	37.0
96	3	31	4.7Mc	17.11	101.29SLUI	61.0	37.0
96	3	13	5.3Me	16.49	99.19COPL	44.0	35.0
96	3	13	5.3Me	16.49	99.19VIGA	46.0	35.0
96	3	13	5.3Me	16.49	99.19SMR2	53.0	35.0
96	3	13	5.3Me	16.49	99.19CPDR	68.0	35.0
96	3	13	5.3Me	16.49	99.19POZU	90.0	35.0
96	3	13	5.3Me	16.49	99.19VNTA	91.0	35.0
96	1	25	5.1Mc	18.43	102.21VILE	53.0	26.0
96	1	25	5.1Mc	18.43	102.21UNIO	72.0	26.0
96	1	1	4.4Mc	16.96	99.63POZU	48.0	45.0
96	1	1	4.4Mc	16.96	99.63CPDR	50.0	45.0
96	1	1	4.4Mc	16.96	99.63VNTA	50.0	45.0
95	12	25	4.2Mc	16.77	100.48ATYC	50.0	12.0
95	12	24	3.3Mb	17.53	101.15PETA	58.0	57.0
95	12	24	3.3Mb	17.53	101.15PAPN	63.0	57.0
95	12	16	4.1Mc	16.70	99.87POZU	54.0	14.0
95	12	9	4.3Mc	16.88	99.63CPDR	26.0	23.0
95	12	9	4.3Mc	16.88	99.63VNTA	31.0	23.0
95	11	27	3.9Mc	17.29	99.96POZU	47.0	22.0
95	11	22	4.4Mc	17.54	101.24PETA	31.0	31.0
95	11	12	3.9Mc	16.95	99.94VNTA	32.0	29.0
95	11	12	3.9Mc	16.95	99.94CPDR	49.0	29.0
95	11	2	4.2Mc	16.37	99.49COPL	64.0	8.0
95	10	31	4.2Mb	16.67	98.62COPL	48.0	27.0
95	10	27	4.6Mc	16.29	99.49CPDR	61.0	27.0
95	10	13	4.3Mb	16.24	98.61COPL	75.0	49.0
95	9	28	4.1Mc	16.07	99.17COPL	65.0	15.0
95	9	22	4.6Mc	16.37	99.62SMR2	56.0	24.0
95	9	22	4.2Mc	16.39	99.90SMR2	71.0	15.0
95	9	20	4.7Mb	16.23	99.00COPL	44.0	14.0
95	9	20	4.7Mb	16.23	99.00SMR2	77.0	14.0
95	9	16	5.1Mb	16.30	98.62COPL	53.0	10.0
95	9	16	4.9Mb	16.46	98.49COPL	59.0	20.0
95	9	15	4.2Mc	16.39	99.67COPL	92.0	43.0
95	9	14	6.4Mb	16.31	98.88COPL	40.0	22.0
95	9	14	3.9Mc	16.09	98.95COPL	57.0	6.0
95	9	14	6.4Mb	16.31	98.88VIGA	67.0	22.0
95	9	14	4.4Mb	16.01	99.41COPL	84.0	20.0
95	8	28	4.2Mc	17.36	100.78PETA	58.0	6.0
95	7	30	3.9Mc	17.25	99.87POZU	48.0	36.0
95	7	30	3.9Mc	17.25	99.87OCTT	54.0	36.0
95	7	19	4.9Mb	16.37	98.75SMR2	90.0	26.0
95	7	12	4.0Mc	17.02	99.99OCLL	29.0	26.0

95	7	12	4.0Mc	17.02	99.99ACAN	34.0	26.0
95	7	12	4.0Mc	17.02	99.99VNTA	34.0	26.0
95	7	12	4.0Mc	17.02	99.99POZU	49.0	26.0
95	7	12	4.0Mc	17.02	99.99OCTT	64.0	26.0
95	7	12	4.0Mc	17.02	99.99SMR2	75.0	26.0
95	7	2	3.7Mc	16.74	99.74POZU	42.0	6.0
95	6	21	3.8Mc	16.94	99.96OCLL	90.0	89.0
95	6	20	3.8Mc	16.85	100.14CPDR	60.0	19.0
95	6	12	4.1Mc	17.10	99.63MSAS	23.0	5.0
95	6	7	4.6Mc	16.49	99.98VNTA	51.0	5.0
95	6	7	4.6Mc	16.49	99.98OCLL	62.0	5.0
95	6	7	4.6Mc	16.49	99.98POZU	78.0	5.0
95	6	7	4.6Mc	16.49	99.98MSAS	82.0	5.0
95	5	15	4.6Mc	16.50	100.02ACAN	44.0	5.0
95	5	15	4.6Mc	16.50	100.02CPDR	52.0	5.0
95	5	15	4.6Mc	16.50	100.02VNTA	52.0	5.0
95	5	15	4.6Mc	16.50	100.02POZU	79.0	5.0
95	5	15	4.6Mc	16.50	100.02MSAS	84.0	5.0
95	4	27	4.9Mb	17.88	101.64AZIH	71.0	61.0
95	4	27	4.2Mc	16.25	99.43MSAS	85.0	15.0
95	4	27	4.2Mc	16.25	99.43POZU	98.0	15.0
95	4	26	3.6Mb	17.96	100.13TNLP	89.0	61.0
95	4	24	3.9Mc	16.89	100.14COYC	13.0	6.0
95	4	24	3.9Mc	16.89	100.14OCLL	35.0	6.0
95	4	15	3.8Mb	16.38	99.11COPL	31.0	12.0
95	4	15	3.8Mb	16.38	99.11MSAS	80.0	12.0
95	3	19	3.7Mc	16.96	99.58MSAS	49.0	47.0
95	3	13	3.3Mc	16.54	99.62MSAS	59.0	20.0
95	3	1	3.7Mc	17.10	100.06OCLL	23.0	8.0
95	2	22	3.9Mc	16.74	100.19MSAS	88.0	11.0
95	1	29	3.6Mc	16.64	99.82MSAS	58.0	8.0
95	1	25	4.5Mc	16.38	99.44MSAS	73.0	21.0
95	1	18	4.1Mc	17.18	99.31MSAS	56.0	50.0
95	1	2	4.2Mc	16.68	99.79CPDR	28.0	20.0
95	1	2	4.2Mc	16.68	99.79POZU	54.0	20.0
95	1	2	4.2Mc	16.68	99.79MSAS	56.0	20.0

Appendix 3

Catalog of strong motion earthquake records, $R \leq 100$ km,

Turkey (3 components)

yr	mm	dd	magtype	Lat.	Long.	stn	R (km)	h (km)
1997	1	22	5.5ML	36.28	35.98	HTY\+V	27.0	23.0
1997	1	21	4.8ML	37.95	28.90	BLD\+V	16.0	9.0
1996	12	20	4.1ML	39.26	41.10	MUS\+V	76.0	7.0
1996	11	22	3.8ML	40.67	35.34	AMS\+V	59.0	0.0
1996	11	12	4.1ML	38.44	39.22	ELZ\+V	28.0	10.0
1996	9	9	3.7ML	40.72	35.24	AMS\+V	71.0	5.0
1996	9	6	3.3ML	40.47	35.83	AMS\+V	19.0	5.0
1996	8	25	4.1ML	39.61	26.01	CNK\+V	77.0	18.0
1996	8	21	3.9ML	40.69	35.36	AMS\+V	57.0	4.0
1996	8	20	3.6ML	40.71	35.44	AMS\+V	49.0	2.0
1996	8	19	3.9ML	40.78	35.35	AMS\+V	61.0	8.0
1996	8	15	3.6ML	40.82	35.31	AMS\+V	66.0	0.0
1996	8	15	3.6ML	40.85	35.29	AMS\+V	74.0	27.0
1996	8	15	3.5ML	40.68	35.33	AMS\+V	92.0	70.0
1996	8	14	5.2ML	40.78	35.23	MRZ\+V	35.0	16.0
1996	8	14	5.4ML	40.77	35.32	OSM\+V	60.0	10.0
1996	8	14	5.4ML	40.77	35.32	AMS\+V	64.0	10.0
1996	8	14	4.1ML	40.78	35.29	AMS\+V	68.0	10.0
1996	8	14	3.7ML	40.68	35.27	AMS\+V	68.0	13.0
1996	8	14	3.7ML	40.68	35.30	AMS\+V	70.0	29.0
1996	8	14	5.2ML	40.78	35.23	AMS\+V	75.0	16.0
1996	8	14	4.1ML	40.89	35.11	AMS\+V	90.0	10.0
1996	7	26	3.3ML	38.30	27.26	IZM\+V	17.0	9.0
1996	7	19	3.6ML	36.20	36.00	HTY\+V	13.0	3.0
1996	6	29	4.4ML	37.90	30.10	DIN\+V	36.0	31.0
1996	6	22	3.8ML	37.82	29.28	DNZ\+V	20.0	5.0
1996	6	5	4.4ML	35.61	35.81	HTY\+V	79.0	10.0
1996	5	20	3.9ML	38.43	27.45	IZM\+V	34.0	18.0
1996	4	14	4.3ML	40.70	27.20	TKR\+V	48.0	10.0
1996	4	8	4.2ML	38.50	39.50	ELZ\+V	40.0	7.0
1996	4	2	4.9ML	37.91	26.88	KUS\+V	54.0	33.0
1996	4	2	3.9ML	37.60	36.40	KMR\+V	60.0	11.0
1996	4	2	4.9ML	37.91	26.88	IZM\+V	72.0	33.0
1996	3	17	4.2ML	40.30	35.40	AMS\+V	64.0	7.0
1996	2	20	4.0ML	38.25	27.13	IZM\+V	21.0	10.0
1996	2	20	4.0ML	38.25	27.13	KUS\+V	47.0	10.0
1996	2	14	4.0ML	39.61	39.23	ERC\+V	35.0	0.0
1996	2	7	4.3ML	38.19	39.37	ELZ\+V	58.0	10.0
1996	1	14	3.3ML	39.66	27.89	BLK\+V	7.0	6.0
1995	12	6	4.3MS	39.30	40.10	ERC\+V	83.0	10.0
1995	12	5	5.4MS	39.30	40.10	ERC\+V	83.0	10.0

1995	12	2	3.1ML	40.58	36.11AMS\+V	27.0	2.0
1995	10	11	3.1ML	38.10	30.15DCE\+V	3.0	0.0
1995	10	11	3.1ML	38.10	30.15DDH\+V	4.0	0.0
1995	10	11	3.1ML	38.10	30.15DJK\+V	4.0	0.0
1995	10	11	3.1ML	38.10	30.15DKH\+V	5.0	0.0
1995	10	11	2.7ML	38.05	30.20DDH\+V	15.0	14.0
1995	10	11	2.7ML	38.05	30.20DKH\+V	15.0	14.0
1995	10	10	2.8ML	38.07	30.04DKH\+V	13.0	7.0
1995	10	9	2.9ML	38.02	30.04DKH\+V	14.0	7.0
1995	10	8	3.4ML	38.12	30.11DDH\+V	9.0	1.0
1995	10	7	3.1ML	38.10	30.14DDH\+V	5.0	0.0
1995	10	6	4.5ML	38.10	30.06DIN\+V	34.0	33.0
1995	10	5	4.4ML	38.04	30.15DIN\+V	33.0	33.0
1995	10	4	3.8ML	38.23	30.08DIN\+V	21.0	0.0
1995	10	3	4.3ML	38.05	30.00DIN\+V	36.0	32.0
1995	10	1	6.0MS	38.13	30.07DIN\+V	13.0	5.0
1995	10	1	3.8ML	38.12	30.02DIN\+V	17.0	5.0
1995	10	1	5.0MS	38.14	29.97DIN\+V	40.0	33.0
1995	10	1	4.1ML	38.12	29.95DIN\+V	41.0	33.0
1995	10	1	6.0MS	38.13	30.07BRD\+V	52.0	5.0
1995	10	1	6.0MS	38.13	30.07CRD\+V	56.0	5.0
1995	10	1	5.0MS	38.14	29.97CRD\+V	58.0	33.0
1995	10	1	4.0ML	41.33	43.51KRS\+V	92.0	10.0
1995	9	28	4.0ML	38.56	30.47DIN\+V	66.0	6.0
1995	9	27	4.8ML	38.10	30.07DIN\+V	21.0	18.0
1995	9	26	4.6ML	38.01	30.18DIN\+V	21.0	20.0
1995	9	26	4.2ML	38.01	30.18DIN\+V	25.0	24.0
1995	9	19	3.8ML	40.26	29.19BRS\+V	17.0	5.0
1995	8	18	4.3ML	37.83	29.46DNZ\+V	40.0	10.0
1995	8	18	4.8ML	37.84	29.43DNZ\+V	45.0	29.0
1995	7	5	3.8ML	39.93	41.59ERZ\+V	37.0	7.0
1995	6	18	4.0ML	39.90	39.85ERC\+V	42.0	9.0
1995	4	23	3.8ML	39.93	41.29ERZ\+V	4.0	0.0
1995	4	18	4.2ML	40.80	27.84TKR\+V	41.0	13.0
1995	4	13	4.7ML	40.86	27.67TKR\+V	31.0	24.0
1995	4	13	4.6MB	37.47	36.20KMR\+V	85.0	24.0
1995	3	28	3.8ML	40.40	27.80TKR\+V	72.0	19.0
1995	3	15	3.2ML	37.84	29.10DNZ\+V	3.0	0.0
1995	3	14	3.5ML	37.84	29.09DNZ\+V	6.0	5.0
1995	3	14	3.0ML	37.85	29.09DNZ\+V	9.0	7.0
1995	3	14	3.3ML	37.82	29.15DNZ\+V	10.0	9.0
1995	3	14	3.3ML	37.87	29.03DNZ\+V	16.0	11.0
1995	3	13	3.1ML	37.81	28.96DNZ\+V	18.0	7.0
1995	3	12	3.4ML	37.84	29.09DNZ\+V	6.0	5.0
1995	3	12	3.1ML	37.78	29.05DNZ\+V	8.0	1.0
1995	3	12	3.3ML	37.85	29.06DNZ\+V	9.0	5.0
1995	2	8	4.5MB	40.82	27.77TKR\+V	39.0	23.0
1995	2	1	3.7ML	38.30	27.20IZM\+V	14.0	9.0
1995	1	29	4.8MS	39.83	40.66TER\+V	43.0	31.0
1995	1	29	4.8MS	39.83	40.66ERZ\+V	74.0	31.0
1995	1	12	4.3MB	38.53	27.11IZM\+V	34.0	10.0
1995	1	9	4.0ML	38.67	27.06IZM\+V	18.0	5.0
1994	12	15	3.5ML	38.90	39.21ELZ\+V	25.0	0.0
1994	11	13	4.1ML	37.00	28.82KOY\+V	14.0	1.0
1994	11	13	4.4MS	37.03	28.91KOY\+V	27.0	10.0
1994	11	13	4.1ML	37.17	28.87KOY\+V	31.0	8.0
1994	11	13	5.0MS	36.91	29.06KOY\+V	42.0	10.0

1994	11	13	4.4MS	37.03	28.91	DNZ\+V	91.0	10.0
1994	11	5	4.1MB	38.21	28.80	DNZ\+V	57.0	10.0
1994	9	17	5.1MB	37.89	41.58	MUS\+V	92.0	9.0
1994	8	16	3.6ML	40.79	27.46	TKR\+V	23.0	11.0
1994	7	16	3.6ML	40.81	27.45	TKR\+V	22.0	11.0
1994	7	1	4.5MB	38.16	38.98	MLT\+V	75.0	10.0
1994	6	20	3.8MB	40.59	27.33	KBG\+V	22.0	8.0
1994	6	16	3.5ML	40.68	30.30	SKR\+V	14.0	1.0
1994	5	24	4.9MS	38.76	26.60	FOC\+V	28.0	16.0
1994	5	24	5.3MS	38.66	26.54	FOC\+V	31.0	17.0
1994	5	24	4.9MS	38.76	26.60	ILI\+V	61.0	16.0
1994	5	24	4.9MS	38.76	26.60	IZM\+V	79.0	16.0
1994	5	7	4.1ML	39.10	28.00	BLK\+V	66.0	17.0
1994	2	21	4.0MB	40.22	29.32	BRS\+V	27.0	5.0
1994	1	3	4.8MS	37.00	35.84	ISL\+V	89.0	26.0
1992	11	6	6.0MS	38.16	26.99	IZM\+V	39.0	17.0
1992	11	6	6.0MS	38.16	26.99	KUS\+V	48.0	17.0
1992	11	6	6.0MS	38.16	26.99	ILI\+V	79.0	17.0
1992	3	15	5.8MS	39.53	39.93	ERC\?	59.0	21.0
1992	3	13	6.8MS	39.72	39.63	ERC\+V	31.0	27.0
1992	3	13	6.8MS	39.72	39.63	TER\+V	89.0	27.0
1992	2	12	4.3MB	40.59	35.83	AMS\+V	12.0	10.0
1991	2	12	4.6MS	40.82	28.88	IST\+V	38.0	10.0
1988	8	4	4.5MB	38.86	27.00	FOC\+V	35.0	3.0
1988	4	20	4.7MS	39.11	44.12	MUR\	73.0	55.0
1986	6	6	5.7MS	38.01	37.91	GOL\+V	41.0	11.0
1986	6	6	5.7MS	38.01	37.91	MLT\?	62.0	11.0
1986	5	5	5.8MS	38.02	37.79	GOL\+V	31.0	4.0
1985	12	6	4.5MS	36.88	28.63	KOY\?	31.0	29.0
1985	8	12	4.2MS	39.95	39.77	KIG\+V	93.0	29.0
1984	3	29	3.8MS	39.70	27.75	BLK\+V	13.0	0.0
1983	10	30	6.8MS	40.35	42.18	HRS\+V	38.0	16.0
1983	7	5	5.8MS	40.33	27.21	GNN\	59.0	7.0
1983	7	5	5.8MS	40.33	27.21	EDC\+V	76.0	7.0
1983	7	5	5.8MS	40.33	27.21	TKR\+V	79.0	7.0
1983	7	5	5.8MS	40.33	27.21	EDR\+V	82.0	7.0
1981	6	30	3.9MS	36.17	35.89	HTY\+V	68.0	63.0
1979	7	18	4.9MS	39.66	28.65	DUR\	15.0	7.0
1979	4	11	4.4MS	39.12	43.91	MUR\	51.0	44.0
1978	9	21	4.2MS	37.97	38.59	MLT\+V	56.0	22.0
1977	12	16	5.3MB	38.41	27.19	IZM\+V	24.0	24.0
1977	12	9	4.8MB	38.35	27.23	IZM\+V	28.0	27.0
1977	10	5	5.3MB	41.02	33.57	CER\+V	76.0	10.0
1976	8	19	5.0MS	37.71	29.00	DNZ\+V	26.0	20.0

Appendix 4[©]

Fourier acceleration spectrum databases

for Japan, Mexico, and Turkey

(Horizontal and vertical component)

The 3-component Fourier spectra of strong motion earthquakes were computed and categorized into H and V summary files, respectively, for Japan, Mexico and Turkey. The first headline tells the starting value of frequency and interval of frequency increment in log units. The following is the main body of the database. Each section in the body contains two records. The first record shows file name, date of events (y, m, d), magnitude, type of the magnitude, station, component, epicentral distance and focal depth (both in log units). The second record shows the 28-point, cm/s Fourier spectra (in log units) averaged over a frequency interval of 0.1 log units starting from -1.0 , i.e., the Fourier spectra range from 0.1 Hz to about 50 Hz. A flag number 9.99 may be assigned when the corresponding information is not available.

Six summary files (H and V component) of the Fourier spectra with same format were zipped into disk #1, attached at the end of this thesis as Appendix 4. The next page is a sample print only.

Sample prints of the Fourier spectra in Appendix 4

(For details see each of the six files in the disk copy #1 attached)

```

Summary output for fl1, dfl=      -1.00      .10
aic002~1.ew      1998 210 4.30JMA      AIC002      E-W      1.69 1.00
-1.58 -1.84 -1.88 -2.11 -2.43 -1.96 -1.90 -2.04 -1.70 -1.76 -1.47 -
1.41 -1.17 -.99 -.71 -.48 -.30 -.44 -.46 -.42 -.79 -.83 -.70
-.73 -.94 -1.59 -1.78 -1.99
aic002~1.ns      1998 210 4.30JMA      AIC002      N-S      1.69 1.00
-1.74 -2.01 -1.96 -2.40 -1.88 -2.15 -1.90 -1.77 -1.84 -1.65 -1.55 -
1.30 -1.22 -.90 -.66 -.20 -.12 -.24 -.47 -.29 -.70 -.77 -.50
-.62 -1.06 -1.46 -1.81 -1.88
aic004~1.ew      1998 210 4.30JMA      AIC004      E-W      1.86 1.00
-1.46 -1.62 -1.78 -1.85 -1.67 -1.70 -1.64 -1.65 -1.34 -1.22 -.77 -
.82 -.57 -.46 -.46 -.38 -.23 -.27 -.16 -.21 -.38 -.31 -.28
-.57 -.88 -1.16 -1.88 -2.17
aic004~1.ns      1998 210 4.30JMA      AIC004      N-S      1.86 1.00
-1.57 -1.58 -1.70 -1.79 -1.81 -1.53 -1.73 -1.67 -1.51 -1.17 -.94 -
.92 -.60 -.46 -.45 -.16 -.24 -.24 -.24 -.11 -.34 -.13 -.07
-.49 -.90 -1.09 -1.60 -2.08
aic008~1.ew      1998 210 4.30JMA      AIC008      E-W      1.93 1.00
-.60 -.88 -1.22 -.98 -1.12 -1.31 -1.33 -1.55 -1.61 -1.39 -1.39 -
1.04 -.69 -.66 -.81 -.55 -.29 -.05 -.27 -.40 -.61 .02 -.24
-.55 -.83 -1.61 -2.08 -2.42
aic008~1.ns      1998 210 4.30JMA      AIC008      N-S      1.93 1.00
-1.21 -1.35 -1.73 -1.79 -1.66 -1.61 -1.61 -1.87 -1.69 -1.58 -1.37 -
1.56 -1.10 -1.01 -.65 -.48 -.21 -.18 -.19 -.22 -.48 -.27 -.22
-.62 -.89 -1.30 -1.63 -2.23
aic009~1.ew      1998 210 4.30JMA      AIC009      E-W      1.84 1.00
-1.34 -1.41 -1.53 -1.89 -1.76 -1.76 -2.08 -1.80 -1.55 -.90 -.34 -
.45 -.15 -.34 -.10 -.26 -.28 -.19 .12 -.18 -.36 -.17 -.03
-.42 -.93 -1.20 -1.83 -2.15
aic009~1.ns      1998 210 4.30JMA      AIC009      N-S      1.84 1.00
-1.47 -1.57 -1.46 -1.72 -2.06 -1.72 -1.77 -1.84 -1.53 -1.31 -.25 -
.68 -.35 -.49 -.13 -.15 -.20 -.06 .13 -.19 -.57 -.16 -.02
-.27 -.75 -1.43 -1.82 -2.22
aic010~1.ew      1998 210 4.30JMA      AIC010      E-W      1.95 1.00
-1.32 -1.54 -1.70 -1.48 -1.92 -1.66 -1.62 -1.58 -1.51 -1.21 -1.00 -
.68 -.15 .40 .19 -.19 .08 .21 .05 .17 .22 .06 .02
-.41 -1.01 -1.52 -1.93 -2.09
aic010~1.ns      1998 210 4.30JMA      AIC010      N-S      1.95 1.00
-1.74 -2.03 -1.99 -1.96 -2.20 -2.03 -1.83 -2.17 -1.81 -1.75 -1.39 -
.99 -.59 .10 .20 -.14 -.18 -.04 .10 .22 .29 .17 .10
-.49 -.82 -1.44 -1.94 -2.23
aic012~1.ew      1998 210 4.30JMA      AIC012      E-W      1.94 1.00
-1.77 -2.04 -2.04 -1.89 -2.00 -2.00 -1.94 -1.27 -1.13 -1.06 -1.11 -
.69 -.72 -.62 -.52 -.41 -.47 .04 -.09 -.35 -.55 -.47 -.60
-.92 -1.29 -1.64 -2.16 -2.41
aic012~1.ns      1998 210 4.30JMA      AIC012      N-S      1.94 1.00
-1.85 -1.93 -2.19 -2.13 -2.27 -1.82 -1.79 -1.70 -1.08 -1.18 -1.27 -
.75 -.60 -.63 -.31 -.36 -.48 .07 -.38 -.33 -.48 -.55 -.71
-.96 -1.36 -1.89 -2.31 -2.57

```

Appendix 5[©]

Integrated database of FA for Japan, Mexico, Turkey, California, B.C. and ENA

This database consists of two parts: Appendix 5A (horizontal component) and Appendix 5B (vertical component). Complete resultant data sets were provided for the overall six regions of Japan, Mexico, Turkey, California, B.C., and ENA, both the horizontal and vertical component. Conversion between H and V component was made for California, B.C., and ENA (see text).

1. The Fourier acceleration spectra (FA) were selected at frequencies of 0.2, 0.5, 1, 2, 5, and 10 Hz, represented respectively by A0.2, A0.5, A1, A2, A5, and A10. Some of the points may not be exactly at the frequencies for the regions of California, B.C. and ENA in order to keep its original FA values at the nearest comparable frequencies without interpolation.
2. The H/V ratios or its related site amplification factors (kappa effects combined) were shown for each value of the corresponding frequencies.
3. Site classes were shown for each region, including the A/B/C/E and A/B/C/D classification for Japan and California.
4. Formulation of magnitudes m_l , m_{hf} , and M were noted at the end of Appendix 5A (see text).

Appendix 5A
Horizontal component

Japan:		FACCN (cm/s), f(Hz), H/V-relevant amp												
yr	mmdd	station	comp	magtype	m ₁	m _{hf}	M _{lpl}	R(km)	A0.2	A0.5	A1	A2	A5	A10
A sites:														
1998	2	21FKS029	E-W	5.0JMA	5.4	6.7	5.1	77.0	0.20	0.50	1.00	2.00	5.01	10.00
1998	2	21FKS029	N-S	5.0JMA	5.4	6.7	5.1	77.0	1.28	1.11	1.24	1.65	2.43	2.79
1996	12	3MYZ004	E-W	6.3JMA	7.0	7.6	5.9	77.0	-1.95	-2.21	-2.13	-1.77	-1.16	-0.39
1996	12	3MYZ004	N-S	6.3JMA	7.0	7.6	5.9	77.0	-2.18	-2.43	-2.16	-1.94	-1.13	-0.52
1996	12	3MYZ004	N-S	6.3JMA	7.0	7.6	5.9	77.0	0.41	0.44	0.30	0.67	0.23	-0.13
1996	12	3MYZ005	E-W	6.3JMA	7.0	7.6	5.9	77.0	-0.10	0.14	0.49	0.32	0.42	-0.21
1996	12	3MYZ005	N-S	6.3JMA	7.0	7.6	5.9	75.0	0.35	0.18	0.76	0.73	0.65	-0.19
1996	12	3MYZ019	E-W	6.3JMA	7.0	7.6	5.9	75.0	-0.20	0.12	0.68	0.36	0.48	-0.07
1996	12	3MYZ019	E-W	6.3JMA	7.0	7.6	5.9	85.0	0.27	0.36	0.82	0.43	0.18	-0.30
1996	12	3MYZ019	N-S	6.3JMA	7.0	7.6	5.9	85.0	-0.03	0.12	0.70	0.55	0.25	-0.27
B/C sites:														
1998	2	22FKS030	E-W	3.9JMA	4.0	5.2	4.4	84.0	1.27	1.61	1.90	2.15	2.09	1.47
1998	2	22FKS030	N-S	3.9JMA	4.0	5.2	4.4	84.0	-1.01	0.08	0.32	0.25	0.36	0.09
1998	2	22GNM002	E-W	3.9JMA	4.0	5.2	4.4	63.0	-1.17	0.06	0.08	0.41	0.54	0.11
1998	2	22GNM002	N-S	3.9JMA	4.0	5.2	4.4	63.0	-0.66	-0.21	0.45	0.42	0.46	-0.48
1998	2	22NIG021	E-W	3.9JMA	4.0	5.2	4.4	29.0	-1.01	-0.22	0.30	0.53	0.43	-0.51
1998	2	22NIG021	N-S	3.9JMA	4.0	5.2	4.4	29.0	-2.34	-1.59	-1.25	-0.69	-0.81	-0.89
1998	2	21FKS030	E-W	5.0JMA	5.4	6.7	5.1	84.0	-2.31	-1.42	-0.79	-0.65	-0.47	-0.85
1998	2	21FKS030	N-S	5.0JMA	5.4	6.7	5.1	84.0	-1.22	-0.85	0.13	0.03	0.78	0.64
1998	2	21GNM001	E-W	5.0JMA	5.4	6.7	5.1	84.0	-1.39	-0.82	-0.10	0.14	0.65	0.41
1998	2	21GNM001	N-S	5.0JMA	5.4	6.7	5.1	78.0	-1.41	-0.60	-0.02	-0.09	0.18	-0.49
1998	2	21GNM002	E-W	5.0JMA	5.4	6.7	5.1	78.0	-1.46	-0.58	0.06	-0.07	0.02	-0.30
1998	2	21GNM002	N-S	5.0JMA	5.4	6.7	5.1	63.0	-1.42	-0.71	-0.45	-0.16	-0.02	-0.47
1998	2	21GNM003	E-W	5.0JMA	5.4	6.7	5.1	63.0	-1.74	-0.78	-0.48	-0.22	-0.18	-0.46
1998	2	21GNM003	N-S	5.0JMA	5.4	6.7	5.1	80.0	-0.86	-0.48	-0.33	0.06	0.09	-0.37
1998	2	21GNM003	N-S	5.0JMA	5.4	6.7	5.1	80.0	-1.09	-0.76	-0.19	0.21	0.20	-0.22

1998	2	21GNM006	E-W	5.0JMA	5.4	6.7	5.1	91.0	-0.68	-0.05	0.33	0.90	0.57	0.48
1998	2	21GNM006	N-S	5.0JMA	5.4	6.7	5.1	91.0	-0.91	-0.27	0.11	0.56	0.49	0.25
1998	2	21NGN003	E-W	5.0JMA	5.4	6.7	5.1	78.0	-1.46	-0.91	-0.54	0.04	0.99	0.71
1998	2	21NGN003	N-S	5.0JMA	5.4	6.7	5.1	78.0	-1.55	-0.98	-0.53	0.21	1.01	0.54
1998	2	21NGN004	E-W	5.0JMA	5.4	6.7	5.1	100.0	-1.19	-0.57	-0.44	0.11	0.06	0.58
1998	2	21NGN004	N-S	5.0JMA	5.4	6.7	5.1	100.0	-1.58	-0.89	-0.26	-0.09	0.04	0.56
1998	2	21NIG015	E-W	5.0JMA	5.4	6.7	5.1	65.0	-1.25	-0.28	0.11	0.31	0.58	-0.42
1998	2	21NIG015	N-S	5.0JMA	5.4	6.7	5.1	65.0	-1.13	0.06	0.46	0.74	0.48	-0.51
1998	2	21NIG021	E-W	5.0JMA	5.4	6.7	5.1	29.0	-0.94	-1.56	-1.62	-0.96	-0.09	-0.58
1998	2	21NIG021	N-S	5.0JMA	5.4	6.7	5.1	29.0	-1.81	-1.66	-1.45	-0.49	-0.12	-0.83
1998	2	21NIG023	E-W	5.0JMA	5.4	6.7	5.1	41.0	-1.85	-0.75	-0.21	0.21	0.33	-0.30
1998	2	21NIG023	N-S	5.0JMA	5.4	6.7	5.1	41.0	-1.94	-0.78	-0.30	0.00	0.11	-0.33
1998	2	21TCG004	E-W	5.0JMA	5.4	6.7	5.1	91.0	-1.18	-1.33	-0.96	-0.65	-0.49	-0.57
1998	2	21TCG004	N-S	5.0JMA	5.4	6.7	5.1	91.0	-1.89	-1.84	-1.11	-0.60	-0.41	-0.71
1998	2	15KGS002	E-W	3.7JMA	4.2	5.0	4.4	34.0	-1.02	-1.16	-1.18	-0.73	-0.30	-0.67
1998	2	15KGS002	N-S	3.7JMA	4.2	5.0	4.4	34.0	-1.99	-1.70	-1.37	-0.93	-0.13	-0.76
1998	2	11HKD105	E-W	5.0JMA	5.4	6.5	5.1	89.0	-2.23	-1.47	-0.89	-0.78	-0.20	-0.35
1998	2	11HKD105	N-S	5.0JMA	5.4	6.5	5.1	89.0	-1.95	-1.55	-0.88	-0.76	-0.06	-0.45
1998	2	10AIC002	E-W	4.3JMA	4.4	6.2	4.6	50.0	-2.11	-2.04	-1.47	-0.99	-0.44	-0.79
1998	2	10AIC002	N-S	4.3JMA	4.4	6.2	4.6	50.0	-2.40	-1.77	-1.55	-0.90	-0.24	-0.70
1998	2	10AIC008	E-W	4.3JMA	4.4	6.2	4.6	86.0	-0.98	-1.55	-1.39	-0.66	-0.05	-0.61
1998	2	10AIC008	N-S	4.3JMA	4.4	6.2	4.6	86.0	-1.79	-1.87	-1.37	-1.01	-0.18	-0.48
1998	2	10GIF001	E-W	4.3JMA	4.4	6.2	4.6	68.0	-1.46	-0.57	-0.19	0.47	-0.19	-0.41
1998	2	10GIF001	N-S	4.3JMA	4.4	6.2	4.6	68.0	-1.47	-0.50	-0.13	0.14	-0.19	-0.48
1998	2	10GIF002	E-W	4.3JMA	4.4	6.2	4.6	64.0	-1.42	-1.13	-0.89	-0.73	-0.30	0.41
1998	2	10GIF002	N-S	4.3JMA	4.4	6.2	4.6	64.0	-2.16	-0.97	-0.68	-0.74	-0.43	0.29
1998	2	10GIF003	E-W	4.3JMA	4.4	6.2	4.6	75.0	-1.50	-0.75	-0.44	-0.31	-0.34	0.03
1998	2	10GIF003	N-S	4.3JMA	4.4	6.2	4.6	75.0	-1.76	-0.62	-0.65	-0.09	-0.29	-0.09
1998	2	10GIF004	E-W	4.3JMA	4.4	6.2	4.6	77.0	-2.22	-2.18	-1.94	-1.64	-1.03	-0.59
1998	2	10GIF004	N-S	4.3JMA	4.4	6.2	4.6	77.0	-2.20	-2.17	-2.23	-1.60	-0.99	-0.47
1998	2	10GIF006	E-W	4.3JMA	4.4	6.2	4.6	41.0	-1.50	-1.33	-1.13	-0.69	-0.83	-0.26

1998	2	10GIF006	N-S	4.3JMA	4.4	6.2	4.6	41.0	-2.25	-1.80	-1.25	-0.68	-0.52	-0.34
1998	2	10GIF008	E-W	4.3JMA	4.4	6.2	4.6	35.0	-2.37	-1.97	-1.58	-1.35	-0.86	-0.71
1998	2	10GIF008	N-S	4.3JMA	4.4	6.2	4.6	35.0	-1.71	-1.76	-1.75	-1.42	-1.06	-0.70
1998	2	10GIF009	E-W	4.3JMA	4.4	6.2	4.6	39.0	-2.32	-1.85	-1.68	-1.05	-0.74	-0.69
1998	2	10GIF009	N-S	4.3JMA	4.4	6.2	4.6	39.0	-2.15	-2.04	-1.72	-1.10	-0.75	-0.30
1998	2	10GIF010	E-W	4.3JMA	4.4	6.2	4.6	22.0	-1.75	-1.34	-1.00	-0.36	0.00	-0.42
1998	2	10GIF010	N-S	4.3JMA	4.4	6.2	4.6	22.0	-2.03	-1.41	-1.04	-0.41	-0.26	-0.46
1998	2	10GIF011	E-W	4.3JMA	4.4	6.2	4.6	18.0	-2.05	-1.64	-1.45	-0.85	0.13	0.39
1998	2	10GIF011	N-S	4.3JMA	4.4	6.2	4.6	18.0	-2.10	-1.79	-1.37	-1.08	0.18	0.27
1998	2	10GIF012	E-W	4.3JMA	4.4	6.2	4.6	68.0	-1.94	-1.58	-1.19	-0.87	-0.45	0.06
1998	2	10GIF012	N-S	4.3JMA	4.4	6.2	4.6	68.0	-2.14	-1.42	-1.00	-0.47	-0.69	-0.19
1998	2	10GIF013	E-W	4.3JMA	4.4	6.2	4.6	13.0	-2.09	-1.70	-1.04	-0.54	0.00	-0.22
1998	2	10GIF013	N-S	4.3JMA	4.4	6.2	4.6	13.0	-1.52	-1.45	-1.34	-0.62	-0.12	-0.34
1998	2	10GIF014	E-W	4.3JMA	4.4	6.2	4.6	38.0	-1.94	-1.17	-0.29	0.18	-0.03	0.15
1998	2	10GIF014	N-S	4.3JMA	4.4	6.2	4.6	38.0	-1.72	-0.84	-0.16	0.37	-0.06	0.17
1998	2	10GIF015	E-W	4.3JMA	4.4	6.2	4.6	29.0	-1.74	-1.50	-0.64	-0.38	0.43	1.13
1998	2	10GIF015	N-S	4.3JMA	4.4	6.2	4.6	29.0	-2.09	-1.06	-0.77	-0.11	0.20	0.58
1998	2	10GIF016	E-W	4.3JMA	4.4	6.2	4.6	21.0	-1.38	-1.83	-1.35	-0.94	-0.73	0.33
1998	2	10GIF016	N-S	4.3JMA	4.4	6.2	4.6	21.0	-1.47	-1.64	-1.25	-0.93	-0.71	0.04
1998	2	10GIF019	E-W	4.3JMA	4.4	6.2	4.6	46.0	-2.01	-1.27	-0.97	-0.84	-0.51	-0.51
1998	2	10GIF019	N-S	4.3JMA	4.4	6.2	4.6	46.0	-2.13	-1.44	-0.76	-0.66	-0.48	-0.37
1998	2	10GIF021	E-W	4.3JMA	4.4	6.2	4.6	32.0	-2.18	-1.73	-1.17	-0.62	-0.40	0.14
1998	2	10GIF021	N-S	4.3JMA	4.4	6.2	4.6	32.0	-2.38	-1.94	-1.26	-0.71	-0.46	-0.11
1998	2	10GIF025	E-W	4.3JMA	4.4	6.2	4.6	36.0	-1.65	-1.47	-0.75	-0.46	-0.31	-0.12
1998	2	10GIF025	N-S	4.3JMA	4.4	6.2	4.6	36.0	-2.08	-1.76	-0.99	-0.40	-0.37	-0.20
1998	2	10NGN018	E-W	4.3JMA	4.4	6.2	4.6	50.0	-1.80	-1.64	-0.81	-0.32	-0.02	-0.07
1998	2	10NGN018	N-S	4.3JMA	4.4	6.2	4.6	50.0	-1.71	-1.81	-0.75	-0.31	-0.21	-0.26
1998	2	10NGN020	E-W	4.3JMA	4.4	6.2	4.6	96.0	-2.15	-2.05	-1.05	-0.29	-0.64	0.14
1998	2	10NGN020	N-S	4.3JMA	4.4	6.2	4.6	96.0	-1.68	-1.26	-0.86	-0.14	-0.46	0.15
1998	2	10NGN025	E-W	4.3JMA	4.4	6.2	4.6	96.0	-1.69	-1.13	-0.56	-0.16	0.01	0.77
1998	2	10NGN025	N-S	4.3JMA	4.4	6.2	4.6	96.0	-1.51	-1.02	-0.68	-0.57	0.22	0.81

1998	2	4HKD105	E-W	4.7JMA	5.2	6.3	4.8	92.0	-1.28	-0.69	-0.65	-0.35	-0.16	-0.67
1998	2	4HKD105	N-S	4.7JMA	5.2	6.3	4.8	92.0	-1.46	-0.64	-0.63	-0.37	-0.31	-0.63
1997	5	13KGS001	E-W	6.2JMA	6.6	7.7	5.9	26.0	0.14	0.74	0.90	0.75	1.30	0.96
1997	5	13KGS001	N-S	6.2JMA	6.6	7.7	5.9	26.0	-0.08	0.86	0.86	0.88	1.18	0.95
1997	5	13KGS002	E-W	6.2JMA	6.6	7.7	5.9	14.0	0.66	1.52	1.43	1.33	1.49	1.82
1997	5	13KGS002	N-S	6.2JMA	6.6	7.7	5.9	14.0	0.05	1.40	1.44	1.37	1.96	2.00
1997	5	13KGS013	E-W	6.2JMA	6.6	7.7	5.9	89.0	0.03	0.59	0.71	0.69	0.58	0.10
1997	5	13KGS013	N-S	6.2JMA	6.6	7.7	5.9	89.0	0.12	0.57	0.59	0.61	0.41	-0.01
1997	5	13KGS037	E-W	6.2JMA	6.6	7.7	5.9	78.0	-0.10	-0.17	-0.17	0.21	0.40	0.25
1997	5	13KGS037	N-S	6.2JMA	6.6	7.7	5.9	78.0	-0.50	-0.17	0.21	0.28	0.64	0.49
1997	5	13KMM013	E-W	6.2JMA	6.6	7.7	5.9	47.0	0.12	0.51	0.59	0.93	0.55	0.17
1997	5	13KMM013	N-S	6.2JMA	6.6	7.7	5.9	47.0	0.20	0.82	0.57	0.98	0.58	0.36
1997	5	13KMM017	E-W	6.2JMA	6.6	7.7	5.9	76.0	-0.02	0.85	0.94	0.62	0.41	0.31
1997	5	13KMM017	N-S	6.2JMA	6.6	7.7	5.9	76.0	-0.04	1.11	0.62	0.80	0.33	0.22
1997	5	13KMM018	E-W	6.2JMA	6.6	7.7	5.9	45.0	0.06	0.87	0.41	0.45	0.37	0.96
1997	5	13KMM018	N-S	6.2JMA	6.6	7.7	5.9	45.0	-0.76	0.28	0.28	0.16	0.52	0.98
1997	5	13KMM020	E-W	6.2JMA	6.6	7.7	5.9	42.0	0.15	0.55	0.68	0.38	0.43	0.83
1997	5	13KMM020	N-S	6.2JMA	6.6	7.7	5.9	42.0	-0.11	0.47	0.47	0.54	0.60	0.78
1997	5	13MYZ007	E-W	6.2JMA	6.6	7.7	5.9	94.0	-0.55	-0.17	0.02	-0.05	-0.12	0.33
1997	5	13MYZ007	N-S	6.2JMA	6.6	7.7	5.9	94.0	-0.24	-0.07	-0.03	0.14	-0.28	0.42
1997	5	13NGS010	E-W	6.2JMA	6.6	7.7	5.9	94.0	-0.31	0.01	0.05	-0.02	0.09	0.49
1997	5	13NGS010	N-S	6.2JMA	6.6	7.7	5.9	94.0	-0.40	0.05	0.19	0.18	0.10	0.33
1997	5	13NGS013	E-W	6.2JMA	6.6	7.7	5.9	87.0	-0.69	-0.11	0.25	-0.09	-0.20	-0.38
1997	5	13NGS013	N-S	6.2JMA	6.6	7.7	5.9	87.0	-0.39	0.04	0.59	0.11	-0.13	-0.20
1997	3	26KGS001	E-W	6.3JMA	6.7	7.6	6.1	33.0	-0.12	0.67	0.86	0.96	1.36	0.96
1997	3	26KGS001	N-S	6.3JMA	6.7	7.6	6.1	33.0	0.28	0.52	1.15	1.04	1.27	1.14
1997	3	26KGS002	E-W	6.3JMA	6.7	7.6	6.1	14.0	1.08	0.81	1.30	1.34	1.50	1.99
1997	3	26KGS002	N-S	6.3JMA	6.7	7.6	6.1	14.0	0.64	0.88	1.35	1.47	1.74	2.07
1997	3	26KGS013	E-W	6.3JMA	6.7	7.6	6.1	80.0	-0.06	0.69	0.59	0.58	0.53	0.23
1997	3	26KGS013	N-S	6.3JMA	6.7	7.6	6.1	80.0	-0.27	0.38	0.67	0.57	0.38	0.10
1997	3	26KGS037	E-W	6.3JMA	6.7	7.6	6.1	87.0	0.12	-0.16	-0.25	0.23	0.47	0.34

1997	3	26KGS037	N-S	6.3JMA	6.7	7.6	6.1	87.0	-0.52	-0.27	-0.02	0.29	0.73	0.53
1997	3	26KMM013	E-W	6.3JMA	6.7	7.6	6.1	42.0	0.61	0.44	0.54	1.02	0.80	0.32
1997	3	26KMM013	N-S	6.3JMA	6.7	7.6	6.1	42.0	0.60	0.60	0.41	0.91	0.75	0.54
1997	3	26KMM017	E-W	6.3JMA	6.7	7.6	6.1	65.0	0.32	1.13	1.24	0.90	0.58	0.41
1997	3	26KMM017	N-S	6.3JMA	6.7	7.6	6.1	65.0	0.51	1.08	0.85	1.02	0.65	0.31
1997	3	26KMM018	E-W	6.3JMA	6.7	7.6	6.1	44.0	0.63	0.18	0.69	0.57	0.41	0.99
1997	3	26KMM018	N-S	6.3JMA	6.7	7.6	6.1	44.0	-0.08	-0.02	0.12	0.24	0.68	1.03
1997	3	26KMM020	E-W	6.3JMA	6.7	7.6	6.1	47.0	0.44	0.16	0.62	0.57	0.56	0.84
1997	3	26KMM020	N-S	6.3JMA	6.7	7.6	6.1	47.0	0.39	0.45	0.54	0.56	0.74	0.82
1997	3	26MYZ007	E-W	6.3JMA	6.7	7.6	6.1	84.0	-0.40	-0.11	0.01	-0.19	0.03	0.69
1997	3	26MYZ007	N-S	6.3JMA	6.7	7.6	6.1	84.0	0.02	0.12	0.21	-0.01	-0.20	0.57
1997	3	26MYZ012	E-W	6.3JMA	6.7	7.6	6.1	76.0	-0.48	0.29	0.37	0.18	0.62	0.27
1997	3	26MYZ012	N-S	6.3JMA	6.7	7.6	6.1	76.0	-0.16	0.32	0.54	0.31	0.49	0.26
1997	3	26MYZ020	E-W	6.3JMA	6.7	7.6	6.1	98.0	-0.33	0.04	0.46	0.82	0.46	0.43
1997	3	26MYZ020	N-S	6.3JMA	6.7	7.6	6.1	98.0	-0.40	-0.08	0.39	0.51	0.52	0.38
1997	3	26NGS013	E-W	6.3JMA	6.7	7.6	6.1	96.0	-0.21	0.06	-0.04	-0.05	-0.14	-0.28
1997	3	26NGS013	N-S	6.3JMA	6.7	7.6	6.1	96.0	0.11	-0.08	0.34	0.23	-0.02	-0.10
1997	3	3CHB021	E-W	5.0JMA	5.3	6.0	5.5	79.0	-1.19	-0.70	-0.54	-0.18	-0.22	-0.40
1997	3	3CHB021	N-S	5.0JMA	5.3	6.0	5.5	79.0	-0.66	-0.77	-0.55	-0.10	-0.29	-0.30
1997	3	3KNG003	E-W	5.0JMA	5.3	6.0	5.5	59.0	-0.57	-0.43	-0.22	0.18	0.00	-0.19
1997	3	3KNG003	N-S	5.0JMA	5.3	6.0	5.5	59.0	-0.68	-0.34	-0.07	0.16	0.08	-0.19
1997	3	3KNG010	E-W	5.0JMA	5.3	6.0	5.5	41.0	-0.04	0.22	0.13	-0.06	-0.23	-0.51
1997	3	3KNG010	N-S	5.0JMA	5.3	6.0	5.5	41.0	-0.29	0.24	0.20	-0.05	-0.29	-0.56
1997	3	3KNG012	E-W	5.0JMA	5.3	6.0	5.5	42.0	-0.66	-0.20	-0.21	-0.31	0.01	-0.22
1997	3	3KNG012	N-S	5.0JMA	5.3	6.0	5.5	42.0	-0.68	-0.41	-0.25	-0.37	-0.08	-0.35
1997	3	3SZO001	E-W	5.0JMA	5.3	6.0	5.5	21.0	-0.19	-0.26	-0.33	-0.02	0.52	0.99
1997	3	3SZO001	N-S	5.0JMA	5.3	6.0	5.5	21.0	-0.98	-0.41	-0.26	-0.19	0.19	0.63
1997	3	3SZO004	E-W	5.0JMA	5.3	6.0	5.5	58.0	-0.37	-0.51	-0.62	-0.25	0.05	0.31
1997	3	3SZO004	N-S	5.0JMA	5.3	6.0	5.5	58.0	-0.48	-0.92	-0.46	-0.45	-0.16	0.14
1997	3	3SZO006	E-W	5.0JMA	5.3	6.0	5.5	46.0	-0.70	-0.64	-0.51	-0.29	-0.51	-0.33
1997	3	3SZO006	N-S	5.0JMA	5.3	6.0	5.5	46.0	-0.06	-0.40	-0.20	-0.35	-0.37	-0.30

1997	3	3SZO007	E-W	5.0JMA	5.3	6.0	5.5	28.0	-0.40	-0.16	0.09	0.18	0.40	0.99
1997	3	3SZO007	N-S	5.0JMA	5.3	6.0	5.5	28.0	-0.14	-0.19	-0.01	0.42	0.68	0.72
1997	3	3SZO009	E-W	5.0JMA	5.3	6.0	5.5	38.0	-0.40	-0.08	-0.09	-0.26	-0.12	-0.64
1997	3	3SZO009	N-S	5.0JMA	5.3	6.0	5.5	38.0	-0.90	-0.41	-0.14	-0.04	-0.14	-0.73
1997	3	3SZO010	E-W	5.0JMA	5.3	6.0	5.5	45.0	-0.29	-0.04	-0.04	-0.26	-0.63	-0.36
1997	3	3SZO010	N-S	5.0JMA	5.3	6.0	5.5	45.0	-0.18	-0.23	0.08	-0.15	-0.62	-0.23
1997	3	3SZO011	E-W	5.0JMA	5.3	6.0	5.5	68.0	-0.42	-0.46	-0.47	-0.34	-0.03	-0.55
1997	3	3SZO011	N-S	5.0JMA	5.3	6.0	5.5	68.0	-0.51	-0.75	-0.43	-0.38	-0.03	-0.43
1997	3	3TKY002	E-W	5.0JMA	5.3	6.0	5.5	81.0	-1.22	-1.09	-1.12	-1.16	-0.67	-0.46
1997	3	3TKY002	N-S	5.0JMA	5.3	6.0	5.5	81.0	-1.45	-1.31	-1.31	-1.13	-0.86	-0.51
1997	3	3TKY008	E-W	5.0JMA	5.3	6.0	5.5	32.0	-0.56	-0.08	-0.05	0.08	0.33	0.49
1997	3	3TKY008	N-S	5.0JMA	5.3	6.0	5.5	32.0	-0.15	-0.04	-0.13	0.00	0.36	0.54
1997	1	18KGS030	E-W	6.0JMA	6.1	8.0	5.6	64.0	-0.65	0.16	0.41	1.69	1.00	-0.03
1997	1	18KGS030	N-S	6.0JMA	6.1	8.0	5.6	64.0	-0.42	-0.10	0.40	1.62	0.67	0.07
1996	12	3KGS013	E-W	6.3JMA	7.0	7.6	5.9	77.0	-0.41	0.47	0.71	0.84	0.66	0.22
1996	12	3KGS013	N-S	6.3JMA	7.0	7.6	5.9	77.0	-0.33	0.93	0.68	0.57	0.83	0.00
1996	12	3KMM017	E-W	6.3JMA	7.0	7.6	5.9	94.0	-0.37	0.67	0.88	0.95	0.27	-0.31
1996	12	3KMM017	N-S	6.3JMA	7.0	7.6	5.9	94.0	-0.16	0.77	1.07	0.91	0.23	-0.23
1996	12	3MYZ006	E-W	6.3JMA	7.0	7.6	5.9	59.0	0.51	0.62	1.08	1.24	0.89	1.36
1996	12	3MYZ006	N-S	6.3JMA	7.0	7.6	5.9	59.0	0.24	0.62	1.06	0.92	0.85	1.32
1996	12	3MYZ007	E-W	6.3JMA	7.0	7.6	5.9	78.0	-0.16	0.18	0.33	0.36	0.26	0.41
1996	12	3MYZ007	N-S	6.3JMA	7.0	7.6	5.9	78.0	-0.25	0.24	0.60	0.16	0.11	0.44
1996	12	3MYZ008	E-W	6.3JMA	7.0	7.6	5.9	51.0	0.62	1.11	1.49	0.97	1.16	1.01
1996	12	3MYZ008	N-S	6.3JMA	7.0	7.6	5.9	51.0	0.05	0.86	1.00	1.15	1.30	0.97
1996	12	3MYZ012	E-W	6.3JMA	7.0	7.6	5.9	67.0	-0.38	0.59	0.88	0.90	1.12	0.51
1996	12	3MYZ012	N-S	6.3JMA	7.0	7.6	5.9	67.0	-0.15	0.47	0.77	0.91	0.79	0.37
1996	12	3MYZ020	E-W	6.3JMA	7.0	7.6	5.9	92.0	0.18	0.06	0.45	1.10	0.44	0.20
1996	12	3MYZ020	N-S	6.3JMA	7.0	7.6	5.9	92.0	-0.12	-0.10	0.35	0.91	0.66	0.23
1998	2	22NIG017	E-W	3.9JMA	4.0	5.2	4.4	26.0	-1.86	-1.21	-0.56	-0.13	0.10	0.05
1998	2	22NIG017	N-S	3.9JMA	4.0	5.2	4.4	26.0	-1.60	-1.16	-0.54	-0.08	0.10	0.10
1998	2	22NIG019	E-W	3.9JMA	4.0	5.2	4.4	20.0	-2.38	-1.72	-1.35	-0.57	-0.27	-0.24

1998	2	22NIG019	N-S	3.9JMA	4.0	5.2	4.4	20.0	-2.31	-1.53	-1.04	-0.28	-0.14	-0.21
1998	2	22NIG020	E-W	3.9JMA	4.0	5.2	4.4	28.0	-2.10	-1.96	-1.59	-0.60	-0.13	-0.31
1998	2	22NIG020	N-S	3.9JMA	4.0	5.2	4.4	28.0	-1.91	-1.51	-1.29	-0.28	0.22	-0.13
1998	2	22NIG022	E-W	3.9JMA	4.0	5.2	4.4	36.0	-1.59	-1.53	-1.16	-0.43	-0.08	-0.24
1998	2	22NIG022	N-S	3.9JMA	4.0	5.2	4.4	36.0	-2.26	-1.98	-1.09	-0.45	0.12	-0.29
1998	2	22NIG024	E-W	3.9JMA	4.0	5.2	4.4	48.0	-1.15	-0.35	-0.29	-0.07	-0.28	-0.38
1998	2	22NIG024	N-S	3.9JMA	4.0	5.2	4.4	48.0	-1.44	-0.18	-0.26	0.12	-0.20	-0.38
1998	2	21FKS028	E-W	5.0JMA	5.4	6.7	5.1	61.0	-1.34	-0.96	-0.48	-0.23	0.32	0.70
1998	2	21FKS028	N-S	5.0JMA	5.4	6.7	5.1	61.0	-1.59	-1.15	-0.89	-0.39	-0.03	0.59
1998	2	21GNM004	E-W	5.0JMA	5.4	6.7	5.1	82.0	-0.72	-0.13	0.10	0.61	0.42	0.29
1998	2	21GNM004	N-S	5.0JMA	5.4	6.7	5.1	82.0	-1.12	-0.25	0.18	0.51	0.73	0.45
1998	2	21GNM007	E-W	5.0JMA	5.4	6.7	5.1	98.0	-1.31	-0.86	-0.39	0.06	0.38	0.69
1998	2	21GNM007	N-S	5.0JMA	5.4	6.7	5.1	98.0	-1.42	-0.97	-0.62	0.20	0.22	0.71
1998	2	21NGN001	E-W	5.0JMA	5.4	6.7	5.1	72.0	-1.38	-0.49	-0.10	0.02	1.24	0.36
1998	2	21NGN001	N-S	5.0JMA	5.4	6.7	5.1	72.0	-1.13	-0.50	-0.24	0.44	1.26	0.45
1998	2	21NGN002	E-W	5.0JMA	5.4	6.7	5.1	87.0	-1.36	-0.79	-0.33	0.08	0.55	0.43
1998	2	21NGN002	N-S	5.0JMA	5.4	6.7	5.1	87.0	-1.48	-0.59	-0.40	0.03	0.60	0.41
1998	2	21NIG002	E-W	5.0JMA	5.4	6.7	5.1	95.0	-1.63	-1.00	-0.23	-0.13	-0.11	-0.90
1998	2	21NIG002	N-S	5.0JMA	5.4	6.7	5.1	95.0	-1.86	-0.91	-0.22	-0.05	-0.33	-0.96
1998	2	21NIG004	E-W	5.0JMA	5.4	6.7	5.1	84.0	-2.01	-0.90	-0.39	0.22	-0.30	-0.56
1998	2	21NIG004	N-S	5.0JMA	5.4	6.7	5.1	84.0	-1.70	-0.64	-0.42	0.42	-0.09	-0.46
1998	2	21NIG005	E-W	5.0JMA	5.4	6.7	5.1	78.0	-1.21	-0.50	-0.11	0.29	0.08	-0.23
1998	2	21NIG005	N-S	5.0JMA	5.4	6.7	5.1	78.0	-1.35	-0.15	0.02	0.25	0.13	-0.18
1998	2	21NIG009	E-W	5.0JMA	5.4	6.7	5.1	95.0	-1.36	-0.60	-0.53	-0.24	-0.38	-0.79
1998	2	21NIG009	N-S	5.0JMA	5.4	6.7	5.1	95.0	-1.45	-0.73	-0.44	-0.33	-0.36	-0.90
1998	2	21NIG012	E-W	5.0JMA	5.4	6.7	5.1	89.0	-1.45	-0.96	-0.18	0.03	0.66	-0.30
1998	2	21NIG012	N-S	5.0JMA	5.4	6.7	5.1	89.0	-1.04	-0.36	-0.17	0.08	0.61	-0.28
1998	2	21NIG016	E-W	5.0JMA	5.4	6.7	5.1	43.0	-1.56	-1.26	-0.71	0.51	-0.11	-0.66
1998	2	21NIG016	N-S	5.0JMA	5.4	6.7	5.1	43.0	-2.06	-1.27	-0.68	0.12	-0.06	-0.60
1998	2	21NIG017	E-W	5.0JMA	5.4	6.7	5.1	26.0	-0.94	-0.66	-0.23	0.61	0.39	-0.39
1998	2	21NIG017	N-S	5.0JMA	5.4	6.7	5.1	26.0	-1.54	-0.58	-0.14	0.48	0.17	-0.38

1998	2	21NIG019	E-W	5.0JMA	5.4	6.7	5.1	20.0	-1.84	-1.78	-1.34	-1.03	-0.25	-0.33
1998	2	21NIG019	N-S	5.0JMA	5.4	6.7	5.1	20.0	-1.89	-1.85	-1.55	-1.07	-0.33	-0.29
1998	2	21NIG020	E-W	5.0JMA	5.4	6.7	5.1	28.0	-2.19	-1.69	-0.87	-0.63	0.08	-0.09
1998	2	21NIG020	N-S	5.0JMA	5.4	6.7	5.1	28.0	-1.88	-1.70	-0.91	-0.59	-0.12	0.07
1998	2	21NIG022	E-W	5.0JMA	5.4	6.7	5.1	36.0	-2.10	-0.91	0.21	0.55	0.28	0.33
1998	2	21NIG022	N-S	5.0JMA	5.4	6.7	5.1	36.0	-1.79	-1.25	-0.15	0.56	0.57	0.47
1998	2	21NIG024	E-W	5.0JMA	5.4	6.7	5.1	48.0	-1.88	-1.75	-1.44	-0.25	-0.27	-0.24
1998	2	21NIG024	N-S	5.0JMA	5.4	6.7	5.1	48.0	-1.70	-2.26	-1.67	-0.27	-0.15	-0.04
1998	2	21NIG026	E-W	5.0JMA	5.4	6.7	5.1	70.0	-2.25	-1.98	-1.09	-0.92	-0.34	-0.93
1998	2	21NIG026	N-S	5.0JMA	5.4	6.7	5.1	70.0	-2.15	-1.70	-1.27	-0.90	-0.23	-0.68
1998	2	15KGS003	E-W	3.7JMA	4.2	5.0	4.4	44.0	-0.89	0.06	0.73	1.05	0.74	0.76
1998	2	15KGS003	N-S	3.7JMA	4.2	5.0	4.4	44.0	-1.18	0.15	0.79	1.03	0.95	0.59
1998	2	15KGS005	E-W	3.7JMA	4.2	5.0	4.4	22.0	-2.34	-1.97	-1.39	-0.65	-0.55	-0.60
1998	2	15KGS005	N-S	3.7JMA	4.2	5.0	4.4	22.0	-2.20	-2.01	-1.22	-0.71	-0.48	-0.79
1998	2	15KGS006	E-W	3.7JMA	4.2	5.0	4.4	48.0	-1.22	-0.08	0.44	1.00	0.54	0.24
1998	2	15KGS006	N-S	3.7JMA	4.2	5.0	4.4	48.0	-0.76	-0.20	0.77	0.87	0.87	0.32
1998	2	15KGS007	E-W	3.7JMA	4.2	5.0	4.4	10.0	-0.60	0.04	0.54	1.25	1.03	0.84
1998	2	15KGS007	N-S	3.7JMA	4.2	5.0	4.4	10.0	-1.04	0.09	0.49	0.77	0.93	0.49
1998	2	15KGS010	E-W	3.7JMA	4.2	5.0	4.4	14.0	-2.26	-1.92	-1.60	-0.82	-0.41	-1.01
1998	2	15KGS010	N-S	3.7JMA	4.2	5.0	4.4	14.0	-2.37	-2.14	-1.68	-1.02	-0.33	-0.86
1998	2	15KGS011	E-W	3.7JMA	4.2	5.0	4.4	27.0	-1.00	0.06	0.49	0.98	0.31	-0.06
1998	2	15KGS011	N-S	3.7JMA	4.2	5.0	4.4	27.0	-0.76	0.10	0.68	1.06	0.19	-0.11
1998	2	15KGS016	E-W	3.7JMA	4.2	5.0	4.4	44.0	-0.99	-0.34	0.21	0.74	0.55	0.06
1998	2	15KGS016	N-S	3.7JMA	4.2	5.0	4.4	44.0	-1.10	-0.23	0.24	0.76	0.46	-0.02
1998	2	15KMM015	E-W	3.7JMA	4.2	5.0	4.4	49.0	-1.56	-1.18	-0.57	-0.10	-0.12	-0.37
1998	2	15KMM015	N-S	3.7JMA	4.2	5.0	4.4	49.0	-1.58	-1.23	-0.55	0.07	0.01	-0.33
1998	2	11HKD106	E-W	5.0JMA	5.4	6.5	5.1	71.0	-0.05	0.64	0.60	1.03	1.06	0.33
1998	2	11HKD106	N-S	5.0JMA	5.4	6.5	5.1	71.0	-0.33	0.41	0.75	1.14	1.21	0.34
1998	2	11HKD107	E-W	5.0JMA	5.4	6.5	5.1	77.0	-0.60	-0.88	-0.76	-0.11	0.51	-0.19
1998	2	11HKD107	N-S	5.0JMA	5.4	6.5	5.1	77.0	-1.82	-1.50	-0.99	-0.20	0.47	0.03
1998	2	11HKD108	E-W	5.0JMA	5.4	6.5	5.1	69.0	-1.06	0.11	0.39	0.60	0.91	0.66

1998	2	11HKD108	N-S	5.0JMA	5.4	6.5	5.1	69.0	-1.14	0.03	0.41	0.61	1.08	0.96
1998	2	11HKD109	E-W	5.0JMA	5.4	6.5	5.1	75.0	-1.86	-2.02	-1.37	-0.92	-0.16	0.29
1998	2	11HKD109	N-S	5.0JMA	5.4	6.5	5.1	75.0	-2.09	-1.92	-1.18	-0.68	0.11	0.19
1998	2	11HKD110	E-W	5.0JMA	5.4	6.5	5.1	86.0	-0.89	0.46	0.77	1.23	0.78	0.51
1998	2	11HKD110	N-S	5.0JMA	5.4	6.5	5.1	86.0	-0.68	0.58	0.86	1.19	0.87	0.37
1998	2	10AIC004	E-W	4.3JMA	4.4	6.2	4.6	73.0	-1.85	-1.65	-0.77	-0.46	-0.27	-0.38
1998	2	10AIC004	N-S	4.3JMA	4.4	6.2	4.6	73.0	-1.79	-1.67	-0.94	-0.46	-0.24	-0.34
1998	2	10AIC009	E-W	4.3JMA	4.4	6.2	4.6	70.0	-1.89	-1.80	-0.34	-0.34	-0.19	-0.36
1998	2	10AIC009	N-S	4.3JMA	4.4	6.2	4.6	70.0	-1.72	-1.84	-0.25	-0.49	-0.06	-0.57
1998	2	10AIC012	E-W	4.3JMA	4.4	6.2	4.6	88.0	-1.89	-1.27	-1.11	-0.62	0.04	-0.55
1998	2	10AIC012	N-S	4.3JMA	4.4	6.2	4.6	88.0	-2.13	-1.70	-1.27	-0.63	0.07	-0.48
1998	2	10AIC014	E-W	4.3JMA	4.4	6.2	4.6	98.0	-1.46	-1.71	-1.22	-0.36	-0.64	-0.48
1998	2	10AIC014	N-S	4.3JMA	4.4	6.2	4.6	98.0	-1.32	-1.81	-1.67	-0.81	-0.86	-0.56
1998	2	10FKI011	E-W	4.3JMA	4.4	6.2	4.6	53.0	-2.25	-1.97	-1.44	-1.23	-0.87	0.03
1998	2	10FKI011	N-S	4.3JMA	4.4	6.2	4.6	53.0	-2.05	-1.84	-1.42	-1.02	-0.81	-0.27
1998	2	10GIF007	E-W	4.3JMA	4.4	6.2	4.6	58.0	-1.91	-1.96	-1.11	-0.66	0.24	-0.49
1998	2	10GIF007	N-S	4.3JMA	4.4	6.2	4.6	58.0	-1.65	-1.81	-1.53	-1.06	0.24	-0.58
1998	2	10GIF018	E-W	4.3JMA	4.4	6.2	4.6	51.0	-0.08	-0.40	-0.44	0.15	0.00	0.31
1998	2	10GIF018	N-S	4.3JMA	4.4	6.2	4.6	51.0	-1.21	-0.93	-0.67	0.05	0.12	0.35
1998	2	10MIE003	E-W	4.3JMA	4.4	6.2	4.6	96.0	-1.46	-1.63	-0.94	0.02	-0.14	-0.30
1998	2	10MIE003	N-S	4.3JMA	4.4	6.2	4.6	96.0	-1.49	-1.53	-0.56	-0.10	-0.05	-0.16
1998	2	10NGN019	E-W	4.3JMA	4.4	6.2	4.6	70.0	-2.64	-1.78	-1.06	-0.61	-0.06	-0.09
1998	2	10NGN019	N-S	4.3JMA	4.4	6.2	4.6	70.0	-2.36	-1.82	-1.17	-0.45	-0.28	-0.17
1998	2	5HKD071	E-W	5.1JMA	5.4	7.6	5.1	77.0	-1.36	-0.89	-0.84	-0.03	-0.54	-0.07
1998	2	5HKD071	N-S	5.1JMA	5.4	7.6	5.1	77.0	-1.55	-1.12	-0.86	-0.13	-0.21	-0.23
1998	2	5HKD072	E-W	5.1JMA	5.4	7.6	5.1	59.0	-1.30	-1.18	-0.69	-0.26	-0.39	-0.60
1998	2	5HKD072	N-S	5.1JMA	5.4	7.6	5.1	59.0	-1.39	-0.70	-0.63	-0.32	-0.16	-0.54
1998	2	5HKD073	E-W	5.1JMA	5.4	7.6	5.1	57.0	-0.81	-0.51	-0.24	-0.23	-0.14	-0.63
1998	2	5HKD073	N-S	5.1JMA	5.4	7.6	5.1	57.0	-1.11	-0.71	-0.19	-0.25	-0.12	-0.62
1998	2	5HKD074	E-W	5.1JMA	5.4	7.6	5.1	53.0	-1.34	-0.58	-0.29	0.21	0.33	-0.26
1998	2	5HKD074	N-S	5.1JMA	5.4	7.6	5.1	53.0	-1.00	-0.51	-0.42	0.12	0.25	-0.24

1998	2	5HKD075	E-W	5.1JMA	5.4	7.6	5.1	91.0	-0.95	-0.01	0.00	0.31	0.04	-0.39
1998	2	5HKD075	N-S	5.1JMA	5.4	7.6	5.1	91.0	-0.58	0.05	-0.08	0.15	-0.04	-0.75
1998	2	4HKD106	E-W	4.7JMA	5.2	6.3	4.8	78.0	-1.24	-0.49	-0.39	-0.40	0.13	-0.15
1998	2	4HKD106	N-S	4.7JMA	5.2	6.3	4.8	78.0	-1.06	-0.66	-0.43	-0.49	0.03	-0.18
1998	2	4HKD108	E-W	4.7JMA	5.2	6.3	4.8	78.0	-0.69	-0.05	0.24	0.17	0.68	0.61
1998	2	4HKD108	N-S	4.7JMA	5.2	6.3	4.8	78.0	-0.67	-0.14	0.05	0.27	0.66	0.58
1998	2	4HKD109	E-W	4.7JMA	5.2	6.3	4.8	85.0	-2.35	-1.92	-1.40	-1.05	0.09	0.28
1998	2	4HKD109	N-S	4.7JMA	5.2	6.3	4.8	85.0	-1.92	-1.95	-1.45	-0.95	0.07	0.22
1998	2	4HKD110	E-W	4.7JMA	5.2	6.3	4.8	97.0	-0.62	0.41	0.62	0.50	0.78	0.40
1998	2	4HKD110	N-S	4.7JMA	5.2	6.3	4.8	97.0	-0.59	0.29	0.55	0.54	0.98	0.22
1997	5	13KGS003	E-W	6.2JMA	6.6	7.7	5.9	33.0	0.19	0.83	1.19	1.23	1.10	0.82
1997	5	13KGS003	N-S	6.2JMA	6.6	7.7	5.9	33.0	-0.17	0.73	1.07	1.11	1.18	1.10
1997	5	13KGS004	E-W	6.2JMA	6.6	7.7	5.9	14.0	0.66	0.81	1.57	1.62	1.12	0.83
1997	5	13KGS004	N-S	6.2JMA	6.6	7.7	5.9	14.0	0.70	1.52	1.83	1.29	1.10	0.76
1997	5	13KGS005	E-W	6.2JMA	6.6	7.7	5.9	22.0	0.78	1.22	1.60	2.06	1.89	1.61
1997	5	13KGS005	N-S	6.2JMA	6.6	7.7	5.9	22.0	0.44	1.68	1.76	1.91	1.88	1.95
1997	5	13KGS006	E-W	6.2JMA	6.6	7.7	5.9	46.0	0.43	1.04	1.08	1.76	1.31	0.88
1997	5	13KGS006	N-S	6.2JMA	6.6	7.7	5.9	46.0	0.69	1.40	1.07	1.95	1.37	0.74
1997	5	13KGS007	E-W	6.2JMA	6.6	7.7	5.9	22.0	1.12	1.08	1.77	1.62	1.36	1.22
1997	5	13KGS007	N-S	6.2JMA	6.6	7.7	5.9	22.0	0.26	1.22	1.70	1.69	1.68	1.09
1997	5	13KGS008	E-W	6.2JMA	6.6	7.7	5.9	42.0	0.67	1.41	1.53	1.34	0.96	1.03
1997	5	13KGS008	N-S	6.2JMA	6.6	7.7	5.9	42.0	0.38	1.46	1.23	1.29	0.98	0.88
1997	5	13KGS009	E-W	6.2JMA	6.6	7.7	5.9	59.0	0.51	1.64	1.60	1.50	0.81	0.78
1997	5	13KGS009	N-S	6.2JMA	6.6	7.7	5.9	59.0	0.73	1.61	1.45	1.49	0.86	0.68
1997	5	13KGS010	E-W	6.2JMA	6.6	7.7	5.9	33.0	0.96	1.85	1.77	1.66	1.37	0.66
1997	5	13KGS010	N-S	6.2JMA	6.6	7.7	5.9	33.0	0.32	1.92	1.87	1.73	1.26	0.87
1997	5	13KGS011	E-W	6.2JMA	6.6	7.7	5.9	47.0	0.62	0.74	1.11	1.53	1.04	1.19
1997	5	13KGS011	N-S	6.2JMA	6.6	7.7	5.9	47.0	-0.20	0.22	0.95	1.65	1.45	1.45
1997	5	13KGS012	E-W	6.2JMA	6.6	7.7	5.9	54.0	0.55	1.28	1.10	1.07	0.72	0.51
1997	5	13KGS012	N-S	6.2JMA	6.6	7.7	5.9	54.0	0.60	1.32	1.24	0.86	0.73	0.59
1997	5	13KGS014	E-W	6.2JMA	6.6	7.7	5.9	73.0	0.14	0.70	0.74	0.42	0.09	-0.09

1997	5	13KGS014	N-S	6.2JMA	6.6	7.7	5.9	73.0	0.32	0.61	0.68	0.59	0.16	-0.03
1997	5	13KGS016	E-W	6.2JMA	6.6	7.7	5.9	65.0	0.36	0.32	0.90	0.82	0.73	0.60
1997	5	13KGS016	N-S	6.2JMA	6.6	7.7	5.9	65.0	-0.31	0.25	0.53	0.74	0.69	0.73
1997	5	13KGS017	E-W	6.2JMA	6.6	7.7	5.9	94.0	-0.12	0.17	0.82	0.93	0.32	0.47
1997	5	13KGS017	N-S	6.2JMA	6.6	7.7	5.9	94.0	-0.08	0.23	0.60	1.09	0.43	0.50
1997	5	13KGS018	E-W	6.2JMA	6.6	7.7	5.9	75.0	0.43	0.30	1.34	1.30	1.30	0.87
1997	5	13KGS018	N-S	6.2JMA	6.6	7.7	5.9	75.0	0.33	0.27	1.14	1.15	1.37	0.89
1997	5	13KGS019	E-W	6.2JMA	6.6	7.7	5.9	82.0	0.23	0.44	0.27	0.62	0.96	1.04
1997	5	13KGS019	N-S	6.2JMA	6.6	7.7	5.9	82.0	0.08	0.22	0.34	0.62	0.98	1.06
1997	5	13KGS020	E-W	6.2JMA	6.6	7.7	5.9	87.0	0.40	0.49	1.25	1.23	1.09	0.62
1997	5	13KGS020	N-S	6.2JMA	6.6	7.7	5.9	87.0	0.15	0.41	0.92	1.20	1.26	0.71
1997	5	13KGS021	E-W	6.2JMA	6.6	7.7	5.9	92.0	0.23	0.37	0.98	1.14	0.80	0.82
1997	5	13KGS021	N-S	6.2JMA	6.6	7.7	5.9	92.0	0.36	0.42	0.87	1.06	0.70	0.55
1997	5	13KGS036	E-W	6.2JMA	6.6	7.7	5.9	52.0	-0.22	0.05	0.25	1.00	1.20	0.55
1997	5	13KGS036	N-S	6.2JMA	6.6	7.7	5.9	52.0	0.16	0.30	0.53	1.24	1.03	0.45
1997	5	13KMM008	E-W	6.2JMA	6.6	7.7	5.9	85.0	0.17	1.06	1.15	0.89	0.59	-0.43
1997	5	13KMM008	N-S	6.2JMA	6.6	7.7	5.9	85.0	-0.24	1.11	0.97	0.62	0.41	-0.53
1997	5	13KMM010	E-W	6.2JMA	6.6	7.7	5.9	71.0	0.08	0.80	0.74	0.77	0.23	-0.14
1997	5	13KMM010	N-S	6.2JMA	6.6	7.7	5.9	71.0	-0.51	0.64	0.83	0.79	0.36	-0.18
1997	5	13KMM011	E-W	6.2JMA	6.6	7.7	5.9	94.0	-0.46	0.15	0.06	1.09	0.62	0.12
1997	5	13KMM011	N-S	6.2JMA	6.6	7.7	5.9	94.0	-0.24	0.24	0.13	0.76	0.37	0.23
1997	5	13KMM012	E-W	6.2JMA	6.6	7.7	5.9	67.0	0.07	1.56	1.02	0.95	0.33	0.23
1997	5	13KMM012	N-S	6.2JMA	6.6	7.7	5.9	67.0	0.18	1.66	1.20	0.99	0.42	0.06
1997	5	13KMM014	E-W	6.2JMA	6.6	7.7	5.9	73.0	-0.70	-0.07	0.29	0.27	1.05	0.70
1997	5	13KMM014	N-S	6.2JMA	6.6	7.7	5.9	73.0	-0.56	0.19	0.52	0.22	1.04	0.65
1997	5	13KMM015	E-W	6.2JMA	6.6	7.7	5.9	27.0	0.13	0.90	1.13	1.46	0.92	0.38
1997	5	13KMM015	N-S	6.2JMA	6.6	7.7	5.9	27.0	0.50	1.36	1.46	1.61	0.93	0.54
1997	5	13KMM016	E-W	6.2JMA	6.6	7.7	5.9	54.0	-0.17	0.81	0.80	0.63	0.94	0.76
1997	5	13KMM016	N-S	6.2JMA	6.6	7.7	5.9	54.0	-0.06	0.83	0.84	0.63	0.80	0.79
1997	5	13KMM021	E-W	6.2JMA	6.6	7.7	5.9	54.0	-0.55	0.28	0.12	0.76	0.47	0.16
1997	5	13KMM021	N-S	6.2JMA	6.6	7.7	5.9	54.0	-0.07	0.44	0.10	0.49	0.21	0.08

1997	5	13KMM022	E-W	6.2JMA	6.6	7.7	5.9	38.0	-0.11	0.74	0.56	0.67	0.61	0.38
1997	5	13KMM022	N-S	6.2JMA	6.6	7.7	5.9	38.0	0.13	0.70	0.59	0.74	0.84	0.28
1997	5	13MYZ010	E-W	6.2JMA	6.6	7.7	5.9	75.0	-0.56	0.60	0.71	0.90	0.14	0.16
1997	5	13MYZ010	N-S	6.2JMA	6.6	7.7	5.9	75.0	0.25	0.76	0.77	0.52	-0.09	-0.02
1997	5	13MYZ015	E-W	6.2JMA	6.6	7.7	5.9	92.0	0.52	1.23	1.18	0.98	0.92	0.32
1997	5	13MYZ015	N-S	6.2JMA	6.6	7.7	5.9	92.0	0.47	1.20	0.98	0.99	0.82	0.42
1997	5	13NGS009	E-W	6.2JMA	6.6	7.7	5.9	98.0	0.33	0.19	-0.18	-0.25	0.28	-0.63
1997	5	13NGS009	N-S	6.2JMA	6.6	7.7	5.9	98.0	-0.33	0.44	-0.08	0.05	0.21	-0.39
1997	5	13NGS012	E-W	6.2JMA	6.6	7.7	5.9	87.0	-0.32	0.26	0.40	0.51	0.12	-0.38
1997	5	13NGS012	N-S	6.2JMA	6.6	7.7	5.9	87.0	-0.07	0.39	0.43	0.52	0.16	-0.40
1997	5	13NGS014	E-W	6.2JMA	6.6	7.7	5.9	70.0	0.17	1.01	0.53	1.16	0.89	0.22
1997	5	13NGS014	N-S	6.2JMA	6.6	7.7	5.9	70.0	-0.27	0.65	0.79	1.23	0.86	0.34
1997	3	26KGS003	E-W	6.3JMA	6.7	7.6	6.1	23.0	0.71	1.20	1.59	1.49	1.49	1.14
1997	3	26KGS003	N-S	6.3JMA	6.7	7.6	6.1	23.0	0.02	1.07	1.55	1.42	1.28	1.32
1997	3	26KGS004	E-W	6.3JMA	6.7	7.6	6.1	24.0	0.55	1.21	1.77	1.34	1.05	0.88
1997	3	26KGS004	N-S	6.3JMA	6.7	7.6	6.1	24.0	1.15	1.67	2.14	1.26	1.00	0.67
1997	3	26KGS005	E-W	6.3JMA	6.7	7.6	6.1	15.0	0.81	1.24	1.75	1.92	1.52	1.38
1997	3	26KGS005	N-S	6.3JMA	6.7	7.6	6.1	15.0	0.74	1.58	1.79	1.70	1.31	1.60
1997	3	26KGS006	E-W	6.3JMA	6.7	7.6	6.1	36.0	0.48	1.19	1.24	1.64	1.26	0.79
1997	3	26KGS006	N-S	6.3JMA	6.7	7.6	6.1	36.0	0.55	1.30	1.28	1.77	1.43	0.73
1997	3	26KGS007	E-W	6.3JMA	6.7	7.6	6.1	25.0	1.08	1.11	2.21	1.27	1.36	1.16
1997	3	26KGS007	N-S	6.3JMA	6.7	7.6	6.1	25.0	0.76	0.98	1.90	1.52	1.51	1.11
1997	3	26KGS008	E-W	6.3JMA	6.7	7.6	6.1	34.0	0.43	1.45	1.67	1.48	1.02	1.04
1997	3	26KGS008	N-S	6.3JMA	6.7	7.6	6.1	34.0	0.51	1.55	1.88	1.46	1.09	0.96
1997	3	26KGS009	E-W	6.3JMA	6.7	7.6	6.1	51.0	0.45	1.64	1.55	1.64	0.89	0.85
1997	3	26KGS009	N-S	6.3JMA	6.7	7.6	6.1	51.0	0.40	1.66	1.49	1.28	1.02	0.86
1997	3	26KGS010	E-W	6.3JMA	6.7	7.6	6.1	36.0	0.94	1.38	1.75	1.50	1.39	0.49
1997	3	26KGS010	N-S	6.3JMA	6.7	7.6	6.1	36.0	0.58	1.36	1.84	1.67	1.09	0.73
1997	3	26KGS011	E-W	6.3JMA	6.7	7.6	6.1	47.0	0.66	0.90	0.56	1.36	0.75	1.05
1997	3	26KGS011	N-S	6.3JMA	6.7	7.6	6.1	47.0	0.02	0.51	0.71	1.55	1.08	1.07
1997	3	26KGS012	E-W	6.3JMA	6.7	7.6	6.1	49.0	0.67	1.45	1.60	0.94	0.68	0.48

1997	3	26KGS012	N-S	6.3JMA	6.7	7.6	6.1	49.0	0.45	1.05	1.25	0.86	0.73	0.62
1997	3	26KGS014	E-W	6.3JMA	6.7	7.6	6.1	67.0	0.11	0.60	0.66	0.55	0.04	-0.01
1997	3	26KGS014	N-S	6.3JMA	6.7	7.6	6.1	67.0	0.23	0.58	0.93	0.45	0.13	-0.09
1997	3	26KGS015	E-W	6.3JMA	6.7	7.6	6.1	94.0	-0.08	0.93	0.89	0.52	0.65	-0.07
1997	3	26KGS015	N-S	6.3JMA	6.7	7.6	6.1	94.0	-0.57	0.98	0.91	0.52	0.66	0.00
1997	3	26KGS016	E-W	6.3JMA	6.7	7.6	6.1	67.0	0.47	0.15	0.56	0.80	0.64	0.62
1997	3	26KGS016	N-S	6.3JMA	6.7	7.6	6.1	67.0	-0.50	0.03	0.48	0.77	0.49	0.64
1997	3	26KGS017	E-W	6.3JMA	6.7	7.6	6.1	85.0	-0.37	0.04	0.85	0.56	0.44	0.28
1997	3	26KGS017	N-S	6.3JMA	6.7	7.6	6.1	85.0	-0.04	0.35	0.77	0.74	0.51	0.47
1997	3	26KGS018	E-W	6.3JMA	6.7	7.6	6.1	71.0	0.38	0.86	1.28	0.95	1.24	0.69
1997	3	26KGS018	N-S	6.3JMA	6.7	7.6	6.1	71.0	0.12	0.38	1.18	1.04	1.19	0.72
1997	3	26KGS019	E-W	6.3JMA	6.7	7.6	6.1	82.0	0.36	0.56	0.52	0.72	0.76	0.91
1997	3	26KGS019	N-S	6.3JMA	6.7	7.6	6.1	82.0	0.09	0.23	0.30	0.48	0.91	0.99
1997	3	26KGS020	E-W	6.3JMA	6.7	7.6	6.1	85.0	0.32	0.68	0.97	0.89	0.61	0.45
1997	3	26KGS020	N-S	6.3JMA	6.7	7.6	6.1	85.0	-0.12	0.66	0.74	1.14	0.74	0.54
1997	3	26KGS021	E-W	6.3JMA	6.7	7.6	6.1	87.0	0.35	0.62	0.95	0.78	0.58	0.71
1997	3	26KGS021	N-S	6.3JMA	6.7	7.6	6.1	87.0	0.25	0.48	0.92	0.82	0.72	0.60
1997	3	26KGS036	E-W	6.3JMA	6.7	7.6	6.1	62.0	0.34	0.11	0.16	0.96	0.95	0.61
1997	3	26KGS036	N-S	6.3JMA	6.7	7.6	6.1	62.0	0.17	0.08	0.53	1.16	0.92	0.47
1997	3	26KMM006	E-W	6.3JMA	6.7	7.6	6.1	96.0	0.65	1.13	0.64	0.62	0.32	-0.27
1997	3	26KMM006	N-S	6.3JMA	6.7	7.6	6.1	96.0	0.36	0.86	0.65	0.52	0.12	-0.08
1997	3	26KMM008	E-W	6.3JMA	6.7	7.6	6.1	82.0	0.70	1.05	1.28	0.85	0.81	-0.30
1997	3	26KMM008	N-S	6.3JMA	6.7	7.6	6.1	82.0	0.29	1.06	1.07	0.63	0.69	-0.30
1997	3	26KMM010	E-W	6.3JMA	6.7	7.6	6.1	70.0	0.63	0.51	0.81	0.95	0.31	0.04
1997	3	26KMM010	N-S	6.3JMA	6.7	7.6	6.1	70.0	0.07	0.44	0.92	1.11	0.38	-0.05
1997	3	26KMM011	E-W	6.3JMA	6.7	7.6	6.1	85.0	-0.12	-0.03	0.38	0.94	0.89	0.17
1997	3	26KMM011	N-S	6.3JMA	6.7	7.6	6.1	85.0	0.09	0.15	0.31	0.42	0.52	0.27
1997	3	26KMM012	E-W	6.3JMA	6.7	7.6	6.1	61.0	0.52	1.48	1.16	1.02	0.99	0.42
1997	3	26KMM012	N-S	6.3JMA	6.7	7.6	6.1	61.0	0.68	1.54	1.09	1.15	0.71	0.27
1997	3	26KMM014	E-W	6.3JMA	6.7	7.6	6.1	65.0	-0.29	0.21	0.33	0.40	1.26	0.74
1997	3	26KMM014	N-S	6.3JMA	6.7	7.6	6.1	65.0	-0.18	0.30	0.44	0.29	1.30	0.77

1997	3	26KMM015	E-W	6.3JMA	6.7	7.6	6.1	25.0	0.81	0.65	0.85	1.54	0.99	0.61
1997	3	26KMM015	N-S	6.3JMA	6.7	7.6	6.1	25.0	0.96	0.88	1.01	1.59	0.81	0.86
1997	3	26KMM016	E-W	6.3JMA	6.7	7.6	6.1	44.0	0.00	0.72	0.82	0.80	1.04	0.92
1997	3	26KMM016	N-S	6.3JMA	6.7	7.6	6.1	44.0	0.09	0.97	1.02	0.82	1.13	0.84
1997	3	26KMM021	E-W	6.3JMA	6.7	7.6	6.1	61.0	0.20	0.35	0.32	0.81	0.55	0.29
1997	3	26KMM021	N-S	6.3JMA	6.7	7.6	6.1	61.0	0.39	0.33	0.24	0.71	0.43	0.19
1997	3	26KMM022	E-W	6.3JMA	6.7	7.6	6.1	47.0	0.55	0.85	0.98	0.83	0.73	0.52
1997	3	26KMM022	N-S	6.3JMA	6.7	7.6	6.1	47.0	0.51	0.79	1.18	1.18	0.85	0.34
1997	3	26MYZ009	E-W	6.3JMA	6.7	7.6	6.1	46.0	-0.01	1.75	1.29	0.93	0.75	0.73
1997	3	26MYZ009	N-S	6.3JMA	6.7	7.6	6.1	46.0	0.43	1.74	1.37	1.07	0.93	0.74
1997	3	26MYZ010	E-W	6.3JMA	6.7	7.6	6.1	64.0	0.12	0.67	0.74	0.62	0.23	0.39
1997	3	26MYZ010	N-S	6.3JMA	6.7	7.6	6.1	64.0	0.47	0.95	1.06	0.49	0.24	0.31
1997	3	26MYZ011	E-W	6.3JMA	6.7	7.6	6.1	96.0	-0.12	0.26	0.08	0.58	0.17	0.11
1997	3	26MYZ011	N-S	6.3JMA	6.7	7.6	6.1	96.0	-0.18	0.30	0.40	0.44	0.18	-0.05
1997	3	26MYZ015	E-W	6.3JMA	6.7	7.6	6.1	80.0	0.55	1.22	1.11	1.24	1.01	0.40
1997	3	26MYZ015	N-S	6.3JMA	6.7	7.6	6.1	80.0	0.65	1.16	1.04	0.95	0.91	0.24
1997	3	26NGS012	E-W	6.3JMA	6.7	7.6	6.1	87.0	0.77	0.98	0.53	0.56	0.39	-0.25
1997	3	26NGS012	N-S	6.3JMA	6.7	7.6	6.1	87.0	0.65	0.91	0.57	0.56	0.24	-0.23
1997	3	26NGS014	E-W	6.3JMA	6.7	7.6	6.1	71.0	0.66	0.43	0.78	1.01	0.81	0.44
1997	3	26NGS014	N-S	6.3JMA	6.7	7.6	6.1	71.0	-0.04	0.35	0.89	1.07	0.85	0.35
1997	3	3CHB022	E-W	5.0JMA	5.3	6.0	5.5	81.0	-0.58	-0.28	0.21	0.42	0.59	-0.29
1997	3	3CHB022	N-S	5.0JMA	5.3	6.0	5.5	81.0	-0.53	-0.26	0.10	0.39	0.44	-0.41
1997	3	3KNG004	E-W	5.0JMA	5.3	6.0	5.5	50.0	-0.64	-0.27	0.01	0.27	0.25	0.06
1997	3	3KNG004	N-S	5.0JMA	5.3	6.0	5.5	50.0	-0.41	-0.17	0.04	0.13	0.43	-0.04
1997	3	3KNG005	E-W	5.0JMA	5.3	6.0	5.5	53.0	-0.43	-0.18	0.17	0.83	0.52	-0.03
1997	3	3KNG005	N-S	5.0JMA	5.3	6.0	5.5	53.0	0.11	0.12	0.09	0.69	0.58	-0.12
1997	3	3KNG008	E-W	5.0JMA	5.3	6.0	5.5	65.0	-0.65	-0.73	-0.59	-0.31	0.04	-0.13
1997	3	3KNG008	N-S	5.0JMA	5.3	6.0	5.5	65.0	-0.95	-0.78	-0.50	-0.47	0.01	-0.07
1997	3	3SZO002	E-W	5.0JMA	5.3	6.0	5.5	12.0	0.28	0.69	1.44	2.06	1.45	1.10
1997	3	3SZO002	N-S	5.0JMA	5.3	6.0	5.5	12.0	0.34	0.70	1.42	1.16	1.04	1.25
1997	3	3SZO003	E-W	5.0JMA	5.3	6.0	5.5	26.0	-0.55	-0.01	0.25	0.84	1.03	0.74

1997	3	3SZO003	N-S	5.0JMA	5.3	6.0	5.5	26.0	-0.66	-0.10	0.00	0.62	1.14	0.86
1997	3	3SZO008	E-W	5.0JMA	5.3	6.0	5.5	38.0	-0.80	-0.18	0.40	0.02	0.24	0.14
1997	3	3SZO008	N-S	5.0JMA	5.3	6.0	5.5	38.0	-0.69	-0.31	0.23	-0.06	0.21	0.06
1997	3	3SZO012	E-W	5.0JMA	5.3	6.0	5.5	66.0	-0.67	-0.76	-0.59	-0.32	-0.20	-0.43
1997	3	3SZO012	N-S	5.0JMA	5.3	6.0	5.5	66.0	-0.37	-0.50	-0.82	-0.35	-0.32	-0.35
1997	3	3TKY003	E-W	5.0JMA	5.3	6.0	5.5	89.0	-1.18	-1.20	-0.61	-0.36	-0.55	-0.90
1997	3	3TKY003	N-S	5.0JMA	5.3	6.0	5.5	89.0	-1.47	-1.17	-0.83	-0.33	-0.40	-0.96
1997	3	3TKY005	E-W	5.0JMA	5.3	6.0	5.5	68.0	-0.34	-0.48	-0.40	-0.15	0.02	-0.18
1997	3	3TKY005	N-S	5.0JMA	5.3	6.0	5.5	68.0	-0.07	-0.23	-0.30	-0.17	0.01	-0.30
1997	3	3TKY006	E-W	5.0JMA	5.3	6.0	5.5	85.0	-0.63	-0.39	-0.31	-0.27	-0.13	-0.68
1997	3	3TKY006	N-S	5.0JMA	5.3	6.0	5.5	85.0	-0.55	-0.46	-0.32	-0.35	-0.11	-0.70
1997	3	3TKY007	E-W	5.0JMA	5.3	6.0	5.5	96.0	-0.69	-0.06	-0.16	-0.22	0.12	-0.40
1997	3	3TKY007	N-S	5.0JMA	5.3	6.0	5.5	96.0	-0.92	-0.17	-0.26	-0.38	-0.17	-0.50
1997	3	3TKY009	E-W	5.0JMA	5.3	6.0	5.5	45.0	0.03	-0.10	-0.22	-0.31	-0.32	-0.32
1997	3	3TKY009	N-S	5.0JMA	5.3	6.0	5.5	45.0	-0.34	-0.11	-0.46	-0.51	-0.39	-0.23
1997	3	3TKY010	E-W	5.0JMA	5.3	6.0	5.5	69.0	-0.27	-0.32	-0.05	0.01	0.20	-0.21
1997	3	3TKY010	N-S	5.0JMA	5.3	6.0	5.5	69.0	-0.27	-0.51	-0.42	0.01	0.20	-0.19
1997	3	3YMN002	E-W	5.0JMA	5.3	6.0	5.5	73.0	-0.87	-0.82	-0.94	-0.65	-0.07	-0.53
1997	3	3YMN002	N-S	5.0JMA	5.3	6.0	5.5	73.0	-1.25	-0.97	-0.84	-0.46	-0.21	-0.52
1997	2	20HKD100	E-W	5.6JMA	6.2	7.5	5.7	87.0	-0.56	-0.06	0.09	0.46	1.00	0.40
1997	2	20HKD100	N-S	5.6JMA	6.2	7.5	5.7	87.0	-0.37	-0.25	0.37	0.51	1.07	0.22
1997	2	20HKD106	E-W	5.6JMA	6.2	7.5	5.7	97.0	-0.67	0.05	0.41	0.80	0.33	-0.17
1997	2	20HKD106	N-S	5.6JMA	6.2	7.5	5.7	97.0	-0.49	0.08	0.47	0.98	0.35	-0.12
1997	2	20HKD107	E-W	5.6JMA	6.2	7.5	5.7	95.0	-0.64	-0.41	0.11	0.19	-0.08	-0.58
1997	2	20HKD107	N-S	5.6JMA	6.2	7.5	5.7	95.0	-0.45	-0.13	0.22	0.11	0.06	-0.68
1997	2	20HKD108	E-W	5.6JMA	6.2	7.5	5.7	79.0	-0.40	-0.17	0.18	0.74	0.72	-0.36
1997	2	20HKD108	N-S	5.6JMA	6.2	7.5	5.7	79.0	-0.32	-0.06	0.24	0.54	0.76	-0.27
1997	2	20HKD109	E-W	5.6JMA	6.2	7.5	5.7	66.0	0.03	0.28	0.51	1.36	0.98	0.14
1997	2	20HKD109	N-S	5.6JMA	6.2	7.5	5.7	66.0	-0.17	0.16	0.51	1.39	0.82	0.09
1997	2	20HKD110	E-W	5.6JMA	6.2	7.5	5.7	62.0	-0.40	0.11	0.72	1.21	0.74	0.20
1997	2	20HKD110	N-S	5.6JMA	6.2	7.5	5.7	62.0	-0.02	0.29	0.84	1.42	0.82	0.27

1997	2	20HKD111	E-W	5.6JMA	6.2	7.5	5.7	62.0	-0.32	0.00	0.29	0.45	0.45	0.49
1997	2	20HKD111	N-S	5.6JMA	6.2	7.5	5.7	62.0	-0.28	0.07	0.54	0.28	0.38	0.33
1997	2	20HKD112	E-W	5.6JMA	6.2	7.5	5.7	65.0	-0.24	0.39	0.44	0.83	1.36	0.84
1997	2	20HKD112	N-S	5.6JMA	6.2	7.5	5.7	65.0	-0.47	0.35	0.11	0.92	1.43	0.67
1997	1	18KGS031	E-W	6.0JMA	6.1	8.0	5.6	88.0	-0.47	-0.23	0.07	1.01	0.90	0.66
1997	1	18KGS031	N-S	6.0JMA	6.1	8.0	5.6	88.0	-0.74	-0.31	0.10	0.84	0.69	0.71
1996	12	3KGS009	E-W	6.3JMA	7.0	7.6	5.9	98.0	0.05	1.53	1.29	0.84	0.45	-0.30
1996	12	3KGS009	N-S	6.3JMA	7.0	7.6	5.9	98.0	0.00	1.48	1.31	0.95	0.51	-0.28
1996	12	3KGS015	E-W	6.3JMA	7.0	7.6	5.9	83.0	0.04	1.23	0.96	0.98	0.95	-0.01
1996	12	3KGS015	N-S	6.3JMA	7.0	7.6	5.9	83.0	0.11	1.33	1.05	0.82	0.92	0.05
1996	12	3KGS017	E-W	6.3JMA	7.0	7.6	5.9	98.0	-0.53	0.36	1.33	1.00	0.74	0.19
1996	12	3KGS017	N-S	6.3JMA	7.0	7.6	5.9	98.0	-0.40	0.43	1.01	1.03	0.68	0.23
1996	12	3KGS022	E-W	6.3JMA	7.0	7.6	5.9	88.0	-0.62	0.26	0.29	0.44	0.28	0.15
1996	12	3KGS022	N-S	6.3JMA	7.0	7.6	5.9	88.0	-0.41	0.37	0.21	0.55	0.40	0.20
1996	12	3MYZ009	E-W	6.3JMA	7.0	7.6	5.9	96.0	0.26	1.55	1.18	0.98	0.12	-0.31
1996	12	3MYZ009	N-S	6.3JMA	7.0	7.6	5.9	96.0	0.14	1.37	1.16	0.89	0.25	-0.14
1996	12	3MYZ010	E-W	6.3JMA	7.0	7.6	5.9	78.0	0.01	0.60	0.79	1.15	0.41	0.31
1996	12	3MYZ010	N-S	6.3JMA	7.0	7.6	5.9	78.0	-0.05	0.72	1.06	0.78	0.27	0.18
1996	12	3MYZ011	E-W	6.3JMA	7.0	7.6	5.9	53.0	0.05	0.75	1.07	1.14	0.75	0.39
1996	12	3MYZ011	N-S	6.3JMA	7.0	7.6	5.9	53.0	-0.05	0.61	1.05	1.01	0.86	0.41
1996	12	3MYZ014	E-W	6.3JMA	7.0	7.6	5.9	45.0	0.13	0.97	0.99	1.40	1.12	0.54
1996	12	3MYZ014	N-S	6.3JMA	7.0	7.6	5.9	45.0	-0.54	0.79	1.01	1.35	0.84	0.42
1996	12	3MYZ015	E-W	6.3JMA	7.0	7.6	5.9	67.0	-0.16	1.18	1.27	1.21	0.78	0.00
1996	12	3MYZ015	N-S	6.3JMA	7.0	7.6	5.9	67.0	-0.67	1.11	1.06	1.28	0.87	0.01
1996	12	3MYZ016	E-W	6.3JMA	7.0	7.6	5.9	44.0	0.04	0.92	1.33	1.41	1.09	0.39
1996	12	3MYZ016	N-S	6.3JMA	7.0	7.6	5.9	44.0	0.00	0.93	1.18	1.49	0.86	0.39
1996	12	3MYZ018	E-W	6.3JMA	7.0	7.6	5.9	63.0	-0.19	0.57	0.63	0.99	0.37	-0.51
1996	12	3MYZ018	N-S	6.3JMA	7.0	7.6	5.9	63.0	-0.23	0.37	0.69	1.34	0.39	-0.39
E sites:														
1998	2	22NIG018	E-W	3.9JMA	4.0	5.2	4.4	34.0	-1.47	-0.50	-0.42	-0.12	0.05	-0.36
1998	2	22NIG018	N-S	3.9JMA	4.0	5.2	4.4	34.0	-1.23	-0.62	-0.41	0.01	-0.03	-0.24

yr	mmdd	station	comp	magtype	m_1	m_{hf}	M_{lp1}	R(km)	A0.2	A0.5	A1	A2	A5	A10
									0.20	0.50	1.00	2.00	5.01	10.00
									0.96	1.21	1.33	1.45	1.72	1.49
97	8	2ATYC	N90W	4.2Mc	3.5	5.6	4.1	34.0	-2.45	-2.60	-2.35	-1.78	-0.85	-0.16
97	8	2ATYC	N00W	4.2Mc	3.5	5.6	4.1	34.0	-2.34	-2.17	-1.91	-1.50	-0.65	-0.10
97	8	5COYC	N90W	4.2Mc	3.5	4.9	4.4	72.0	-2.50	-2.94	-2.51	-1.91	-0.75	-0.70
97	8	5COYC	N00W	4.2Mc	3.5	4.9	4.4	72.0	-2.19	-2.57	-2.47	-2.09	-1.31	-0.74
97	8	14COYC	N90W	4.0Mc	3.6	4.4	4.3	30.0	-2.27	-2.40	-1.96	-1.43	-0.81	-0.22
97	8	14COYC	N00W	4.0Mc	3.6	4.4	4.3	30.0	-2.04	-2.23	-1.59	-1.04	-0.65	-0.12
97	8	14VNTA	N90W	4.0Mc	3.6	4.4	4.3	47.0	-2.07	-2.57	-2.03	-1.52	-1.04	-0.88
97	8	14VNTA	N00W	4.0Mc	3.6	4.4	4.3	47.0	-2.18	-2.28	-2.10	-1.75	-1.27	-0.81
97	8	25VNTA	N90W	3.9Mc	3.3	4.1	4.4	29.0	-1.93	-2.62	-2.43	-1.56	-1.18	-0.63
97	8	25VNTA	N00W	3.9Mc	3.3	4.1	4.4	29.0	-1.94	-2.61	-2.35	-1.67	-1.40	-0.77
97	7	19ATYC	N90W	4.9Mc	4.8	6.3	4.9	56.0	-1.93	-0.96	-0.28	0.01	0.28	0.25
97	7	19ATYC	N00W	4.9Mc	4.8	6.3	4.9	56.0	-0.89	-0.57	0.07	0.35	0.84	0.51
97	7	19CAYR	S90E	4.9Mc	4.8	6.3	4.9	62.0	-1.94	-2.22	-1.33	-0.91	-0.25	-0.17
97	7	19CAYR	S00E	4.9Mc	4.8	6.3	4.9	62.0	-1.60	-1.76	-0.93	-0.69	0.13	-0.04
97	7	19COYC	N90W	4.9Mc	4.8	6.3	4.9	74.0	-2.15	-2.25	-1.84	-0.94	-0.77	-0.49
97	7	19COYC	N00W	4.9Mc	4.8	6.3	4.9	74.0	-1.96	-2.14	-1.38	-0.73	-0.40	-0.84
97	7	19NUXC	N90W	4.9Mc	4.8	6.3	4.9	67.0	-1.80	-2.52	-1.46	-1.01	-0.12	-0.37
97	7	19NUXC	N00W	4.9Mc	4.8	6.3	4.9	67.0	-1.97	-2.24	-1.84	-0.99	-0.36	-0.44
97	7	19OCLL	N90W	4.9Mc	4.8	6.3	4.9	86.0	-1.21	-1.00	-0.69	-0.30	0.22	0.01
97	7	19OCLL	N00W	4.9Mc	4.8	6.3	4.9	86.0	-0.70	-1.00	-0.25	-0.22	-0.11	0.17
97	7	19PAPN	N90W	4.9Mc	4.8	6.3	4.9	89.0	-2.08	-2.10	-1.59	-1.27	-0.69	-0.12
97	7	19PAPN	N00W	4.9Mc	4.8	6.3	4.9	89.0	-2.16	-1.64	-1.50	-1.13	-0.20	-0.40
97	7	19SLUI	N90W	4.9Mc	4.8	6.3	4.9	76.0	-1.97	-1.18	-0.80	0.13	0.20	0.12
97	7	19SLUI	N00W	4.9Mc	4.8	6.3	4.9	76.0	-1.29	-1.15	-0.73	-0.16	0.04	0.06
97	7	19VNTA	N90W	4.9Mc	4.8	6.3	4.9	94.0	-2.31	-1.21	-0.79	-0.34	-0.11	0.53
97	7	19VNTA	N00W	4.9Mc	4.8	6.3	4.9	94.0	-2.06	-1.17	-0.80	-0.34	-0.10	0.54
97	7	19ATYC	N90W	4.5Mc	4.1	5.9	4.6	44.0	-2.16	-2.56	-2.40	-1.71	-1.15	-0.39
97	7	19ATYC	N00W	4.5Mc	4.1	5.9	4.6	44.0	-1.84	-1.92	-1.81	-1.71	-1.31	-0.57

97	7 19PAPN	N90W	4.5Mc	4.1	5.9	4.6	85.0	-1.94	-2.42	-2.42	-1.52	-0.80	-0.77
97	7 19PAPN	N00W	4.5Mc	4.1	5.9	4.6	85.0	-1.46	-1.57	-1.64	-1.36	-0.88	-0.75
97	7 19SLUI	N90W	4.5Mc	4.1	5.9	4.6	71.0	-2.01	-1.29	-0.73	-0.50	-0.39	-0.20
97	7 19SLUI	N00W	4.5Mc	4.1	5.9	4.6	71.0	-1.65	-1.28	-0.95	-0.48	-0.58	-0.25
97	7 24ATYC	N90W	4.3Mc	3.9	5.2	4.4	44.0	-1.93	-2.04	-1.31	-0.73	-0.43	-0.55
97	7 24ATYC	N00W	4.3Mc	3.9	5.2	4.4	44.0	-1.94	-1.72	-1.50	-0.81	-0.62	-0.32
97	7 24ATYC	N90W	4.5Mc	4.0	5.3	4.7	73.0	-1.16	-1.38	-1.18	-1.38	-0.74	-0.29
97	7 24ATYC	N00W	4.5Mc	4.0	5.3	4.7	73.0	-1.29	-1.76	-1.08	-1.44	-0.66	-0.66
97	7 11COYC	N90W	4.3Ma	4.2	5.3	4.5	67.0	-1.10	-1.49	-0.76	-0.39	-0.11	-0.26
97	7 11COYC	N00W	4.3Ma	4.2	5.3	4.5	67.0	-1.30	-1.50	-0.78	-0.47	-0.15	-0.25
97	7 11CPDR	N90W	4.3Ma	4.2	5.3	4.5	25.0	-2.22	-1.58	-1.13	-0.74	-0.38	0.05
97	7 11CPDR	N00W	4.3Ma	4.2	5.3	4.5	25.0	-1.92	-1.27	-0.88	-0.58	-0.18	-0.06
97	7 11OCLL	N90W	4.3Ma	4.2	5.3	4.5	60.0	-1.97	-2.20	-2.00	-1.28	-0.73	-0.50
97	7 11OCLL	N00W	4.3Ma	4.2	5.3	4.5	60.0	-2.15	-2.00	-1.75	-1.02	-0.54	-0.66
97	7 11POZU	N90W	4.3Ma	4.2	5.3	4.5	61.0	-2.31	-1.93	-1.40	-1.40	-0.72	-0.61
97	7 11POZU	N00W	4.3Ma	4.2	5.3	4.5	61.0	-2.46	-1.54	-1.35	-1.19	-0.64	-0.68
97	7 11SMR2	N90W	4.3Ma	4.2	5.3	4.5	38.0	-2.93	-3.15	-2.87	-2.12	-1.43	-0.85
97	7 11SMR2	N00W	4.3Ma	4.2	5.3	4.5	38.0	-2.79	-2.82	-2.78	-2.37	-1.53	-0.83
97	7 11VNTA	N90W	4.3Ma	4.2	5.3	4.5	46.0	-1.86	-1.64	-0.61	-0.33	-0.37	-0.43
97	7 11VNTA	N00W	4.3Ma	4.2	5.3	4.5	46.0	-1.60	-1.02	-0.64	-0.06	-0.19	-0.40
97	7 15CPDR	N90W	4.0Mc	3.4	4.6	4.1	33.0	-1.94	-2.08	-1.41	-1.22	-0.51	-0.89
97	7 15CPDR	N00W	4.0Mc	3.4	4.6	4.1	33.0	-2.12	-1.93	-1.63	-1.03	-0.42	-0.71
97	7 15POZU	N90W	4.0Mc	3.4	4.6	4.1	46.0	-2.43	-1.67	-1.68	-0.85	0.01	-0.34
97	7 15POZU	N00W	4.0Mc	3.4	4.6	4.1	46.0	-2.04	-1.27	-1.02	-0.55	-0.11	-0.32
97	7 16CPDR	N90W	4.0Mc	3.7	4.2	4.7	54.0	-1.99	-1.53	-0.99	-0.68	-0.57	-0.40
97	7 16CPDR	N00W	4.0Mc	3.7	4.2	4.7	54.0	-2.07	-1.26	-0.94	-1.16	-0.69	-0.41
97	7 21NUXC	N90W	4.5Mc	4.4	7.0	4.7	96.0	-2.16	-1.38	-1.00	-0.65	-0.31	-0.71
97	7 21NUXC	N00W	4.5Mc	4.4	7.0	4.7	96.0	-1.65	-1.53	-1.10	-0.44	-0.34	-0.66
97	6 15ATYC	N90W	4.0Mc	3.6	5.3	4.3	34.0	-2.12	-2.30	-2.10	-1.54	-1.02	-0.10
97	6 15ATYC	N00W	4.0Mc	3.6	5.3	4.3	34.0	-2.31	-2.26	-1.92	-1.56	-0.63	-0.32
97	6 24CPDR	N90W	3.5Mc	3.5	4.1	4.5	35.0	-2.14	-2.33	-2.62	-1.76	-0.85	-0.53

97	6	24CPDR	N00W	3.5Mc	3.5	4.1	4.5	35.0	-1.55	-1.59	-1.67	-1.56	-1.44	-0.50
97	6	26CPDR	N90W	3.9Mc	3.7	4.2	4.6	36.0	-1.85	-2.40	-2.33	-1.56	-0.97	-0.53
97	6	26CPDR	N00W	3.9Mc	3.7	4.2	4.6	36.0	-1.51	-1.54	-1.47	-1.56	-0.83	-0.65
97	6	28CPDR	N90W	4.1Mc	3.4	4.2	4.0	14.0	-2.06	-2.32	-2.23	-1.41	-0.95	-0.85
97	6	28CPDR	N00W	4.1Mc	3.4	4.2	4.0	14.0	-2.06	-1.95	-1.93	-1.43	-0.86	-0.97
97	6	28POZU	N90W	4.1Mc	3.4	4.2	4.0	26.0	-2.21	-2.35	-1.93	-1.59	-0.90	-0.55
97	6	28POZU	N00W	4.1Mc	3.4	4.2	4.0	26.0	-2.24	-2.44	-1.98	-1.60	-0.73	-0.45
97	6	28VNTA	N90W	4.1Mc	3.4	4.2	4.0	23.0	-2.58	-2.79	-2.18	-1.86	-1.15	-0.73
97	6	28VNTA	N00W	4.1Mc	3.4	4.2	4.0	23.0	-2.83	-2.62	-2.19	-1.83	-0.98	-0.86
97	6	17PAPN	N90W	4.2Mc	3.8	5.7	4.4	60.0	-2.13	-2.53	-2.28	-1.56	-1.02	-1.17
97	6	17PAPN	N00W	4.2Mc	3.8	5.7	4.4	60.0	-2.13	-2.41	-1.88	-1.60	-1.23	-0.64
97	5	8ATYC	N90W	5.1Me	4.8	6.2	4.8	16.0	-1.65	-0.67	0.05	0.07	0.56	0.85
97	5	8ATYC	N00W	5.1Me	4.8	6.2	4.8	16.0	-0.97	-0.17	0.33	0.45	0.55	0.86
97	5	8CAYR	S90E	5.1Me	4.8	6.2	4.8	30.0	-2.78	-2.19	-1.74	-1.49	-0.67	-0.59
97	5	8CAYR	S00E	5.1Me	4.8	6.2	4.8	30.0	-2.13	-2.18	-1.58	-1.11	-0.64	-0.37
97	5	8COYC	N90W	5.1Me	4.8	6.2	4.8	48.0	-0.89	-0.65	-0.50	-0.16	0.64	0.08
97	5	8COYC	N00W	5.1Me	4.8	6.2	4.8	48.0	-0.72	-0.84	-0.01	0.11	0.38	0.11
97	5	8NUXC	N90W	5.1Me	4.8	6.2	4.8	45.0	-1.57	-0.64	-0.35	0.46	0.57	0.28
97	5	8NUXC	N00W	5.1Me	4.8	6.2	4.8	45.0	-1.36	-0.82	-0.39	0.11	0.20	0.11
97	5	8PAPN	N90W	5.1Me	4.8	6.2	4.8	75.0	-1.62	-0.97	-0.38	-0.16	0.09	0.08
97	5	8PAPN	N00W	5.1Me	4.8	6.2	4.8	75.0	-1.35	-1.04	-0.57	-0.36	-0.25	0.08
97	5	8POZU	N90E	5.1Me	4.8	6.2	4.8	86.0	-1.95	-1.75	-1.10	-0.74	-0.47	-0.32
97	5	8POZU	N00E	5.1Me	4.8	6.2	4.8	86.0	-1.92	-1.52	-1.25	-0.85	-0.75	-0.38
97	5	8SLUI	N90W	5.1Me	4.8	6.2	4.8	58.0	-2.01	-2.45	-2.51	-1.89	-1.28	-0.66
97	5	8SLUI	N00W	5.1Me	4.8	6.2	4.8	58.0	-2.07	-2.45	-2.56	-2.07	-1.38	-0.67
97	5	8SUCH	N90W	5.1Me	4.8	6.2	4.8	33.0	-1.80	-1.16	-0.76	-0.15	0.08	0.28
97	5	8SUCH	N00W	5.1Me	4.8	6.2	4.8	33.0	-0.86	-0.76	-0.68	-0.26	0.45	0.20
97	5	14ATYC	N90W	4.2Mc	3.8	4.9	4.1	31.0	-2.50	-1.38	-1.17	-0.79	-0.27	-0.40
97	5	14ATYC	N00W	4.2Mc	3.8	4.9	4.1	31.0	-1.56	-1.25	-0.84	-0.15	-0.34	-0.22
97	5	19NUXC	N90W	4.3Mc	4.4	5.8	4.6	60.0	-1.89	-0.94	-0.45	-0.50	-0.01	-0.15
97	5	19NUXC	N00W	4.3Mc	4.4	5.8	4.6	60.0	-0.95	-0.82	-0.38	-0.33	0.09	-0.19

97	5	19SUCH	N90W	4.3Mc	4.4	5.8	4.6	48.0	-1.75	-0.91	-0.49	0.12	0.13	0.18
97	5	19SUCH	N00W	4.3Mc	4.4	5.8	4.6	48.0	-1.44	-0.54	0.13	0.36	0.22	0.12
97	5	7PAPN	N90W	3.6Mc	3.3	5.4	4.4	38.0	-1.91	-1.80	-0.89	-0.63	0.05	-0.07
97	5	7PAPN	N00W	3.6Mc	3.3	5.4	4.4	38.0	-1.82	-1.24	-0.52	-0.68	-0.39	-0.06
97	5	29UNIO	N90W	4.5Mc	4.2	5.0	4.3	64.0	-2.33	-1.95	-1.11	-0.93	-0.34	-0.48
97	5	29UNIO	N00W	4.5Mc	4.2	5.0	4.3	64.0	-2.49	-2.03	-1.35	-0.85	-0.32	-0.39
97	5	21VILE	N90W	4.7Mc	4.4	4.8	4.7	75.0	-1.85	-1.37	-0.98	-0.39	-0.65	-1.01
97	5	21VILE	N00W	4.7Mc	4.4	4.8	4.7	75.0	-2.06	-1.53	-1.22	-0.56	-0.59	-1.07
97	5	22VILE	N90W	5.9Me	6.7	7.1	5.9	89.0	-0.20	0.38	0.84	0.83	0.69	0.11
97	5	22VILE	N00W	5.9Me	6.7	7.1	5.9	89.0	-0.13	0.25	0.75	0.90	0.61	0.33
97	4	22ATYC	N90W	3.5Mc	3.5	4.6	4.2	44.0	-2.74	-2.51	-2.29	-1.92	-1.31	-0.70
97	4	22ATYC	N00W	3.5Mc	3.5	4.6	4.2	44.0	-1.92	-2.05	-2.06	-1.82	-1.15	-0.67
97	4	22ATYC	N90W	4.0Mc	3.6	4.1	4.3	34.0	-2.02	-2.33	-1.69	-1.30	-0.49	-0.79
97	4	22ATYC	N00W	4.0Mc	3.6	4.1	4.3	34.0	-2.16	-2.37	-2.22	-1.30	-0.35	-0.90
97	4	18SMR2	N90W	3.7Mc	3.6	5.1	4.6	74.0	-2.00	-2.21	-2.14	-1.73	-0.90	-0.69
97	4	18SMR2	N00W	3.7Mc	3.6	5.1	4.6	74.0	-1.94	-2.77	-2.63	-1.76	-1.12	-0.40
97	4	28TNLP	N90E	4.1Mc	3.6	4.9	4.4	47.0	-1.95	-2.72	-2.00	-1.87	-0.81	-0.78
97	4	28TNLP	N00E	4.1Mc	3.6	4.9	4.4	47.0	-2.36	-2.31	-2.33	-1.77	-1.10	-0.63
97	3	22ACAN	S90E	4.9Mc	4.7	6.1	4.8	33.0	-0.55	-0.60	-0.58	-0.40	-0.25	-0.02
97	3	22ACAN	S00E	4.9Mc	4.7	6.1	4.8	33.0	-1.23	-1.40	-0.70	-0.40	-0.26	0.14
97	3	22ATYC	N90W	4.9Mc	4.7	6.1	4.8	76.0	-2.15	-2.19	-1.94	-1.49	-0.86	-0.45
97	3	22ATYC	N00W	4.9Mc	4.7	6.1	4.8	76.0	-2.46	-2.34	-2.18	-1.53	-1.01	-0.52
97	3	22COYC	N90W	4.9Mc	4.7	6.1	4.8	40.0	-2.81	-2.19	-1.89	-1.11	-0.83	-0.46
97	3	22COYC	N00W	4.9Mc	4.7	6.1	4.8	40.0	-2.29	-2.02	-1.49	-1.33	-1.00	-0.43
97	3	22CPDR	N90W	4.9Mc	4.7	6.1	4.8	45.0	-1.85	-1.52	-0.85	-0.51	-0.25	-0.20
97	3	22CPDR	N00W	4.9Mc	4.7	6.1	4.8	45.0	-1.90	-1.47	-0.75	-0.67	-0.06	-0.33
97	3	22OCLL	N90W	4.9Mc	4.7	6.1	4.8	28.0	-2.19	-0.85	-0.30	-0.14	-0.11	0.15
97	3	22OCLL	N00W	4.9Mc	4.7	6.1	4.8	28.0	-0.74	-0.67	-0.51	-0.14	-0.09	0.03
97	3	22OCTT	N90E	4.9Mc	4.7	6.1	4.8	50.0	-2.15	-1.79	-1.25	-0.70	0.22	0.15
97	3	22OCTT	N00E	4.9Mc	4.7	6.1	4.8	50.0	-1.95	-2.01	-1.23	-0.47	0.58	0.49
97	3	22POZU	N90E	4.9Mc	4.7	6.1	4.8	35.0	-1.58	-0.51	0.23	0.49	0.63	0.99

97	3	22POZU	N00E	4.9Mc	4.7	6.1	4.8	35.0	-1.03	-0.40	0.32	0.32	0.65	0.59
97	3	22SMR2	N90W	4.9Mc	4.7	6.1	4.8	60.0	-2.08	-2.34	-1.85	-1.28	-0.88	-0.65
97	3	22SMR2	N00W	4.9Mc	4.7	6.1	4.8	60.0	-2.57	-2.44	-1.59	-1.58	-0.96	-0.79
97	3	22VNTA	N90W	4.9Mc	4.7	6.1	4.8	29.0	-1.85	-0.95	-1.04	-0.10	-0.43	0.55
97	3	22VNTA	N00W	4.9Mc	4.7	6.1	4.8	29.0	-2.13	-0.73	-0.46	0.03	-0.13	0.29
97	3	6ATYC	N90W	4.2Mc	3.8	5.6	4.3	36.0	-1.74	-1.67	-1.01	-0.86	-0.68	-0.47
97	3	6ATYC	N00W	4.2Mc	3.8	5.6	4.3	36.0	-1.41	-1.27	-1.13	-0.80	-0.78	-0.69
97	3	6COYC	N90W	4.2Mc	3.8	5.6	4.3	30.0	-2.48	-2.35	-1.81	-1.56	-0.60	-0.82
97	3	6COYC	N00W	4.2Mc	3.8	5.6	4.3	30.0	-2.09	-2.27	-1.60	-1.37	-0.85	-0.61
97	3	16ATYC	N90W	4.1Mc	3.7	4.3	4.1	53.0	-1.70	-0.98	-0.63	-0.38	-0.04	0.00
97	3	16ATYC	N00W	4.1Mc	3.7	4.3	4.1	53.0	-1.42	-1.01	-0.49	-0.40	-0.08	0.15
97	3	16VNTA	N90W	4.1Mc	3.7	4.3	4.1	34.0	-0.99	-0.93	-0.37	-0.16	-0.19	0.35
97	3	16VNTA	N00W	4.1Mc	3.7	4.3	4.1	34.0	-1.01	-0.59	-0.31	-0.41	-0.28	-0.16
97	3	23ATYC	N90W	4.7Mc	4.6	6.4	4.8	55.0	-0.84	-0.86	-0.53	0.22	0.90	0.44
97	3	23ATYC	N00W	4.7Mc	4.6	6.4	4.8	55.0	-0.77	-0.70	-0.36	-0.12	0.87	0.32
97	3	23NUXC	N90W	4.7Mc	4.6	6.4	4.8	31.0	-1.99	-2.25	-2.42	-2.11	-0.84	-0.15
97	3	23NUXC	N00W	4.7Mc	4.6	6.4	4.8	31.0	-2.13	-2.22	-2.11	-1.51	-0.59	-0.40
97	3	23PAPN	N90W	4.7Mc	4.6	6.4	4.8	28.0	-1.18	-0.59	-0.08	0.33	1.27	0.62
97	3	23PAPN	N00W	4.7Mc	4.6	6.4	4.8	28.0	-0.86	-0.63	-0.60	-0.11	1.07	0.98
97	3	23PETA	S90E	4.7Mc	4.6	6.4	4.8	50.0	-2.04	-2.32	-1.76	-1.19	-0.69	-0.46
97	3	23PETA	S00E	4.7Mc	4.6	6.4	4.8	50.0	-2.29	-2.46	-1.90	-1.31	-0.74	-0.54
97	3	23SLUI	N90W	4.7Mc	4.6	6.4	4.8	24.0	-1.31	-0.70	-0.71	-0.18	-0.11	0.61
97	3	23SLUI	N00W	4.7Mc	4.6	6.4	4.8	24.0	-0.98	-0.69	-0.22	0.15	0.34	0.81
97	3	23SUCH	N90W	4.7Mc	4.6	6.4	4.8	36.0	-1.80	-1.13	-0.63	-0.35	-0.31	0.13
97	3	23SUCH	N00W	4.7Mc	4.6	6.4	4.8	36.0	-1.73	-1.06	-0.64	-0.34	-0.33	0.15
97	3	2CPDR	N90W	4.3Mc	4.1	5.1	4.5	100.0	-1.96	-2.25	-2.14	-1.30	-0.71	-0.65
97	3	2CPDR	N00W	4.3Mc	4.1	5.1	4.5	100.0	-2.26	-1.90	-1.24	-0.77	-0.64	-0.55
97	3	22CPDR	N90W	4.6Mc	4.2	4.4	4.6	58.0	-1.66	-1.05	-0.74	-0.27	-0.22	0.04
97	3	22CPDR	N00W	4.6Mc	4.2	4.4	4.6	58.0	-1.60	-0.82	-0.28	-0.42	-0.10	-0.20
97	3	22VNTA	N90W	4.6Mc	4.2	4.4	4.6	56.0	-2.21	-2.58	-2.25	-1.50	-1.14	-0.59
97	3	22VNTA	N00W	4.6Mc	4.2	4.4	4.6	56.0	-2.64	-2.04	-1.47	-0.97	-0.95	-0.58

97	3	10NUXC	N90W	4.3Mc	4.1	6.2	4.6	83.0	-1.59	-0.84	-0.14	-0.01	-0.61	0.08
97	3	10NUXC	N00W	4.3Mc	4.1	6.2	4.6	83.0	-1.87	-0.74	-0.43	-0.42	-0.61	0.08
97	3	10SLUI	N90W	4.3Mc	4.1	6.2	4.6	99.0	-1.56	-0.65	-0.25	-0.14	0.26	-0.29
97	3	10SLUI	N00W	4.3Mc	4.1	6.2	4.6	99.0	-1.75	-1.17	-0.75	-0.28	-0.12	-0.18
97	3	20PAPN	N90W	3.9Mc	3.6	6.1	4.5	59.0	-2.57	-2.52	-2.49	-1.62	-1.13	-1.08
97	3	20PAPN	N00W	3.9Mc	3.6	6.1	4.5	59.0	-2.65	-2.10	-1.96	-1.56	-1.05	-0.97
97	3	24PAPN	N90W	4.3Mc	3.7	4.8	4.1	28.0	-2.16	-1.55	-0.78	-0.13	-0.39	-0.37
97	3	24PAPN	N00W	4.3Mc	3.7	4.8	4.1	28.0	-1.27	-0.73	-0.28	-0.19	-0.64	-0.01
97	3	24SLUI	N90W	4.3Mc	3.7	4.8	4.1	29.0	-2.27	-1.79	-1.47	-1.25	-0.99	-0.59
97	3	24SLUI	N00W	4.3Mc	3.7	4.8	4.1	29.0	-2.51	-1.65	-1.38	-1.14	-0.87	-0.78
97	2	15NUXC	N90W	4.5Mc	4.1	5.5	4.4	33.0	-2.20	-1.91	-1.69	-1.08	-0.81	-0.76
97	2	15NUXC	N00W	4.5Mc	4.1	5.5	4.4	33.0	-1.97	-1.49	-0.87	-0.73	-0.68	-0.52
97	2	15PAPN	N90W	4.5Mc	4.1	5.5	4.4	55.0	-2.17	-2.05	-1.44	-0.70	-0.41	-0.44
97	2	15PAPN	N00W	4.5Mc	4.1	5.5	4.4	55.0	-2.10	-1.87	-1.46	-0.85	-0.40	-0.36
97	2	15SLUI	N90W	4.5Mc	4.1	5.5	4.4	42.0	-1.86	-1.90	-1.43	-1.05	-0.76	-0.79
97	2	15SLUI	N00W	4.5Mc	4.1	5.5	4.4	42.0	-2.04	-1.65	-0.98	-0.55	-0.72	-0.92
97	1	11CALE	S90E	7.3Me	7.2	7.8	6.2	21.0	0.39	1.27	1.58	1.65	1.85	1.53
97	1	11CALE	S00E	7.3Me	7.2	7.8	6.2	21.0	0.75	1.54	1.78	1.83	1.81	1.46
97	1	11VILE	S90E	7.3Me	7.2	7.8	6.2	74.0	-1.25	-0.62	-0.68	-0.76	-0.27	0.06
97	1	11VILE	S00E	7.3Me	7.2	7.8	6.2	74.0	-0.77	-0.81	-0.10	0.19	-0.48	-0.15
97	1	12CALE	S90E	4.7Mc	4.7	5.4	5.0	33.0	-0.57	0.58	0.94	1.01	0.32	0.47
97	1	12CALE	S00E	4.7Mc	4.7	5.4	5.0	33.0	-0.58	0.50	1.12	1.18	0.52	0.45
97	1	16CALE	S90E	5.4Me	6.1	6.3	5.3	29.0	0.67	0.98	1.27	1.44	0.93	0.82
97	1	16CALE	S00E	5.4Me	6.1	6.3	5.3	29.0	0.82	0.88	1.20	1.38	1.04	0.70
96	12	28NUXC	N90W	4.4Mc	4.0	5.9	4.4	68.0	-2.12	-2.48	-1.76	-1.12	-0.60	-0.49
96	12	28NUXC	N00W	4.4Mc	4.0	5.9	4.4	68.0	-2.45	-2.09	-1.55	-1.00	-0.82	-0.35
96	12	28PAPN	N90W	4.4Mc	4.0	5.9	4.4	40.0	-2.04	-1.93	-1.24	-0.58	-0.68	-0.10
96	12	28PAPN	N00W	4.4Mc	4.0	5.9	4.4	40.0	-2.11	-2.01	-1.55	-0.86	-0.13	-0.17
96	12	28SLUI	N90W	4.4Mc	4.0	5.9	4.4	54.0	-2.21	-2.07	-1.33	-1.06	-0.56	-0.52
96	12	28SLUI	N00W	4.4Mc	4.0	5.9	4.4	54.0	-2.48	-2.00	-1.63	-1.00	-1.02	-0.73
96	11	3CPDR	N90W	4.1Mc	3.6	4.2	4.3	32.0	-1.95	-2.33	-2.26	-1.36	-0.63	-0.51

96	11	3CPDR	N00W	4.1MC	3.6	4.2	4.3	32.0	-2.22	-2.23	-1.90	-1.24	-1.06	-0.37
96	11	20CPDR	N90W	4.1MC	3.9	5.7	4.7	95.0	-1.85	-2.27	-2.12	-1.55	-1.07	-0.41
96	11	20CPDR	N00W	4.1MC	3.9	5.7	4.7	95.0	-2.55	-2.30	-1.81	-1.36	-0.90	-0.75
96	11	20OCLL	N90W	4.1MC	3.9	5.7	4.7	81.0	-1.10	-1.85	-1.87	-1.55	-0.64	-0.39
96	11	20OCLL	N00W	4.1MC	3.9	5.7	4.7	81.0	-1.16	-1.75	-1.77	-1.67	-0.82	-0.66
96	11	20POZU	N90E	4.1MC	3.9	5.7	4.7	90.0	-2.95	-2.65	-2.32	-1.69	-0.95	-0.44
96	11	20POZU	N00E	4.1MC	3.9	5.7	4.7	90.0	-1.79	-1.81	-1.93	-1.55	-0.58	-0.51
96	10	1ATYC	N90W	4.3MC	3.9	6.1	4.8	88.0	-1.95	-2.51	-2.20	-1.47	-0.95	-0.36
96	10	1ATYC	N00W	4.3MC	3.9	6.1	4.8	88.0	-1.79	-2.06	-1.87	-1.10	-0.71	-0.40
96	10	17COPL	N90E	4.9MC	4.7	5.3	4.5	13.0	-1.92	-0.73	-0.05	-0.20	0.49	0.02
96	10	17COPL	N00E	4.9MC	4.7	5.3	4.5	13.0	-1.14	-0.80	-0.07	-0.01	0.40	0.17
96	10	17CPDR	N90W	4.9MC	4.7	5.3	4.5	80.0	-2.03	-1.45	-0.69	-0.68	-0.41	-0.24
96	10	17CPDR	N00W	4.9MC	4.7	5.3	4.5	80.0	-2.51	-1.49	-0.48	-0.54	-0.54	-0.59
96	10	17POZU	N90E	4.9MC	4.7	5.3	4.5	98.0	-2.10	-2.43	-1.39	-0.98	-0.87	-0.36
96	10	17POZU	N00E	4.9MC	4.7	5.3	4.5	98.0	-2.01	-1.66	-1.26	-0.76	-0.92	-0.14
96	10	17SMR2	N90W	4.9MC	4.7	5.3	4.5	58.0	-2.02	-2.11	-1.61	-1.22	-0.41	-0.17
96	10	17SMR2	N00W	4.9MC	4.7	5.3	4.5	58.0	-2.37	-2.07	-1.66	-1.07	-0.35	-0.15
96	10	27NUXC	N90W	4.4MC	4.3	7.5	4.7	92.0	-2.05	-2.34	-1.53	-0.63	-0.17	-0.09
96	10	27NUXC	N00W	4.4MC	4.3	7.5	4.7	92.0	-1.88	-1.79	-1.09	-0.50	0.02	-0.08
96	10	27PAPN	N90W	4.4MC	4.3	7.5	4.7	94.0	-2.27	-1.62	-0.81	-0.39	-0.04	-0.08
96	10	27PAPN	N00W	4.4MC	4.3	7.5	4.7	94.0	-2.29	-1.12	-0.80	-0.67	0.18	-0.34
96	10	27SLUI	N90W	4.4MC	4.3	7.5	4.7	91.0	-2.09	-2.19	-1.47	-1.21	-0.78	-0.71
96	10	27SLUI	N00W	4.4MC	4.3	7.5	4.7	91.0	-2.01	-2.17	-1.68	-1.37	-1.13	-0.87
96	10	20PAPN	N90W	4.3MC	3.8	5.4	4.3	30.0	-2.21	-2.17	-1.79	-0.93	-0.61	-0.23
96	10	20PAPN	N00W	4.3MC	3.8	5.4	4.3	30.0	-1.83	-1.57	-0.96	-0.47	-0.46	-0.35
96	10	20SLUI	N90W	4.3MC	3.8	5.4	4.3	37.0	-1.76	-1.47	-1.02	-0.39	-0.11	-0.38
96	10	20SLUI	N00W	4.3MC	3.8	5.4	4.3	37.0	-2.02	-0.90	-1.10	-0.08	-0.14	-0.16
96	9	22ATYC	N90W	4.2MC	3.6	5.6	4.2	27.0	-2.14	-2.41	-1.72	-1.48	-0.62	-0.26
96	9	22ATYC	N00W	4.2MC	3.6	5.6	4.2	27.0	-2.22	-2.17	-2.00	-1.28	-0.53	-0.18
96	9	3COYC	N90W	4.9MC	4.2	3.8	4.5	36.0	-1.58	-1.06	-0.54	-0.12	-0.08	-0.23
96	9	3COYC	N00W	4.9MC	4.2	3.8	4.5	36.0	-1.50	-1.44	-0.87	-0.63	-0.40	-0.35

96	9	3CPDR	N90W	4.9Mc	4.2	3.8	4.5	21.0	-1.78	-1.12	-0.61	-0.53	-0.15	-0.52
96	9	3CPDR	N00W	4.9Mc	4.2	3.8	4.5	21.0	-1.68	-1.36	-0.72	-0.43	-0.25	-0.63
96	9	3VNTA	N90W	4.9Mc	4.2	3.8	4.5	14.0	-1.71	-1.25	-0.71	-0.78	-0.58	-0.55
96	9	3VNTA	N00W	4.9Mc	4.2	3.8	4.5	14.0	-1.33	-1.60	-0.85	-0.75	-0.74	-0.58
96	8	27CPDR	N90W	4.5Mc	4.3	5.1	4.5	39.0	-1.84	-1.92	-1.06	-0.89	-0.25	-0.42
96	8	27CPDR	N00W	4.5Mc	4.3	5.1	4.5	39.0	-2.34	-1.54	-0.84	-0.36	-0.49	-0.59
96	8	27POZU	N90E	4.5Mc	4.3	5.1	4.5	69.0	-1.09	-1.64	-1.85	-1.73	-0.65	-0.52
96	8	27POZU	N00E	4.5Mc	4.3	5.1	4.5	69.0	-1.37	-2.09	-2.16	-1.69	-0.81	-0.16
96	8	27SMR2	N90W	4.5Mc	4.3	5.1	4.5	32.0	-2.40	-1.83	-1.19	-0.56	-0.20	-0.46
96	8	27SMR2	N00W	4.5Mc	4.3	5.1	4.5	32.0	-1.88	-1.58	-1.14	-0.85	-0.38	-0.48
96	8	8OCLL	N90W	3.8Mc	3.5	4.4	4.5	23.0	-1.92	-1.82	-0.88	-0.59	0.29	-0.29
96	8	8OCLL	N00W	3.8Mc	3.5	4.4	4.5	23.0	-1.77	-0.89	-0.34	0.00	0.30	-0.26
96	8	8VNTA	N90W	3.8Mc	3.5	4.4	4.5	26.0	-2.10	-2.11	-1.97	-1.44	-0.95	-0.79
96	8	8VNTA	N00W	3.8Mc	3.5	4.4	4.5	26.0	-2.21	-2.38	-2.25	-1.59	-0.94	-0.69
96	7	15ATYC	N90W	6.5Me	5.9	7.1	5.7	87.0	-0.40	0.09	0.09	0.49	0.49	0.60
96	7	15ATYC	N00W	6.5Me	5.9	7.1	5.7	87.0	-0.69	0.50	0.45	0.67	0.71	0.47
96	7	15AZIH	N90E	6.5Me	5.9	7.1	5.7	40.0	-1.50	-0.98	-0.46	-0.22	0.24	0.49
96	7	15AZIH	N00E	6.5Me	5.9	7.1	5.7	40.0	-1.43	-1.27	-0.86	-0.15	0.27	0.46
96	7	15NUXC	N90W	6.5Me	5.9	7.1	5.7	55.0	0.31	0.74	0.61	0.64	0.71	0.55
96	7	15NUXC	N00W	6.5Me	5.9	7.1	5.7	55.0	-0.10	0.95	0.69	0.74	0.74	0.45
96	7	15PAPN	N90W	6.5Me	5.9	7.1	5.7	26.0	-1.07	-1.61	-1.90	-1.69	-0.89	-0.08
96	7	15PAPN	N00W	6.5Me	5.9	7.1	5.7	26.0	-2.17	-2.40	-2.29	-1.35	-0.38	-0.50
96	7	15PETA	S90E	6.5Me	5.9	7.1	5.7	23.0	-0.30	0.06	0.55	0.61	0.68	0.59
96	7	15PETA	S00E	6.5Me	5.9	7.1	5.7	23.0	-0.52	0.37	0.43	1.00	0.64	0.71
96	7	15UNIO	S90E	6.5Me	5.9	7.1	5.7	95.0	-1.37	-0.90	-0.57	-0.10	0.13	-0.18
96	7	15UNIO	S00E	6.5Me	5.9	7.1	5.7	95.0	-1.45	-0.66	-0.23	0.07	0.01	-0.03
96	7	19ATYC	N90W	4.8Mc	4.6	6.1	4.6	24.0	-1.93	-1.02	-0.55	-0.40	-0.14	-0.27
96	7	19ATYC	N00W	4.8Mc	4.6	6.1	4.6	24.0	-1.96	-1.36	-1.03	-0.42	-0.28	-0.24
96	7	19NUXC	N90W	4.8Mc	4.6	6.1	4.6	54.0	-1.06	-1.56	-1.84	-0.96	-0.59	-0.58
96	7	19NUXC	N00W	4.8Mc	4.6	6.1	4.6	54.0	-1.18	-1.68	-1.76	-1.07	-0.70	-0.80
96	7	19OCLL	N90W	4.8Mc	4.6	6.1	4.6	61.0	-1.59	-1.16	-0.34	-0.47	-0.40	-0.38

96	7	19OCLL	N00W	4.8MC	4.6	6.1	4.6	61.0	-1.21	-1.34	-0.79	-0.61	-0.69	0.07
96	7	19PAPN	N90W	4.8MC	4.6	6.1	4.6	83.0	0.16	0.42	0.52	1.14	1.24	1.19
96	7	19PAPN	N00W	4.8MC	4.6	6.1	4.6	83.0	0.30	0.65	0.80	1.43	1.51	1.29
96	7	19POZU	N90E	4.8MC	4.6	6.1	4.6	80.0	-2.31	-1.92	-1.37	-1.02	-0.29	-0.30
96	7	19POZU	N00E	4.8MC	4.6	6.1	4.6	80.0	-2.14	-1.69	-1.03	-0.55	0.13	-0.47
96	7	19VNTA	N90W	4.8MC	4.6	6.1	4.6	73.0	-1.83	-1.66	-1.30	-1.03	-0.44	-0.44
96	7	19VNTA	N00W	4.8MC	4.6	6.1	4.6	73.0	-1.83	-1.61	-1.10	-0.65	0.10	-0.51
96	7	6CPDR	N90W	4.2MC	3.7	4.9	4.9	68.0	-2.23	-2.02	-1.46	-0.84	-0.36	-0.34
96	7	6CPDR	N00W	4.2MC	3.7	4.9	4.9	68.0	-1.95	-1.79	-1.44	-0.81	-0.28	-0.34
96	7	6OCLL	N90W	4.2MC	3.7	4.9	4.9	36.0	-1.82	-0.98	-0.77	-0.45	-0.50	-0.21
96	7	6OCLL	N00W	4.2MC	3.7	4.9	4.9	36.0	-1.45	-0.59	-0.50	-0.61	-0.26	-0.43
96	7	18NUXC	N90W	4.8MC	4.9	6.5	5.0	69.0	-1.75	-1.57	-0.61	-0.63	0.26	-0.07
96	7	18NUXC	N00W	4.8MC	4.9	6.5	5.0	69.0	-2.08	-1.72	-0.90	-0.57	0.13	-0.07
96	7	18PAPN	N90W	4.8MC	4.9	6.5	5.0	36.0	-2.07	-1.83	-1.47	-1.19	-0.74	-0.03
96	7	18PAPN	N00W	4.8MC	4.9	6.5	5.0	36.0	-1.91	-1.64	-1.18	-0.87	-0.59	-0.15
96	7	18PETA	S90E	4.8MC	4.9	6.5	5.0	7.0	-1.04	-0.29	-0.21	0.32	0.32	0.72
96	7	18PETA	S00E	4.8MC	4.9	6.5	5.0	7.0	-0.97	-0.26	0.01	0.52	0.78	0.63
96	7	18UNIO	S90E	4.8MC	4.9	6.5	5.0	76.0	-1.95	-1.38	-1.14	-0.66	-0.46	-0.28
96	7	18UNIO	S00E	4.8MC	4.9	6.5	5.0	76.0	-2.00	-1.89	-1.20	-0.97	-0.36	-0.33
96	7	15PAPN	N90W	4.3MC	4.0	5.7	4.2	28.0	0.11	0.78	0.86	1.17	0.98	1.26
96	7	15PAPN	N00W	4.3MC	4.0	5.7	4.2	28.0	0.02	0.85	0.98	1.29	0.91	1.26
96	7	15PAPN	N90W	4.8MC	4.0	5.5	4.4	25.0	-0.73	-1.01	-0.71	-0.56	0.57	0.21
96	7	15PAPN	N00W	4.8MC	4.0	5.5	4.4	25.0	-1.08	-0.91	-0.29	0.41	0.69	0.19
96	7	15PAPN	N90W	4.1MC	4.1	6.6	4.4	50.0	-0.35	-1.19	-1.26	-1.07	-0.82	-0.39
96	7	15PAPN	N00W	4.1MC	4.1	6.6	4.4	50.0	-0.64	-1.04	-1.06	-0.87	-0.67	-0.19
96	7	16PAPN	N90W	4.9MC	4.6	5.8	4.7	45.0	-0.74	-0.19	-0.07	0.35	0.52	0.88
96	7	16PAPN	N00W	4.9MC	4.6	5.8	4.7	45.0	-0.44	0.02	0.21	0.54	0.65	0.98
96	7	16PAPN	N90W	4.8MC	4.5	6.0	4.8	35.0	-2.57	-1.49	-1.17	-0.82	-0.70	-0.28
96	7	16PAPN	N00W	4.8MC	4.5	6.0	4.8	35.0	-2.21	-1.30	-0.84	-0.40	-0.73	-0.28
96	7	16PETA	S90E	4.8MC	4.5	6.0	4.8	34.0	-0.47	0.42	0.48	0.67	0.71	0.13
96	7	16PETA	S00E	4.8MC	4.5	6.0	4.8	34.0	0.05	-0.03	0.37	0.59	0.44	0.11

96	7	16PAPN	N90W	4.1Mc	4.0	5.4	4.9	24.0	-1.45	-0.94	-0.34	-0.22	0.16	-0.28
96	7	16PAPN	N00W	4.1Mc	4.0	5.4	4.9	24.0	-0.78	-1.05	-0.54	-0.76	0.06	-0.20
96	7	16PETA	S90E	4.1Mc	4.0	5.4	4.9	35.0	-1.88	-1.59	-0.94	-0.57	-0.57	-0.45
96	7	16PETA	S00E	4.1Mc	4.0	5.4	4.9	35.0	-1.96	-1.71	-0.77	-0.65	-0.69	-0.50
96	6	8CPDR	N90W	4.4Mc	4.0	5.4	4.3	20.0	-2.36	-1.86	-1.01	-0.48	-0.38	-0.31
96	6	8CPDR	N00W	4.4Mc	4.0	5.4	4.3	20.0	-2.35	-1.84	-1.82	-0.82	-0.20	-0.45
96	6	8POZU	N90E	4.4Mc	4.0	5.4	4.3	56.0	-2.14	-2.30	-2.58	-1.79	-0.89	-0.74
96	6	8POZU	N00E	4.4Mc	4.0	5.4	4.3	56.0	-1.63	-2.21	-2.27	-1.92	-1.41	-0.78
96	6	8SMR2	N90W	4.4Mc	4.0	5.4	4.3	34.0	-1.80	-1.97	-2.04	-1.49	-0.77	-0.65
96	6	8SMR2	N00W	4.4Mc	4.0	5.4	4.3	34.0	-1.64	-2.06	-1.98	-1.43	-1.12	-0.18
96	6	8VNTA	N90W	4.4Mc	4.0	5.4	4.3	40.0	-2.02	-2.03	-1.55	-0.97	-0.44	0.02
96	6	8VNTA	N00W	4.4Mc	4.0	5.4	4.3	40.0	-1.98	-1.97	-1.37	-0.87	-0.62	-0.02
96	6	11CPDR	N90W	3.9Mc	3.5	4.5	4.5	35.0	-0.74	-0.85	-1.00	-0.72	-0.21	-0.07
96	6	11CPDR	N00W	3.9Mc	3.5	4.5	4.5	35.0	-0.58	-1.28	-0.64	-0.49	-0.09	0.07
96	6	11OCLL	N90W	3.9Mc	3.5	4.5	4.5	41.0	-2.34	-2.12	-1.57	-1.41	-0.49	-0.35
96	6	11OCLL	N00W	3.9Mc	3.5	4.5	4.5	41.0	-2.35	-2.08	-1.67	-1.37	-0.55	-0.55
96	6	11VNTA	N90W	3.9Mc	3.5	4.5	4.5	31.0	-1.91	-0.88	-0.45	0.04	0.31	0.57
96	6	11VNTA	N00W	3.9Mc	3.5	4.5	4.5	31.0	-1.98	-1.22	-0.82	-0.08	0.79	0.79
96	6	30PAPN	N90W	4.6Mc	4.3	6.6	5.0	67.0	-2.19	-2.09	-1.98	-1.31	-1.12	-0.82
96	6	30PAPN	N00W	4.6Mc	4.3	6.6	5.0	67.0	-2.33	-2.23	-1.65	-1.08	-0.82	-0.74
96	6	30PETA	S90E	4.6Mc	4.3	6.6	5.0	62.0	-2.08	-2.54	-1.95	-1.37	-0.57	-0.58
96	6	30PETA	S00E	4.6Mc	4.3	6.6	5.0	62.0	-2.02	-2.33	-1.91	-1.31	-0.75	-0.45
96	6	24VNTA	N90W	3.9Mc	3.6	4.6	4.3	31.0	-1.97	-2.54	-1.87	-1.45	-0.68	-1.12
96	6	24VNTA	N00W	3.9Mc	3.6	4.6	4.3	31.0	-2.33	-2.21	-2.00	-1.36	-0.94	-1.15
96	5	8COYC	N90W	4.6Mc	4.1	4.9	4.3	25.0	-2.31	-1.95	-1.03	-0.77	-0.37	-0.25
96	5	8COYC	N00W	4.6Mc	4.1	4.9	4.3	25.0	-2.27	-1.59	-0.63	-0.38	-0.32	-0.38
96	5	8COYC	N90W	4.6Mc	4.1	4.9	4.3	25.0	-2.06	-1.83	-1.35	-1.15	-0.34	-0.04
96	5	8COYC	N00W	4.6Mc	4.1	4.9	4.3	25.0	-1.65	-1.56	-1.11	-0.84	-0.17	0.25
96	5	8VNTA	N90W	4.6Mc	4.1	4.9	4.3	48.0	-2.06	-1.75	-1.01	-0.81	0.19	-0.02
96	5	8VNTA	N00W	4.6Mc	4.1	4.9	4.3	48.0	-1.74	-1.32	-0.55	-0.32	0.42	-0.11
96	5	8COYC	N90W	4.7Mc	4.3	5.1	4.6	28.0	-2.05	-1.62	-0.86	-0.66	-0.81	-0.42

96	5	8COYC	N00W	4.7Mc	4.3	5.1	4.6	28.0	-1.83	-1.71	-1.16	-0.59	-0.85	-0.70
96	5	8CPDR	N90W	4.7Mc	4.3	5.1	4.6	72.0	-1.30	-1.31	-1.32	-0.80	-0.43	-0.28
96	5	8CPDR	N00W	4.7Mc	4.3	5.1	4.6	72.0	-1.68	-1.56	-1.11	-0.28	-0.72	-0.14
96	5	8OCLL	N90W	4.7Mc	4.3	5.1	4.6	50.0	-1.88	-2.48	-2.65	-1.99	-1.38	-0.83
96	5	8OCLL	N00W	4.7Mc	4.3	5.1	4.6	50.0	-1.97	-2.42	-2.44	-1.95	-1.55	-0.74
96	5	8VNTA	N90W	4.7Mc	4.3	5.1	4.6	53.0	-2.14	-1.96	-1.37	-0.79	-0.70	-0.49
96	5	8VNTA	N00W	4.7Mc	4.3	5.1	4.6	53.0	-2.05	-1.66	-1.30	-0.74	-0.66	-0.54
96	5	6PAPN	N90W	3.8Mc	3.3	5.5	4.5	41.0	-2.05	-1.64	-1.24	-0.88	-0.87	-0.84
96	5	6PAPN	N00W	3.8Mc	3.3	5.5	4.5	41.0	-2.18	-1.86	-1.08	-0.74	-0.84	-0.94
96	5	8PAPN	N90W	4.5Mc	4.0	5.9	4.3	27.0	-2.07	-1.56	-1.14	-0.72	-0.66	-0.63
96	5	8PAPN	N00W	4.5Mc	4.0	5.9	4.3	27.0	-1.97	-1.74	-0.88	-0.50	-0.70	-0.35
96	4	23ATYC	N90W	5.4Mc	4.8	5.7	5.1	87.0	-1.41	-0.78	-0.87	-0.64	-0.34	-0.05
96	4	23ATYC	N00W	5.4Mc	4.8	5.7	5.1	87.0	-1.70	-0.84	-0.90	-0.90	-0.58	-0.46
96	4	23PAPN	N90W	5.4Mc	4.8	5.7	5.1	31.0	-1.97	-2.10	-1.54	-0.99	-0.33	-0.07
96	4	23PAPN	N00W	5.4Mc	4.8	5.7	5.1	31.0	-2.35	-1.55	-0.78	-0.51	-0.43	-0.08
96	4	23PETA	S90E	5.4Mc	4.8	5.7	5.1	42.0	-2.41	-2.04	-1.24	-0.52	0.20	-0.06
96	4	23PETA	S00E	5.4Mc	4.8	5.7	5.1	42.0	-2.14	-1.35	-0.76	-0.37	-0.06	0.22
96	4	29ATYC	N90W	4.7Mc	4.2	5.6	4.3	45.0	-1.82	-1.11	-0.88	-0.60	-0.40	-0.30
96	4	29ATYC	N00W	4.7Mc	4.2	5.6	4.3	45.0	-1.44	-0.79	-0.47	-0.42	-0.22	-0.26
96	4	29NUXC	N90W	4.7Mc	4.2	5.6	4.3	32.0	-1.00	-0.57	-0.55	-0.48	-0.23	0.02
96	4	29NUXC	N00W	4.7Mc	4.2	5.6	4.3	32.0	-0.64	-0.16	-0.27	-0.40	-0.02	-0.03
96	4	29PAPN	N90W	4.7Mc	4.2	5.6	4.3	46.0	-2.22	-1.83	-1.55	-0.50	-0.14	0.05
96	4	29PAPN	N00W	4.7Mc	4.2	5.6	4.3	46.0	-2.28	-1.66	-0.92	-0.72	-0.14	0.14
96	4	29SUCH	N90W	4.7Mc	4.2	5.6	4.3	32.0	-0.96	-0.52	-0.38	-0.18	0.05	-0.12
96	4	29SUCH	N00W	4.7Mc	4.2	5.6	4.3	32.0	-1.01	-0.53	0.09	-0.38	-0.28	0.14
96	4	18PAPN	N90W	4.9Mc	4.4	5.4	4.6	34.0	-2.26	-1.68	-1.28	-1.03	-0.32	-0.33
96	4	18PAPN	N00W	4.9Mc	4.4	5.4	4.6	34.0	-1.80	-1.36	-0.68	-0.07	-0.32	-0.30
96	3	13COPL	N90E	5.3Me	5.1	6.6	5.0	44.0	-1.10	-0.51	-0.10	-0.01	0.29	0.05
96	3	13COPL	N00E	5.3Me	5.1	6.6	5.0	44.0	-1.12	-0.21	0.30	-0.01	0.25	0.16
96	3	13CPDR	N90W	5.3Me	5.1	6.6	5.0	67.0	-1.57	-1.10	0.09	-0.30	0.04	0.47
96	3	13CPDR	N00W	5.3Me	5.1	6.6	5.0	67.0	-1.28	-0.52	-0.22	-0.11	0.01	-0.03

96	3	13POZU	N90E	5.3Me	5.1	6.6	5.0	90.0	-2.06	-1.66	-1.00	-0.47	0.35	0.24
96	3	13POZU	N00E	5.3Me	5.1	6.6	5.0	90.0	-1.65	-1.22	-0.44	0.07	0.30	0.16
96	3	13SMR2	S90E	5.3Me	5.1	6.6	5.0	53.0	-1.74	-0.79	-0.46	-0.42	0.17	0.09
96	3	13SMR2	S00E	5.3Me	5.1	6.6	5.0	53.0	-2.32	-1.25	-0.45	-0.64	-0.15	-0.11
96	3	13VIGA	S90E	5.3Me	5.1	6.6	5.0	46.0	-1.63	-1.21	-0.57	-0.12	-0.30	-0.48
96	3	13VIGA	S00E	5.3Me	5.1	6.6	5.0	46.0	-1.70	-0.92	-0.42	0.01	-0.22	-0.56
96	3	13VNTA	N90W	5.3Me	5.1	6.6	5.0	92.0	-0.91	-0.46	0.03	0.21	0.59	0.06
96	3	13VNTA	N00W	5.3Me	5.1	6.6	5.0	92.0	-1.11	-0.32	0.18	0.17	0.57	0.01
96	3	31PAPN	N90W	4.7Mc	4.7	6.2	4.7	53.0	-0.34	-0.23	0.12	0.49	1.02	1.17
96	3	31PAPN	N00W	4.7Mc	4.7	6.2	4.7	53.0	-0.21	-0.49	-0.29	-0.09	0.62	1.10
96	3	31SLUI	N90W	4.7Mc	4.7	6.2	4.7	61.0	-2.01	-1.45	-0.96	-0.47	-0.48	-0.49
96	3	31SLUI	N00W	4.7Mc	4.7	6.2	4.7	61.0	-2.00	-1.01	-0.58	-0.74	-0.57	-0.43
96	1	1CPDR	N90W	4.4Mc	3.9	5.1	4.3	50.0	-2.28	-2.06	-1.43	-0.84	-0.56	-0.01
96	1	1CPDR	N00W	4.4Mc	3.9	5.1	4.3	50.0	-1.97	-1.95	-1.31	-0.80	-0.79	-0.28
96	1	1POZU	N90E	4.4Mc	3.9	5.1	4.3	47.0	-2.84	-2.61	-2.03	-1.31	-0.78	-0.26
96	1	1POZU	N00E	4.4Mc	3.9	5.1	4.3	47.0	-2.45	-2.68	-1.72	-1.23	-0.85	-0.23
96	1	1VNTA	N90W	4.4Mc	3.9	5.1	4.3	49.0	-0.88	-0.12	-0.04	0.26	0.27	0.13
96	1	1VNTA	N00W	4.4Mc	3.9	5.1	4.3	49.0	-0.83	-0.12	-0.01	0.17	0.35	0.33
96	1	25UNIO	S90E	5.1Mc	5.7	6.2	5.5	72.0	-0.58	-0.04	0.27	0.38	0.01	0.07
96	1	25UNIO	S00E	5.1Mc	5.7	6.2	5.5	72.0	-0.41	0.27	0.52	0.87	0.17	-0.08
96	1	25VILE	S90E	5.1Mc	5.7	6.2	5.5	52.0	-2.13	-2.00	-1.49	-1.52	-0.68	-0.85
96	1	25VILE	S00E	5.1Mc	5.7	6.2	5.5	52.0	-2.15	-2.22	-1.47	-0.87	-0.72	-0.78
95	12	25ATYC	S90E	4.2Mc	4.2	5.3	5.4	50.0	-0.62	-1.01	-1.61	-0.93	-0.91	-0.33
95	12	25ATYC	S00E	4.2Mc	4.2	5.3	5.4	50.0	-0.64	-1.25	-1.14	-0.58	-0.06	-0.32
95	12	9CPDR	N90W	4.3Mc	3.9	4.7	4.2	26.0	-2.39	-1.82	-1.40	-0.93	-0.40	-0.20
95	12	9CPDR	N00W	4.3Mc	3.9	4.7	4.2	26.0	-1.85	-1.98	-1.46	-0.68	-0.90	-0.37
95	12	9VNTA	N90W	4.3Mc	3.9	4.7	4.2	31.0	-0.92	-1.05	-2.00	-1.17	-0.78	-0.23
95	12	9VNTA	N00W	4.3Mc	3.9	4.7	4.2	31.0	-0.76	-0.91	-1.00	-0.94	-0.76	-0.32
95	12	24PAPN	N90E	3.3Mb	4.2	5.9	5.4	63.0	-0.66	-1.32	-1.19	-0.77	-0.52	-0.03
95	12	24PAPN	N00E	3.3Mb	4.2	5.9	5.4	63.0	-0.71	-0.85	-1.08	-0.52	-0.17	0.05
95	12	24PETA	S90E	3.3Mb	4.2	5.9	5.4	59.0	-1.78	-2.14	-2.23	-1.79	-1.23	-0.43

95	12	24PETA	S00E	3.3Mb	4.2	5.9	5.4	59.0	-1.71	-2.39	-2.34	-1.67	-1.21	-0.51
95	12	16POZU	N90E	4.1Mc	3.5	6.3	4.7	53.0	-2.25	-2.32	-1.83	-0.83	-0.48	-0.48
95	12	16POZU	N00E	4.1Mc	3.5	6.3	4.7	53.0	-2.23	-1.95	-1.36	-0.96	-0.95	-0.65
95	11	2COPL	N90E	4.2Mc	4.1	5.1	5.0	64.0	-1.26	-1.25	-1.39	-1.31	-0.72	-0.69
95	11	2COPL	N00E	4.2Mc	4.1	5.1	5.0	64.0	-1.40	-1.45	-1.36	-1.46	-0.28	-0.79
95	11	12CPDR	N90W	3.9Mc	3.4	4.5	4.3	49.0	-2.09	-2.39	-2.53	-1.84	-1.08	-0.35
95	11	12CPDR	N00W	3.9Mc	3.4	4.5	4.3	49.0	-2.04	-2.24	-2.36	-1.68	-1.19	-0.68
95	11	12VNTA	N90W	3.9Mc	3.4	4.5	4.3	32.0	-0.43	-1.42	-1.11	-1.23	-0.62	0.55
95	11	12VNTA	N00W	3.9Mc	3.4	4.5	4.3	32.0	-0.71	-1.03	-0.97	-0.99	-0.43	0.65
95	11	22PETA	S90E	4.4Mc	4.1	6.2	5.3	31.0	-1.71	-2.17	-2.54	-2.18	-1.14	-0.71
95	11	22PETA	S00E	4.4Mc	4.1	6.2	5.3	31.0	-2.45	-3.24	-2.73	-2.44	-1.45	-0.84
95	11	27POZU	N90E	3.9Mc	3.3	5.4	4.4	48.0	-2.54	-2.47	-2.62	-2.05	-1.01	-0.78
95	11	27POZU	N00E	3.9Mc	3.3	5.4	4.4	48.0	-2.44	-2.39	-2.16	-1.56	-1.10	-0.78
95	10	13COPL	N90E	4.3Mb	4.7	6.2	5.2	76.0	-1.35	-1.26	-0.79	-0.37	0.23	-0.69
95	10	13COPL	N00E	4.3Mb	4.7	6.2	5.2	76.0	-0.98	-1.42	-0.81	-0.06	0.24	-0.68
95	10	31COPL	N90E	4.2Mb	4.2	5.3	4.9	48.0	-1.53	-1.56	-1.19	-1.08	-0.79	-0.75
95	10	31COPL	N00E	4.2Mb	4.2	5.3	4.9	48.0	-1.29	-1.57	-1.42	-0.73	-0.53	-0.73
95	10	27CPDR	N90W	4.6Mc	4.2	4.8	4.4	61.0	-1.94	-1.69	-1.42	-1.03	-0.82	-0.24
95	10	27CPDR	N00W	4.6Mc	4.2	4.8	4.4	61.0	-2.48	-2.11	-1.23	-1.30	-1.03	-0.73
95	9	14COPL	N90E	6.4Mb	6.7	7.8	6.1	41.0	0.61	0.88	1.08	1.31	1.12	0.87
95	9	14COPL	N00E	6.4Mb	6.7	7.8	6.1	41.0	1.09	1.53	1.29	1.11	1.13	0.75
95	9	14VIGA	S90E	6.4Mb	6.7	7.8	6.1	67.0	-0.96	-0.92	-0.42	-0.07	0.24	-0.12
95	9	14VIGA	S00E	6.4Mb	6.7	7.8	6.1	67.0	-0.62	-0.96	-0.71	-0.26	0.27	-0.20
95	9	14COPL	N90E	4.4Mb	4.9	6.3	5.5	84.0	-0.96	-1.88	-1.06	-0.59	-0.68	-0.67
95	9	14COPL	N00E	4.4Mb	4.9	6.3	5.5	84.0	-1.37	-1.37	-1.10	-1.24	-0.60	-0.95
95	9	14COPL	N90E	3.9Mc	4.3	5.2	5.1	58.0	-1.19	-1.33	-1.08	-1.32	-0.67	-0.96
95	9	14COPL	N00E	3.9Mc	4.3	5.2	5.1	58.0	-1.03	-1.34	-1.76	-1.35	-0.27	-0.58
95	9	15COPL	N90E	4.2Mc	4.3	5.1	5.3	92.0	-1.04	-0.93	-0.50	-0.46	-0.27	-0.36
95	9	15COPL	N00E	4.2Mc	4.3	5.1	5.3	92.0	-0.92	-0.73	-0.56	-0.46	-0.26	-0.67
95	9	16COPL	N90E	5.1Mb	4.8	5.2	5.2	52.0	-1.23	-1.11	-0.91	-0.45	-0.30	-0.19
95	9	16COPL	N00E	5.1Mb	4.8	5.2	5.2	52.0	-1.26	-1.07	-0.87	-0.51	-0.38	-0.21

95	9	16COPL	N90E	4.9Mb	4.5	5.4	5.1	60.0	-0.90	-0.73	-0.18	0.01	-0.41	-0.59
95	9	16COPL	N00E	4.9Mb	4.5	5.4	5.1	60.0	-1.94	-1.46	-0.71	-0.49	-0.50	-0.75
95	9	20COPL	N90E	4.7Mb	4.7	4.6	4.9	44.0	-1.22	-1.19	-1.28	-0.81	-0.43	0.08
95	9	20COPL	N00E	4.7Mb	4.7	4.6	4.9	44.0	-1.50	-1.21	-1.07	-0.70	-0.25	0.17
95	9	20SMR2	N90W	4.7Mb	4.7	4.6	4.9	77.0	-1.89	-1.38	-0.87	-0.59	-0.71	-1.43
95	9	20SMR2	N00W	4.7Mb	4.7	4.6	4.9	77.0	-1.43	-1.20	-0.97	-0.56	-0.80	-1.35
95	9	28COPL	N90E	4.1Mc	4.4	5.9	5.0	65.0	-1.99	-1.24	-1.09	-0.54	-0.67	-0.41
95	9	28COPL	N00E	4.1Mc	4.4	5.9	5.0	65.0	-1.85	-1.45	-1.33	-0.86	-0.42	-0.38
95	9	22SMR2	N90W	4.6Mc	4.2	5.0	4.6	57.0	-2.75	-2.34	-1.81	-1.26	-1.12	-1.05
95	9	22SMR2	N00W	4.6Mc	4.2	5.0	4.6	57.0	-2.16	-2.36	-1.88	-1.43	-1.21	-0.80
95	9	22SMR2	N90W	4.2Mc	3.9	4.5	4.3	71.0	-0.06	0.62	0.64	0.82	0.97	1.13
95	9	22SMR2	N00W	4.2Mc	3.9	4.5	4.3	71.0	0.09	0.95	0.87	1.27	1.18	1.17
95	8	28PETA	S90E	4.2Mc	4.3	6.1	5.4	58.0	-0.63	-1.00	-1.30	-0.80	-0.39	-0.04
95	8	28PETA	S00E	4.2Mc	4.3	6.1	5.4	58.0	-0.75	-0.85	-1.10	-0.60	-0.57	-0.12
95	7	12ACAN	S90E	4.0Mc	4.0	5.2	4.6	34.0	-0.59	-1.20	-1.09	-0.91	0.11	-0.22
95	7	12ACAN	S00E	4.0Mc	4.0	5.2	4.6	34.0	-0.73	-1.52	-0.90	-0.43	0.05	-0.03
95	7	12OCLL	N90W	4.0Mc	4.0	5.2	4.6	29.0	-2.37	-2.05	-1.40	-1.03	-0.93	-0.58
95	7	12OCLL	N00W	4.0Mc	4.0	5.2	4.6	29.0	-2.08	-2.26	-1.66	-1.20	-0.74	-0.56
95	7	12OCTT	N90E	4.0Mc	4.0	5.2	4.6	64.0	-0.41	-0.59	-1.16	-0.28	0.22	-0.50
95	7	12OCTT	N00E	4.0Mc	4.0	5.2	4.6	64.0	-0.52	-0.73	-0.90	-0.45	0.25	-0.52
95	7	12POZU	N90E	4.0Mc	4.0	5.2	4.6	48.0	-0.63	-0.89	-0.87	-0.81	0.02	-0.50
95	7	12POZU	N00E	4.0Mc	4.0	5.2	4.6	48.0	-0.83	-0.72	-0.98	-0.95	0.18	-0.54
95	7	12SMR2	N90W	4.0Mc	4.0	5.2	4.6	75.0	-2.75	-2.71	-2.43	-1.94	-1.33	-0.74
95	7	12SMR2	N00W	4.0Mc	4.0	5.2	4.6	75.0	-2.64	-2.83	-2.33	-1.37	-0.97	-0.97
95	7	12VNTA	N90W	4.0Mc	4.0	5.2	4.6	34.0	-2.88	-2.37	-1.69	-1.20	-0.80	-0.44
95	7	12VNTA	N00W	4.0Mc	4.0	5.2	4.6	34.0	-2.55	-2.44	-1.76	-1.47	-1.16	-0.70
95	7	30OCTT	N90E	3.9Mc	4.0	5.5	4.7	54.0	-2.41	-2.39	-2.14	-1.77	-0.95	-0.31
95	7	30OCTT	N00E	3.9Mc	4.0	5.5	4.7	54.0	-2.79	-2.65	-2.19	-1.84	-1.21	-0.29
95	7	30POZU	N90E	3.9Mc	4.0	5.5	4.7	48.0	-2.37	-2.59	-2.01	-1.60	-0.70	-0.76
95	7	30POZU	N00E	3.9Mc	4.0	5.5	4.7	48.0	-2.44	-2.25	-1.83	-1.29	-0.68	-0.69
95	7	2POZU	N90E	3.7Mc	3.5	5.3	4.0	42.0	-2.18	-1.59	-0.91	-0.95	-0.54	-0.73

95	7	2POZU	N00E	3.7Mc	3.5	5.3	4.0	42.0	-1.79	-1.24	-0.60	-0.39	-0.43	-0.79
95	7	19SMR2	N90W	4.9Mb	4.7	4.9	4.7	89.0	-2.36	-2.10	-1.47	-1.59	-0.88	-0.42
95	7	19SMR2	N00W	4.9Mb	4.7	4.9	4.7	89.0	-2.35	-1.69	-1.23	-0.76	-0.64	-0.43
95	6	20CPDR	N90W	3.8Mc	3.7	5.6	4.1	61.0	-2.22	-2.63	-2.30	-1.35	-0.58	-0.31
95	6	20CPDR	N00W	3.8Mc	3.7	5.6	4.1	61.0	-3.30	-2.25	-1.89	-1.41	-0.78	-0.28
95	6	7MSAS	N90E	4.6Mc	4.3	5.4	4.4	81.0	-2.15	-2.01	-1.49	-1.02	-0.45	-0.08
95	6	7MSAS	N00E	4.6Mc	4.3	5.4	4.4	81.0	-2.22	-1.50	-0.98	-0.54	-0.62	-0.11
95	6	7OCLL	N90W	4.6Mc	4.3	5.4	4.4	62.0	-2.20	-1.93	-2.31	-1.83	-1.19	-0.57
95	6	7OCLL	N00W	4.6Mc	4.3	5.4	4.4	62.0	-1.76	-2.38	-1.86	-1.29	-1.04	-0.38
95	6	7POZU	N90E	4.6Mc	4.3	5.4	4.4	78.0	-2.46	-1.52	-1.35	-1.09	-0.80	-0.52
95	6	7POZU	N00E	4.6Mc	4.3	5.4	4.4	78.0	-2.61	-1.84	-1.12	-1.22	-0.85	-0.73
95	6	7VNTA	N90W	4.6Mc	4.3	5.4	4.4	52.0	-2.58	-2.68	-2.73	-1.86	-0.79	-0.48
95	6	7VNTA	N00W	4.6Mc	4.3	5.4	4.4	52.0	-2.35	-2.59	-2.29	-1.86	-0.77	-0.82
95	6	12MSAS	N90E	4.1Mc	3.5	3.7	4.3	22.0	-1.97	-1.99	-1.81	-1.35	-1.11	-0.26
95	6	12MSAS	N00E	4.1Mc	3.5	3.7	4.3	22.0	-2.51	-1.71	-1.15	-0.84	-1.05	-0.40
95	6	21OCLL	N90W	3.8Mc	3.6	5.3	4.4	90.0	-2.19	-1.72	-1.09	-0.55	-0.66	-0.87
95	6	21OCLL	N00W	3.8Mc	3.6	5.3	4.4	90.0	-2.49	-1.36	-1.01	-0.90	-0.94	-0.72
95	5	15ACAN	S90E	4.6Mc	4.6	6.0	5.1	45.0	-0.64	-1.12	-1.01	-0.72	-0.40	0.17
95	5	15ACAN	S00E	4.6Mc	4.6	6.0	5.1	45.0	-0.80	-0.99	-0.49	-0.44	-0.51	0.10
95	5	15CPDR	N90E	4.6Mc	4.6	6.0	5.1	53.0	-0.60	-1.41	-0.59	-0.18	0.49	0.40
95	5	15CPDR	N00E	4.6Mc	4.6	6.0	5.1	53.0	-0.56	-0.89	-0.70	0.07	0.25	0.15
95	5	15MSAS	N90E	4.6Mc	4.6	6.0	5.1	85.0	-1.88	-1.68	-0.90	-0.77	-0.84	0.28
95	5	15MSAS	N00E	4.6Mc	4.6	6.0	5.1	85.0	-1.94	-1.40	-1.05	-0.60	-0.77	0.07
95	5	15POZU	N90E	4.6Mc	4.6	6.0	5.1	80.0	-2.55	-1.49	-0.83	-0.83	-0.80	-0.54
95	5	15POZU	N00E	4.6Mc	4.6	6.0	5.1	80.0	-2.06	-1.35	-0.89	-0.87	-0.75	-0.52
95	5	15VNTA	S90E	4.6Mc	4.6	6.0	5.1	53.0	-0.41	-0.86	-0.70	-0.23	-0.40	-0.48
95	5	15VNTA	S00E	4.6Mc	4.6	6.0	5.1	53.0	-0.82	-0.74	-0.54	-0.35	-0.78	-0.20
95	4	27AZIH	N90E	4.9Mb	5.4	5.7	4.9	72.0	-0.92	-0.85	-0.06	0.14	0.01	-0.19
95	4	27AZIH	N00E	4.9Mb	5.4	5.7	4.9	72.0	-2.19	-0.72	-0.02	0.11	-0.22	-0.22
95	4	15COPL	N90E	3.8Mb	4.4	5.7	4.8	32.0	-1.88	-1.20	-0.42	-0.05	0.37	0.08
95	4	15COPL	N00E	3.8Mb	4.4	5.7	4.8	32.0	-0.95	-0.96	-0.37	0.15	0.55	0.00

95	4	15MSAS	N90E	3.8Mb	4.4	5.7	4.8	80.0	-0.88	-1.18	-1.09	-0.47	0.11
95	4	15MSAS	N00E	3.8Mb	4.4	5.7	4.8	80.0	-0.93	-1.13	-0.89	-0.33	-0.32
95	4	24COYC	N90E	3.9Mc	4.0	4.8	5.0	12.0	-1.79	-1.75	-1.18	-0.67	0.17
95	4	24COYC	N00E	3.9Mc	4.0	4.8	5.0	12.0	-1.71	-1.91	-1.00	-0.40	-0.24
95	4	24OCLL	N90E	3.9Mc	4.0	4.8	5.0	34.0	-2.06	-1.75	-1.73	-0.88	0.07
95	4	24OCLL	N00E	3.9Mc	4.0	4.8	5.0	34.0	-1.72	-1.85	-1.56	-0.43	-0.32
95	4	27MSAS	N90E	4.2Mc	3.9	5.8	4.5	85.0	-1.15	-1.06	-0.98	-0.67	-0.49
95	4	27MSAS	N00E	4.2Mc	3.9	5.8	4.5	85.0	-0.71	-1.53	-1.21	-0.89	-0.21
95	4	27POZU	N90E	4.2Mc	3.9	5.8	4.5	99.0	-2.59	-2.31	-1.68	-0.78	-0.55
95	4	27POZU	N00E	4.2Mc	3.9	5.8	4.5	99.0	-2.55	-2.60	-1.50	-0.70	-0.66
95	4	26TNLP	N90E	3.6Mb	4.1	5.8	4.5	89.0	-1.97	-2.28	-0.80	-0.27	-0.31
95	4	26TNLP	N00E	3.6Mb	4.1	5.8	4.5	89.0	-2.51	-1.90	-0.79	-0.42	-0.26
95	3	13MSAS	N90E	3.3Mc	3.5	5.4	4.3	58.0	-2.27	-2.17	-2.32	-1.35	-0.88
95	3	13MSAS	N00E	3.3Mc	3.5	5.4	4.3	58.0	-2.56	-2.63	-2.34	-1.36	-1.08
95	3	19MSAS	N90E	3.7Mc	3.6	4.7	4.4	49.0	-2.27	-2.20	-1.90	-0.81	-0.22
95	3	19MSAS	N00E	3.7Mc	3.6	4.7	4.4	49.0	-1.93	-2.63	-1.37	-0.80	-0.43
95	3	10CLL	N90E	3.7Mc	4.1	4.4	5.1	23.0	-1.07	-0.71	-1.43	-0.63	-0.03
95	3	10CLL	N00E	3.7Mc	4.1	4.4	5.1	23.0	-0.51	-0.75	-1.19	-0.81	-0.56
95	2	22MSAS	N90E	3.9Mc	3.6	4.6	4.3	88.0	-2.94	-2.59	-2.12	-1.83	-0.81
95	2	22MSAS	N00E	3.9Mc	3.6	4.6	4.3	88.0	-2.24	-2.31	-1.81	-1.54	-1.06
95	1	2CPDR	N90E	4.2Mc	3.9	5.6	4.7	28.0	-1.07	-1.56	-1.18	-0.77	-0.02
95	1	2CPDR	N00E	4.2Mc	3.9	5.6	4.7	28.0	-0.80	-0.97	-0.99	-0.54	-0.07
95	1	2MSAS	N90E	4.2Mc	3.9	5.6	4.7	56.0	-2.38	-1.88	-1.66	-0.78	0.18
95	1	2MSAS	N00E	4.2Mc	3.9	5.6	4.7	56.0	-2.25	-2.11	-1.46	-0.87	0.00
95	1	2POZU	N90E	4.2Mc	3.9	5.6	4.7	54.0	-2.20	-2.53	-1.34	-0.69	-0.27
95	1	2POZU	N00E	4.2Mc	3.9	5.6	4.7	54.0	-2.63	-2.20	-1.98	-1.42	-1.13
95	1	18MSAS	N90E	4.1Mc	3.8	5.2	4.3	56.0	-1.98	-2.28	-1.48	-1.33	-0.46
95	1	18MSAS	N00E	4.1Mc	3.8	5.2	4.3	56.0	-1.98	-2.12	-1.74	-1.28	-0.67
95	1	25MSAS	N90E	4.5Mc	3.9	4.7	4.6	72.0	-2.79	-2.30	-2.02	-1.85	-0.71
95	1	25MSAS	N00E	4.5Mc	3.9	4.7	4.6	72.0	-2.81	-2.66	-2.48	-1.74	-0.95
95	1	29MSAS	N90E	3.6Mc	3.5	4.0	4.0	58.0	-1.83	-2.49	-1.65	-0.99	-0.20

95	1	29MSAS	N00E	3.6Mc	3.5	4.0	4.0	58.0	-2.05	-1.77	-1.86	-1.54	-0.64	-0.50
Turkey: Overall soft rock														
yr		mmdd	station	comp	magtype	m₁	m_{hf}	M_{lpl}	R (km)	FACCN(cm/s), f(Hz), H/V:		A2	A5	A10
										A0.2	A0.5	A1		
1976	8	19DNZ\+L	N	5.0MS		6.8	7.8	6.4	26.0	0.20	0.50	1.00	2.00	5.01
1976	8	19DNZ\+T	E	5.0MS		6.8	7.8	6.4	26.0	1.10	1.31	1.65	1.92	1.88
1977	10	5CER\+L	S	5.3MB		7.1	7.7	6.2	75.0	0.40	0.49	0.68	0.94	0.09
1977	10	5CER\+T	E	5.3MB		7.1	7.7	6.2	75.0	0.31	0.14	0.51	1.11	0.08
1977	12	9IZM\+L	N	4.8MB		5.5	7.2	5.7	28.0	-0.01	9.99	0.67	0.79	1.11
1977	12	9IZM\+T	E	4.8MB		5.5	7.2	5.7	28.0	0.27	9.99	0.22	0.75	1.37
1977	12	16IZM\+L	N	5.3MB		5.8	7.4	6.2	24.0	0.91	0.35	0.91	1.23	1.81
1977	12	16IZM\+T	E	5.3MB		5.8	7.4	6.2	24.0	0.94	0.74	0.61	1.07	1.35
1978	9	21MLT\+L	N	4.2MS		5.1	6.9	6.2	55.0	9.99	9.99	9.99	-0.47	-0.29
1978	9	21MLT\+T	E	4.2MS		5.1	6.9	6.2	55.0	9.99	9.99	9.99	-0.62	0.12
1979	4	11MUR\L	?	4.4MS		6.0	7.1	6.2	50.0	0.64	0.28	0.26	0.93	0.52
1979	4	11MUR\T	?	4.4MS		6.0	7.1	6.2	50.0	0.64	0.39	-0.05	0.89	0.50
1979	7	18DUR\L	?	4.9MS		5.5	6.8	6.0	15.0	0.94	0.61	0.87	1.28	1.04
1979	7	18DUR\T	?	4.9MS		5.5	6.8	6.0	15.0	0.71	0.62	0.52	1.49	1.22
1981	6	30HTY\+L	N	3.9MS		6.9	8.3	6.4	68.0	0.78	0.27	0.76	1.05	1.14
1981	6	30HTY\+T	E	3.9MS		6.9	8.3	6.4	68.0	0.56	0.61	0.55	1.06	0.95
1983	7	5EDC\+L	N	5.8MS		6.7	7.4	6.4	76.0	-0.22	-0.18	1.27	0.80	0.93
1983	7	5EDC\+T	W	5.8MS		6.7	7.4	6.4	76.0	0.57	-0.31	0.52	0.49	0.63
1983	7	5EDR\+L	E	5.8MS		6.7	7.4	6.4	83.0	0.74	-0.12	0.20	0.81	0.45
1983	7	5EDR\+T	N	5.8MS		6.7	7.4	6.4	83.0	0.58	0.51	0.05	0.65	0.58
1983	7	5GNN\L	?	5.8MS		6.7	7.4	6.4	59.0	0.67	0.85	1.12	0.86	0.79
1983	7	5GNN\T	?	5.8MS		6.7	7.4	6.4	59.0	1.08	0.29	0.83	0.78	0.86
1983	7	5TKR\+L	N	5.8MS		6.7	7.4	6.4	78.0	0.88	0.51	0.83	0.98	0.47
1983	7	5TKR\+T	E	5.8MS		6.7	7.4	6.4	78.0	0.89	0.88	0.25	1.06	0.63
1983	10	30HRS\+L	E	6.8MS		7.5	8.5	7.0	37.0	1.65	1.61	1.49	1.55	1.27
1983	10	30HRS\+T	N	6.8MS		7.5	8.5	7.0	37.0	2.04	1.83	1.59	1.21	1.24

1984	3	29BLK\+L	N	3.8MS	5.3	6.7	5.8	20.0	0.46	9.99	0.98	0.90	1.74	0.89
1984	3	29BLK\+T	E	3.8MS	5.3	6.7	5.8	13.0	0.51	9.99	0.33	0.40	1.26	0.56
1985	8	12KIG\+L	S	4.2MS	6.3	8.5	6.1	94.0	0.51	0.25	0.18	0.74	1.22	0.66
1985	8	12KIG\+T	E	4.2MS	6.3	8.5	6.1	94.0	-0.09	0.18	0.04	0.72	0.97	0.31
1985	12	6KOY\?	NS	4.5MS	5.7	6.9	6.2	31.0	0.79	9.99	0.58	0.74	0.93	0.87
1985	12	6KOY\?	EW	4.5MS	5.7	6.9	6.2	31.0	0.84	9.99	0.63	0.79	0.98	0.91
1986	5	5GOL\+L	N	5.8MS	7.0	7.1	5.9	32.0	-0.05	1.53	1.56	1.43	0.93	0.41
1986	5	5GOL\+T	W	5.8MS	7.0	7.1	5.9	32.0	0.67	1.03	1.16	1.00	0.78	-0.05
1986	6	6GOL\+L	N	5.7MS	6.9	7.2	6.6	40.0	0.73	-0.11	1.54	1.24	0.67	-0.07
1986	6	6GOL\+T	W	5.7MS	6.9	7.2	6.6	40.0	1.13	0.81	0.97	0.76	0.46	-0.41
1986	6	6MLT\?	NS	5.7MS	6.9	7.2	6.6	61.0	1.25	1.03	0.88	0.60	0.36	-0.14
1986	6	6MLT\?	EW	5.7MS	6.9	7.2	6.6	61.0	1.31	0.81	0.68	0.85	0.45	-0.10
1988	4	20MUR\+L	?	4.7MS	7.9	8.0	6.6	73.0	0.96	1.02	1.37	0.76	0.34	-0.15
1988	4	20MUR\+T	?	4.7MS	7.9	8.0	6.6	73.0	1.16	0.88	1.46	1.14	0.20	0.01
1988	8	4FOC\+L	N	4.5MB	5.1	6.5	5.2	36.0	-0.62	9.99	-0.28	0.69	0.68	-0.24
1988	8	4FOC\+T	W	4.5MB	5.1	6.5	5.2	36.0	-1.02	9.99	-0.09	0.82	0.85	0.10
1991	2	12IST\+L	N	4.6MS	5.0	5.6	5.7	38.0	-0.16	-0.05	-0.15	0.13	0.52	-0.14
1991	2	12IST\+T	W	4.6MS	5.0	5.6	5.7	38.0	0.10	-0.82	-0.21	-0.04	0.12	-0.32
1992	2	12AMS\+L	N	4.3MB	4.6	4.9	5.4	12.0	0.26	9.99	-0.14	0.14	0.49	0.62
1992	2	12AMS\+T	E	4.3MB	4.6	4.9	5.4	12.0	-0.30	9.99	-0.19	0.53	0.42	0.39
1992	3	13ERC\+L	W	6.8MS	8.2	8.4	6.5	31.0	1.50	1.99	2.10	1.78	1.64	0.84
1992	3	13ERC\+T	S	6.8MS	8.2	8.4	6.5	31.0	1.50	2.40	2.05	1.71	1.41	0.90
1992	3	13TER\+L	S	6.8MS	8.2	8.4	6.5	89.0	0.67	0.67	1.34	1.02	0.52	-0.19
1992	3	13TER\+T	E	6.8MS	8.2	8.4	6.5	89.0	0.30	0.83	0.82	0.92	0.55	-0.29
1992	3	15ERC\?	NS	5.8MS	6.9	7.4	6.1	59.0	0.45	0.81	0.81	1.11	0.45	0.05
1992	3	15ERC\?	EW	5.8MS	6.9	7.4	6.1	59.0	0.19	1.04	0.90	1.20	0.47	0.01
1992	11	6KUS\+L	N	6.0MS	6.7	7.3	6.3	49.0	0.67	0.61	0.95	0.75	0.97	0.80
1992	11	6KUS\+T	W	6.0MS	6.7	7.3	6.3	49.0	0.74	0.24	0.79	0.78	1.16	0.92
1992	11	6ILI\+L	S	6.0MS	6.7	7.3	6.3	79.0	0.82	0.29	0.44	0.58	0.43	-0.16
1992	11	6ILI\+T	E	6.0MS	6.7	7.3	6.3	79.0	1.14	0.74	0.68	0.75	0.73	0.11
1992	11	6IZM\+L	N	6.0MS	6.7	7.3	6.3	39.0	0.60	0.31	1.01	1.07	0.39	-0.02

1992	11	6 IZM\+T	W	6.0MS	6.7	7.3	6.3	39.0	0.35	0.76	0.78	1.05	0.49	-0.21
1994	1	3 ISL\+T	W	4.8MS	5.7	6.9	5.9	89.0	-0.09	9.99	-0.12	0.07	0.10	-0.08
1994	2	21BRS\+L	N	4.0MB	4.2	4.5	5.9	28.0	9.99	-1.24	-1.10	-0.27	-0.32	-0.64
1994	2	21BRS\+T	E	4.0MB	4.2	4.5	5.9	28.0	9.99	-1.43	-1.42	0.06	-0.42	-0.89
1994	5	7BLK\+L	N	4.1ML	4.6	5.9	5.0	67.0	-1.23	-1.28	-0.87	-0.59	-0.30	-0.27
1994	5	7BLK\+T	E	4.1ML	4.6	5.9	5.0	67.0	-1.37	-0.88	-0.96	-0.41	-0.13	-0.35
1994	5	24FOC\+L	N	5.3MS	5.2	6.5	6.2	31.0	0.81	0.41	-0.13	0.73	0.78	-0.43
1994	5	24FOC\+T	W	5.3MS	5.2	6.5	6.2	31.0	0.66	0.17	0.30	0.86	0.73	-0.15
1994	5	24IZM\+L	N	4.9MS	5.8	6.5	5.8	79.0	-1.13	-0.44	0.35	0.18	0.03	-0.42
1994	5	24IZM\+T	E	4.9MS	5.8	6.5	5.8	79.0	-1.90	-0.56	0.25	0.21	-0.04	-0.70
1994	5	24FOC\+L	N	4.9MS	5.8	6.5	5.8	28.0	0.28	0.10	0.41	0.88	0.57	-0.07
1994	5	24FOC\+T	W	4.9MS	5.8	6.5	5.8	28.0	0.87	-0.06	0.09	0.13	0.65	-0.16
1994	5	24ILI\+L	S	4.9MS	5.8	6.5	5.8	61.0	0.77	0.93	0.47	0.47	0.31	0.28
1994	5	24ILI\+T	E	4.9MS	5.8	6.5	5.8	61.0	0.78	0.77	0.57	0.32	0.35	0.10
1994	6	16SKR\+L	N	3.5ML	3.7	3.9	6.4	14.0	9.99	-1.61	-1.32	-1.15	-0.78	-0.59
1994	6	16SKR\+T	E	3.5ML	3.7	3.9	6.4	14.0	9.99	-1.77	-1.35	-1.06	-0.86	-0.51
1994	6	20KBG\+L	N	3.8MB	4.5	5.6	5.3	21.0	-0.03	9.99	-0.52	-0.16	0.51	-0.22
1994	6	20KBG\+T	W	3.8MB	4.5	5.6	5.3	21.0	-0.90	9.99	-0.68	-0.41	-0.03	0.69
1994	7	1MLT\+L	N	4.5MB	5.1	6.1	5.3	75.0	-0.99	-1.05	-0.53	0.10	-0.19	-0.09
1994	7	1MLT\+T	E	4.5MB	5.1	6.1	5.3	75.0	-0.96	-0.90	-0.68	0.35	-0.11	-0.40
1994	7	16TKR\+L	N	3.6ML	4.0	3.8	5.3	22.0	9.99	-1.35	-0.96	-0.97	-0.56	-0.70
1994	7	16TKR\+T	E	3.6ML	4.0	3.8	5.3	22.0	9.99	-1.08	-1.26	-1.20	-0.49	-0.41
1994	8	16TKR\+L	N	3.6ML	3.8	3.9	5.3	23.0	9.99	-1.49	-1.17	-1.36	-0.83	-0.73
1994	8	16TKR\+T	E	3.6ML	3.8	3.9	5.3	23.0	9.99	-1.41	-1.90	-1.28	-0.55	-0.60
1994	9	17MUS\+L	N	5.1MB	5.5	5.6	5.4	94.0	-0.80	-0.71	-0.20	-0.09	-0.63	-1.29
1994	9	17MUS\+T	E	5.1MB	5.5	5.6	5.4	94.0	-0.98	-1.06	-0.45	-0.12	-0.70	-1.32
1994	11	5DNZ\+L	N	4.1MB	4.3	4.8	5.0	57.0	-1.30	-1.17	-1.26	-0.89	-0.81	-0.68
1994	11	5DNZ\+T	E	4.1MB	4.3	4.8	5.0	57.0	-1.15	-1.55	-1.27	-1.24	-0.54	-0.62
1994	11	13KOY\+L	S	5.0MS	5.9	7.1	5.6	42.0	-0.39	0.05	0.60	0.92	0.89	0.64
1994	11	13KOY\+T	E	5.0MS	5.9	7.1	5.6	42.0	-0.14	-0.12	-0.27	1.05	1.07	0.62
1994	11	13KOY\+L	S	4.1ML	4.8	5.5	5.4	14.0	-0.09	9.99	-0.38	0.10	0.68	0.12

1994	11	13KOY\+T	E	4.1ML	4.8	5.5	5.4	14.0	-0.03	9.99	0.28	0.26	0.66	-0.15
1994	11	13KOY\+L	S	4.1ML	4.8	5.5	5.4	31.0	-0.93	-0.36	-0.53	-0.43	-0.79	-1.37
1994	11	13KOY\+T	E	4.1ML	4.8	5.5	5.4	31.0	-0.97	-0.44	-0.27	-0.42	-0.70	-1.35
1994	11	13DNZ\+L	N	4.4MS	5.4	5.7	5.5	90.0	-0.17	0.50	0.30	0.74	0.73	0.46
1994	11	13DNZ\+T	E	4.4MS	5.4	5.7	5.5	90.0	0.09	0.27	0.32	0.95	0.88	0.27
1994	11	13KOY\+L	S	4.4MS	5.4	5.7	5.5	27.0	0.06	9.99	0.20	0.10	0.50	0.19
1994	11	13KOY\+T	E	4.4MS	5.4	5.7	5.5	27.0	-0.77	9.99	-0.32	0.56	0.72	-0.03
1994	12	15ELZ\+L	N	3.5ML	4.2	4.4	4.5	25.0	-1.95	-1.95	-0.90	-0.46	-0.50	-0.20
1994	12	15ELZ\+T	E	3.5ML	4.2	4.4	4.5	25.0	-1.30	-1.42	-1.10	-0.09	-0.47	-0.23
1995	1	12IZM\+L	N	4.3MB	5.0	4.8	4.9	20.0	-1.36	-1.66	0.12	0.02	0.15	-0.39
1995	1	12IZM\+T	E	4.3MB	5.0	4.8	4.9	35.0	-1.62	-1.55	-0.83	-0.27	-0.75	-0.78
1995	1	9IZM\+T	E	4.0ML	4.1	3.2	4.4	18.0	-1.56	-1.30	-0.94	-0.33	-0.71	-0.61
1995	1	9IZM\+L	N	4.3ML	4.3	3.9	4.7	33.0	-0.78	-0.25	0.02	0.23	-0.08	-0.39
1995	1	29ERZ\+L	N	4.8MS	5.9	6.5	5.7	74.0	-0.72	-0.45	-0.04	-0.08	-0.11	-0.76
1995	1	29ERZ\+T	E	4.8MS	5.9	6.5	5.7	74.0	-1.02	0.00	-0.15	-0.10	-0.09	-0.60
1995	1	29TER\+L	S	4.8MS	5.9	6.5	5.7	43.0	0.54	0.10	0.63	0.82	1.08	-0.01
1995	1	29TER\+T	E	4.8MS	5.9	6.5	5.7	43.0	0.24	0.33	0.45	1.04	0.91	0.01
1995	2	1IZM\+L	N	3.7ML	4.2	3.7	5.9	14.0	9.99	-1.15	-1.22	0.08	-0.40	-0.65
1995	2	1IZM\+T	E	3.7ML	4.2	3.7	5.9	14.0	9.99	-1.13	-0.42	0.19	-0.40	-0.66
1995	2	8TKR\+L	N	4.5MB	4.2	5.0	5.0	38.0	-1.16	-0.89	-1.21	-0.45	-0.05	-0.47
1995	2	8TKR\+T	E	4.5MB	4.2	5.0	5.0	38.0	-1.04	-1.07	-1.51	-0.47	-0.21	-0.41
1995	3	12DNZ\+L	N	3.3ML	3.9	4.2	4.5	9.0	-1.35	-1.19	-1.01	-0.47	-0.26	0.21
1995	3	12DNZ\+T	E	3.3ML	3.9	4.2	4.5	9.0	-0.98	-1.36	-0.87	-0.48	-0.15	0.00
1995	3	12DNZ\+L	N	3.4ML	3.3	2.4	4.3	6.0	-1.59	-1.30	-1.66	-1.38	-1.20	-0.75
1995	3	12DNZ\+T	E	3.4ML	3.3	2.4	4.3	6.0	-1.10	-1.47	-1.71	-1.45	-1.39	-1.04
1995	3	12DNZ\+L	N	3.1ML	3.5	3.1	4.5	8.0	9.99	-2.27	-1.23	-1.05	-0.40	-0.26
1995	3	12DNZ\+T	E	3.1ML	3.5	3.1	4.5	8.0	9.99	-1.36	-1.51	-1.06	-0.61	-0.55
1995	3	13DNZ\+L	N	3.1ML	3.8	4.0	4.5	18.0	9.99	-1.33	-1.42	-1.04	-0.70	-0.45
1995	3	13DNZ\+T	E	3.1ML	3.8	4.0	4.5	18.0	9.99	-1.99	-1.23	-0.95	-0.93	-0.87
1995	3	14DNZ\+L	N	3.5ML	4.2	5.7	4.6	6.0	-0.87	-0.67	-0.18	0.35	1.02	1.14
1995	3	14DNZ\+T	E	3.5ML	4.2	5.7	4.6	6.0	-0.84	-0.90	-0.31	0.06	0.67	0.75

1995	3	14DNZ\+L	N	3.3ML	4.1	5.1	4.6	10.0	-1.66	-1.21	-0.59	-0.12	0.18	0.02
1995	3	14DNZ\+T	E	3.3ML	4.1	5.1	4.6	10.0	-0.93	-1.22	-1.06	-0.66	0.08	0.33
1995	3	14DNZ\+L	N	3.3ML	4.1	5.1	4.6	16.0	-1.00	-0.94	-0.55	-0.54	0.35	0.33
1995	3	14DNZ\+T	E	3.3ML	4.1	5.1	4.6	16.0	-1.06	-1.47	-0.86	-0.73	0.35	0.49
1995	3	14DNZ\+L	N	3.0ML	3.6	3.6	4.4	8.0	-1.32	-1.13	-1.33	-0.79	-0.50	-0.07
1995	3	14DNZ\+T	E	3.0ML	3.6	3.6	4.4	8.0	-1.30	-1.25	-1.37	-1.20	-0.64	-0.10
1995	3	15DNZ\+L	N	3.2ML	3.2	1.7	4.4	3.0	9.99	-2.23	-1.72	-1.79	-0.91	-0.61
1995	3	15DNZ\+T	E	3.2ML	3.2	1.7	4.4	3.0	9.99	-1.78	-1.46	-1.59	-1.05	-1.00
1995	3	28TKR\+L	N	3.8ML	4.6	5.9	5.3	72.0	-1.02	-1.70	-0.96	-0.64	-0.29	-0.43
1995	3	28TKR\+T	E	3.8ML	4.6	5.9	5.3	72.0	-0.79	-1.48	-1.30	-0.55	-0.10	-0.27
1995	4	13TKR\+L	N	4.7ML	4.8	6.1	5.0	31.0	-1.02	-0.75	-0.15	0.09	0.68	0.12
1995	4	13TKR\+T	E	4.7ML	4.8	6.1	5.0	31.0	-1.13	-1.08	-0.45	0.44	0.83	0.18
1995	4	13KMR\+L	N	4.6MB	5.1	5.6	5.0	85.0	-1.05	-0.96	-0.56	-0.45	-0.31	-0.62
1995	4	13KMR\+T	E	4.6MB	5.1	5.6	5.0	85.0	-1.76	-1.13	-0.77	-0.35	-0.20	-0.82
1995	4	18TKR\+L	N	4.2ML	4.8	6.1	5.0	41.0	-0.81	-1.52	-0.53	0.11	0.29	-0.02
1995	4	18TKR\+T	E	4.2ML	4.8	6.1	5.0	41.0	-1.35	-1.29	-0.55	-0.03	0.54	-0.13
1995	4	23ERZ\+L	N	3.8ML	4.0	3.7	4.1	4.0	-1.89	-0.50	-0.24	0.29	0.11	0.29
1995	4	23ERZ\+T	E	3.8ML	4.0	3.7	4.1	4.0	-1.01	-0.94	-0.58	0.27	0.30	0.28
1995	6	18ERC\+L	S	4.0ML	4.4	5.1	5.0	43.0	-1.30	-1.42	-0.83	-0.44	-0.05	-0.54
1995	6	18ERC\+T	E	4.0ML	4.4	5.1	5.0	43.0	-1.14	-1.52	-1.10	-0.67	-0.19	-0.55
1995	7	5ERZ\+L	N	3.8ML	4.4	4.9	5.0	37.0	-1.10	-1.20	-0.93	-0.29	-0.19	-0.42
1995	7	5ERZ\+T	E	3.8ML	4.4	4.9	5.0	37.0	-0.98	-0.97	-0.82	-0.24	0.01	-0.35
1995	8	18DNZ\+L	N	4.8ML	6.3	6.3	5.6	46.0	-0.21	0.71	0.79	0.60	0.42	-0.03
1995	8	18DNZ\+T	E	4.8ML	6.3	6.3	5.6	46.0	-0.40	0.53	0.77	0.58	0.35	0.07
1995	8	18DNZ\+L	N	4.3ML	5.4	5.0	5.6	40.0	-0.50	0.03	0.24	0.08	-0.32	-0.93
1995	8	18DNZ\+T	E	4.3ML	5.4	5.0	5.6	40.0	-0.04	0.05	0.06	0.04	-0.41	-0.93
1995	9	19BRS\+L	N	3.8ML	4.0	3.3	4.9	17.0	-1.14	-1.15	-0.87	-0.33	-0.17	-1.04
1995	9	19BRS\+T	E	3.8ML	4.0	3.3	4.9	17.0	-0.68	-1.16	-1.18	-0.42	-0.78	-0.97
1995	9	26DIN\+L	S	4.6ML	6.7	6.9	5.9	21.0	0.18	1.02	1.25	1.03	1.11	0.59
1995	9	26DIN\+T	E	4.6ML	6.7	6.9	5.9	21.0	0.75	1.40	1.62	1.36	1.49	0.73
1995	9	26DIN\+L	S	4.2ML	5.9	6.4	5.7	25.0	0.11	-0.11	0.72	0.95	0.72	0.23

1995	9	26DIN\+T	E	4.2ML	5.9	6.4	5.7	25.0	0.20	0.78	0.91	1.07	0.77	0.10
1995	9	27DIN\+L	S	4.8ML	6.7	7.1	5.9	21.0	0.52	0.12	1.31	1.44	1.07	0.22
1995	9	27DIN\+T	E	4.8ML	6.7	7.1	5.9	21.0	0.55	1.25	1.42	1.77	1.04	0.20
1995	9	28DIN\+L	S	4.0ML	6.2	7.1	6.1	66.0	0.25	-0.18	0.17	0.69	0.47	-0.18
1995	9	28DIN\+T	E	4.0ML	6.2	7.1	6.1	66.0	0.25	9.99	0.59	0.80	0.76	-0.29
1995	10	1KRS\+L	N	4.0ML	5.5	5.6	5.1	92.0	-1.06	-0.65	-0.65	-0.20	-0.72	-1.20
1995	10	1KRS\+T	E	4.0ML	5.5	5.6	5.1	92.0	-1.49	-0.19	-0.29	-0.48	-0.78	-1.26
1995	10	1DIN\+L	S	6.0MS	7.1	7.5	6.2	13.0	1.04	1.89	1.68	1.87	1.53	0.60
1995	10	1DIN\+T	E	6.0MS	7.1	7.5	6.2	13.0	1.34	2.10	2.20	1.88	1.45	0.55
1995	10	1BRD\+L	S	6.0MS	7.1	7.5	6.2	52.0	0.38	1.24	1.08	1.08	0.84	-0.14
1995	10	1BRD\+T	E	6.0MS	7.1	7.5	6.2	52.0	0.23	1.24	1.28	0.92	0.83	-0.13
1995	10	1CRD\+L	N76E	6.0MS	7.1	7.5	6.2	56.0	0.59	0.50	0.87	1.14	1.18	0.39
1995	10	1CRD\+T	N104W	6.0MS	7.1	7.5	6.2	56.0	0.65	0.66	0.90	1.22	1.02	0.34
1995	10	1DIN\+L	S	3.8ML	4.7	5.7	4.9	17.0	-0.40	9.99	-0.37	0.40	0.79	-0.17
1995	10	1DIN\+T	E	3.8ML	4.7	5.7	4.9	17.0	-1.43	9.99	0.11	0.57	1.00	-0.26
1995	10	1DIN\+L	S	5.0MS	6.3	7.5	6.3	40.0	1.56	1.33	1.37	1.94	0.83	0.06
1995	10	1DIN\+T	E	5.0MS	6.3	7.5	6.3	40.0	1.64	1.36	1.63	1.58	0.87	-0.07
1995	10	1CRD\+L	N76E	5.0MS	6.3	7.5	6.3	59.0	0.22	0.01	-0.88	0.02	0.66	-0.25
1995	10	1CRD\+T	N104W	5.0MS	6.3	7.5	6.3	59.0	-0.19	-0.02	0.00	0.54	0.74	-0.34
1995	10	1DIN\+L	S	4.1ML	6.6	7.6	5.8	41.0	0.10	0.07	0.85	1.23	1.14	0.23
1995	10	1DIN\+T	E	4.1ML	6.6	7.6	5.8	41.0	0.15	0.62	1.20	1.54	1.12	0.32
1995	10	3DIN\+L	S	4.3ML	6.4	7.2	5.6	37.0	-0.25	9.99	0.96	0.85	0.72	0.07
1995	10	3DIN\+T	E	4.3ML	6.4	7.2	5.6	37.0	-0.03	9.99	1.10	0.93	1.22	0.08
1995	10	4DIN\+L	S	3.8ML	4.7	5.5	5.6	20.0	0.19	9.99	-0.57	0.28	0.52	0.03
1995	10	4DIN\+T	E	3.8ML	4.7	5.5	5.6	20.0	-0.16	9.99	0.12	0.59	0.76	-0.09
1995	10	5DIN\+L	S	4.4ML	7.0	7.4	6.1	33.0	0.30	1.26	1.30	1.46	0.84	0.13
1995	10	5DIN\+T	E	4.4ML	7.0	7.4	6.1	33.0	0.81	1.46	1.40	1.69	1.10	0.11
1995	10	6DIN\+L	S	4.5ML	6.7	7.2	6.1	34.0	0.64	0.38	0.88	1.19	1.13	0.22
1995	10	6DIN\+T	E	4.5ML	6.7	7.2	6.1	34.0	0.68	0.64	1.35	1.47	1.15	0.08
1995	10	7DDH\+L	N	3.1ML	3.1	1.7	3.9	5.0	-1.75	-2.06	-2.14	-1.43	-0.95	-1.17
1995	10	7DDH\+T	W	3.1ML	3.1	1.7	3.9	5.0	-2.11	-1.71	-1.99	-1.00	-1.01	-0.95

1995	10	8DDH\+L	N	3.4ML	3.7	3.2	3.8	9.0	-1.85	-2.37	-1.04	-0.56	-0.34	-0.86
1995	10	8DDH\+T	W	3.4ML	3.7	3.2	3.8	9.0	-2.65	-1.94	-1.38	-1.07	-0.38	-0.68
1995	10	9DKH\+L	N	2.9ML	3.2	2.4	4.3	13.0	-1.51	-2.32	-2.68	-1.67	-1.18	-1.10
1995	10	9DKH\+T	W	2.9ML	3.2	2.4	4.3	13.0	-1.86	-2.16	-2.28	-1.93	-0.92	-0.99
1995	10	10DKH\+L	N	2.8ML	3.4	2.9	4.4	13.0	-1.64	-2.43	-2.01	-1.26	-0.73	-0.55
1995	10	10DKH\+T	W	2.8ML	3.4	2.9	4.4	13.0	-1.62	-2.19	-1.75	-1.23	-0.76	-0.96
1995	10	11DCE\+L	N	3.1ML	3.4	2.3	4.0	3.0	-2.06	-2.19	-1.24	-1.01	-0.40	-0.61
1995	10	11DCE\+T	W	3.1ML	3.4	2.3	4.0	3.0	-1.78	-1.60	-1.15	-0.72	-0.01	-0.58
1995	10	11DDH\+L	N	3.1ML	3.4	2.3	4.0	4.0	-0.96	-1.50	-1.74	-1.26	-0.69	-1.11
1995	10	11DDH\+T	W	3.1ML	3.4	2.3	4.0	4.0	-1.72	-1.77	-1.85	-1.47	-0.79	-0.76
1995	10	11DJK\+L	N	3.1ML	3.4	2.3	4.0	4.0	-2.14	-1.59	-1.44	-0.90	-0.68	-1.00
1995	10	11DJK\+T	W	3.1ML	3.4	2.3	4.0	4.0	-1.45	-1.88	-1.22	-0.57	-0.51	-1.06
1995	10	11DKH\+L	N	3.1ML	3.4	2.3	4.0	5.0	-1.72	-1.60	-1.33	-0.40	0.07	-0.43
1995	10	11DKH\+T	W	3.1ML	3.4	2.3	4.0	5.0	-1.71	-2.38	-0.94	-0.62	0.15	-0.47
1995	10	11DDH\+L	N	2.7ML	3.4	3.1	4.3	15.0	-1.35	-4.31	-2.15	-1.60	-0.82	-1.00
1995	10	11DDH\+T	W	2.7ML	3.4	3.1	4.3	15.0	-1.77	-2.14	-2.48	-2.22	-0.87	-0.83
1995	10	11DKH\+L	N	2.7ML	3.4	3.1	4.3	15.0	-1.68	-2.01	-1.77	-1.18	-1.03	-0.42
1995	10	11DKH\+T	W	2.7ML	3.4	3.1	4.3	15.0	-2.03	-1.75	-1.88	-1.28	-0.71	-0.75
1995	12	6ERC\+L	S	4.3MS	4.9	5.6	5.4	82.0	-1.09	-1.04	-0.95	-0.51	-0.13	-0.92
1995	12	6ERC\+T	E	4.3MS	4.9	5.6	5.4	82.0	-0.72	-1.02	-0.97	-0.74	-0.28	-0.68
1995	12	5ERC\+L	S	5.4MS	7.0	7.6	6.0	82.0	0.28	0.53	0.63	0.90	0.93	-0.09
1995	12	5ERC\+T	E	5.4MS	7.0	7.6	6.0	82.0	-0.04	0.63	0.85	0.79	0.86	0.07
1996	1	14BLK\+L	N	3.3ML	3.6	2.9	5.9	7.0	9.99	-1.82	-1.30	-0.78	-0.60	-0.84
1996	1	14BLK\+T	E	3.3ML	3.6	2.9	5.9	7.0	9.99	-1.78	-1.05	-0.83	-0.67	-0.72
1996	2	7ELZ\+L	N	4.3ML	5.5	5.6	5.3	58.0	-0.88	-0.71	-0.11	-0.16	-0.20	-0.48
1996	2	7ELZ\+T	E	4.3ML	5.5	5.6	5.3	58.0	-0.76	-0.55	0.25	0.28	-0.34	-0.45
1996	2	14ERC\+L	S	4.0ML	4.5	6.2	5.2	35.0	-0.89	-1.02	-0.72	-0.33	0.59	0.43
1996	2	14ERC\+T	E	4.0ML	4.5	6.2	5.2	35.0	-0.77	-1.05	-0.85	-0.23	0.40	0.22
1996	2	20IZM\+L	N	4.0ML	4.6	4.9	5.3	20.0	-1.21	-1.35	-1.04	-0.55	-0.68	-1.00
1996	2	20IZM\+T	E	4.0ML	4.6	4.9	5.3	20.0	-0.72	-1.07	-1.11	-0.57	-0.85	-0.96
1996	2	20KUS\+L	N	4.0ML	4.6	4.9	5.3	47.0	-0.07	-0.20	-0.32	0.11	0.11	0.18

1996	2	20KUS\+T	W	4.0ML	4.6	4.9	5.3	47.0	-0.19	-0.13	-0.24	-0.05	0.25	0.17
1996	3	17AMS\+L	N	4.2ML	4.7	6.1	5.2	63.0	-0.73	-1.41	-0.72	-0.68	0.00	-0.53
1996	3	17AMS\+T	E	4.2ML	4.7	6.1	5.2	63.0	-1.30	-1.11	-0.96	-0.57	0.21	-0.48
1996	4	2IZM\+L	N	4.9ML	6.0	6.6	5.6	73.0	-0.61	-0.24	0.33	0.48	-0.05	-0.70
1996	4	2IZM\+T	E	4.9ML	6.0	6.6	5.6	73.0	-1.17	-0.16	0.54	0.54	0.01	-0.56
1996	4	2KUS\+L	N	4.9ML	6.0	6.6	5.6	55.0	0.01	-0.39	0.35	0.29	0.49	0.10
1996	4	2KUS\+T	W	4.9ML	6.0	6.6	5.6	55.0	0.18	-0.30	0.03	0.41	0.58	0.38
1996	4	2KMR\+L	N	3.9ML	4.5	5.5	5.3	60.0	-0.68	-1.12	-1.01	-0.83	-0.40	-0.39
1996	4	2KMR\+T	E	3.9ML	4.5	5.5	5.3	60.0	-0.95	-1.25	-1.05	-0.91	-0.61	-0.58
1996	4	8ELZ\+L	N	4.2ML	4.7	4.3	5.2	40.0	-0.69	-1.19	-0.61	-0.31	-0.52	-0.85
1996	4	8ELZ\+T	E	4.2ML	4.7	4.3	5.2	40.0	-1.02	-0.78	-0.40	-0.69	-0.44	-0.87
1996	4	14TKR\+L	N	4.3ML	5.0	5.8	5.4	48.0	-0.69	-1.20	-0.74	-0.04	0.06	-0.18
1996	4	14TKR\+T	E	4.3ML	5.0	5.8	5.4	48.0	-0.60	-0.68	-0.34	0.39	0.21	-0.20
1996	5	20IZM\+L	N	3.9ML	4.6	4.3	5.0	34.0	-1.09	-1.04	-0.38	-0.07	-0.78	-0.73
1996	5	20IZM\+T	E	3.9ML	4.6	4.3	5.0	34.0	-1.04	-1.14	-0.74	-0.34	-0.59	-0.60
1996	6	5HTY\+L	N	4.4ML	5.0	5.3	5.2	78.0	-1.34	-1.21	-0.62	-0.27	-0.45	-0.70
1996	6	5HTY\+T	E	4.4ML	5.0	5.3	5.2	78.0	-1.02	-0.95	-0.73	-0.26	-0.44	-0.67
1996	6	22DNZ\+L	N	3.8ML	4.1	3.3	4.6	19.0	-1.63	-1.43	-0.82	-0.86	-0.81	-0.70
1996	6	22DNZ\+T	E	3.8ML	4.1	3.3	4.6	19.0	-1.10	-1.44	-0.77	-1.05	-0.76	-0.68
1996	6	29DIN\+L	S	4.4ML	6.5	6.8	6.3	36.0	0.60	0.50	0.78	1.13	0.69	-0.08
1996	6	29DIN\+T	E	4.4ML	6.5	6.8	6.3	36.0	1.19	0.42	1.22	1.14	0.84	-0.21
1996	7	26IZM\+L	N	3.3ML	3.9	3.0	4.8	16.0	-0.94	-1.46	-1.28	-0.67	-0.59	-1.03
1996	7	26IZM\+T	E	3.3ML	3.9	3.0	4.8	16.0	-1.09	-1.13	-1.25	-0.93	-0.41	-1.03
1996	7	19HTY\+L	N	3.6ML	3.7	3.6	4.6	14.0	-1.09	-1.09	-1.61	-1.03	-0.60	-0.98
1996	7	19HTY\+T	E	3.6ML	3.7	3.6	4.6	14.0	-1.50	-1.59	-1.79	-0.99	-0.52	-0.50
1996	8	14AMS\+L	N	5.4ML	6.2	7.1	5.8	64.0	-0.11	-0.17	0.64	0.37	0.73	0.07
1996	8	14AMS\+T	E	5.4ML	6.2	7.1	5.8	64.0	-0.73	-0.53	0.05	0.07	0.91	0.09
1996	8	14OSM\+L	S	5.4ML	6.2	7.1	5.8	60.0	-0.95	-1.49	-1.23	-0.80	-0.42	-1.08
1996	8	14OSM\+T	E	5.4ML	6.2	7.1	5.8	60.0	-1.40	-1.09	-1.18	-1.14	-0.35	-1.17
1996	8	14AMS\+L	N	4.1ML	4.6	5.1	5.2	90.0	-0.18	-0.26	0.61	0.54	0.48	-0.07
1996	8	14AMS\+T	E	4.1ML	4.6	5.1	5.2	90.0	-0.92	-0.27	0.00	0.34	0.61	-0.23

1996	8	14AMS\+L	N	4.1ML	4.6	5.1	5.2	67.0	-1.06	-1.21	-1.14	-1.14	-0.65	-1.06
1996	8	14AMS\+T	E	4.1ML	4.6	5.1	5.2	67.0	-1.05	-1.57	-1.51	-1.35	-0.49	-1.07
1996	8	14AMS\+L	N	5.2ML	6.2	7.0	5.8	74.0	-1.29	-1.37	-1.33	-1.03	-0.58	-1.18
1996	8	14AMS\+T	E	5.2ML	6.2	7.0	5.8	74.0	-1.00	-1.06	-1.30	-1.42	-0.52	-1.26
1996	8	14MRZ\+L	N	5.2ML	6.2	7.0	5.8	35.0	-1.61	-1.40	-1.23	-1.41	-0.63	-0.86
1996	8	14MRZ\+T	W	5.2ML	6.2	7.0	5.8	35.0	-0.88	-1.19	-1.44	-1.25	-0.57	-1.12
1996	8	14AMS\+L	N	3.7ML	4.4	4.8	5.1	69.0	-1.27	-1.33	-1.35	-1.22	-0.87	-1.44
1996	8	14AMS\+T	E	3.7ML	4.4	4.8	5.1	69.0	-2.21	-1.12	-1.05	-1.42	-0.64	-1.38
1996	8	14AMS\+L	N	3.7ML	4.4	4.8	5.1	69.0	-1.30	-1.57	-1.26	-1.27	-0.54	-1.02
1996	8	14AMS\+T	E	3.7ML	4.4	4.8	5.1	69.0	-0.95	-1.15	-1.18	-1.37	-0.30	-1.09
1996	8	15AMS\+L	N	3.6ML	4.4	4.7	5.0	66.0	-1.48	-1.42	-1.38	-1.47	-0.92	-1.17
1996	8	15AMS\+T	E	3.6ML	4.4	4.7	5.0	66.0	-0.90	-1.22	-1.37	-1.60	-0.72	-1.14
1996	8	15AMS\+L	N	3.6ML	4.4	4.7	5.0	74.0	-1.57	-1.11	-1.02	-0.93	-0.57	-0.83
1996	8	15AMS\+T	E	3.6ML	4.4	4.7	5.0	74.0	-0.54	-1.19	-1.34	-1.24	-0.40	-1.14
1996	8	15AMS\+L	N	3.5ML	4.6	5.1	5.2	93.0	0.05	-0.60	0.61	0.73	0.30	-0.31
1996	8	15AMS\+T	E	3.5ML	4.6	5.1	5.2	93.0	0.37	0.17	0.42	0.27	0.59	-0.35
1996	8	19AMS\+L	N	3.9ML	4.4	4.9	5.2	61.0	0.40	0.30	0.91	1.08	0.89	-0.03
1996	8	19AMS\+T	E	3.9ML	4.4	4.9	5.2	61.0	0.66	0.75	1.06	1.14	1.00	0.30
1996	8	20AMS\+L	N	3.6ML	4.4	5.3	5.3	49.0	-1.12	-0.91	-0.79	-0.71	-0.16	-0.66
1996	8	20AMS\+T	E	3.6ML	4.4	5.3	5.3	49.0	-0.54	-1.14	-1.24	-0.73	0.00	-0.72
1996	8	21AMS\+L	N	3.9ML	4.3	4.7	4.9	58.0	-1.77	-1.72	-1.06	-0.64	-0.46	-0.99
1996	8	21AMS\+T	E	3.9ML	4.3	4.7	4.9	58.0	-1.09	-1.30	-1.47	-1.12	-0.60	-1.07
1996	8	25CNK\+L	N	4.1ML	4.7	5.5	5.1	78.0	-1.36	-1.42	-0.80	-0.42	-0.11	-0.92
1996	8	25CNK\+T	E	4.1ML	4.7	5.5	5.1	78.0	-1.15	-1.40	-1.38	-0.45	-0.27	-0.84
1996	9	6AMS\+L	N	3.3ML	3.8	4.2	4.8	19.0	-1.29	-1.40	-1.66	-0.89	-0.13	-0.52
1996	9	6AMS\+T	E	3.3ML	3.8	4.2	4.8	19.0	-0.87	-1.37	-1.27	-0.80	0.16	-0.74
1996	9	9AMS\+L	N	3.7ML	4.5	4.7	5.1	71.0	-1.08	-1.33	-0.98	-0.97	-0.60	-1.07
1996	9	9AMS\+T	E	3.7ML	4.5	4.7	5.1	71.0	-1.24	-1.64	-1.28	-1.16	-0.58	-1.24
1996	11	12ELZ\+L	N	4.1ML	4.1	3.5	4.9	28.0	-1.22	-1.13	-1.19	-0.97	-0.87	-1.00
1996	11	12ELZ\+T	E	4.1ML	4.1	3.5	4.9	28.0	-1.10	-1.23	-0.94	-0.80	-0.73	-1.08
1996	11	22AMS\+L	N	3.8ML	4.4	5.1	5.1	59.0	-1.47	-0.97	-1.11	-0.99	-0.36	-1.07

1996	11	22AMS\+T	E	3.8ML	4.4	5.1	5.1	59.0	-0.94	-0.78	-1.51	-1.14	-0.09	-1.00
1996	12	20MUS\+L	N	4.1ML	4.9	4.8	5.3	76.0	-1.11	-1.60	-0.74	-0.97	-0.70	-1.24
1996	12	20MUS\+T	E	4.1ML	4.9	4.8	5.3	76.0	-0.79	-1.95	-0.65	-1.12	-0.58	-1.37
1997	1	22HTY\+L	N	5.5ML	6.6	7.2	5.5	27.0	-0.41	0.92	1.34	1.21	1.27	1.06
1997	1	22HTY\+T	E	5.5ML	6.6	7.2	5.5	27.0	-0.08	0.80	1.17	1.41	1.34	0.88
1997	1	21BLD\+L	W	4.8ML	5.4	5.2	5.5	16.0	-0.23	9.99	0.16	0.80	0.15	-0.99
1997	1	21BLD\+T	S	4.8ML	5.4	5.2	5.5	16.0	0.32	9.99	0.86	0.73	0.13	-0.94
California:														
FACCN(cm/s), f(Hz), H/V-relevant amp:														
yr	mmdd	station	comp	magtype	m ₁	m _{hf}	M _{lpl}	R(km)	A0.2	A0.5*	A1*	A2*	A5*	A10*
A/B sites:														
1966	6	28PARKF\C08H		6.1Mw	5.8	6.2	6.5	9.0	9.99	1.15	1.32	1.52	1.23	1.15
1966	6	28PARKF\C08H		6.1Mw	5.8	6.2	6.5	9.0	9.99	1.37	1.49	1.62	1.53	0.98
1966	6	28PARKF\C12H		6.1Mw	5.8	6.2	6.5	15.0	9.99	0.76	0.96	0.87	0.85	0.66
1966	6	28PARKF\C12H		6.1Mw	5.8	6.2	6.5	15.0	9.99	0.93	0.98	1.04	0.88	0.55
1966	6	28PARKF\SLOH		6.1Mw	5.8	6.2	6.5	60.0	9.99	0.24	0.30	0.47	0.13	-0.03
1966	6	28PARKF\SLOH		6.1Mw	5.8	6.2	6.5	60.0	9.99	-0.03	0.45	0.40	0.20	0.11
1966	6	28PARKF\TMBH		6.1Mw	5.8	6.2	6.5	10.0	9.99	0.97	1.43	1.78	1.48	0.85
1966	6	28PARKF\TMBH		6.1Mw	5.8	6.2	6.5	10.0	9.99	1.21	0.97	1.66	1.58	0.72
1970	9	12LYTLECR\CH		5.4Mw	5.6	6.4	6.3	20.0	9.99	9.99	0.47	0.54	0.53	0.63
1970	9	12LYTLECR\CH		5.4Mw	5.6	6.4	6.3	23.0	9.99	9.99	0.23	0.80	0.91	0.68
1970	9	12LYTLECR\CH		5.4Mw	5.6	6.4	6.3	23.0	9.99	0.52	0.70	0.87	0.91	0.65
1970	9	12LYTLECR\PH		5.4Mw	5.6	6.4	6.3	33.0	9.99	9.99	0.53	0.39	0.28	0.19
1970	9	12LYTLECR\PH		5.4Mw	5.6	6.4	6.3	33.0	9.99	9.99	0.31	0.25	0.34	0.23
1970	9	12LYTLECR\SH		5.4Mw	5.6	6.4	6.3	46.0	9.99	-0.52	0.01	-0.08	0.24	0.32
1970	9	12LYTLECR\WH		5.4Mw	5.6	6.4	6.3	15.0	9.99	9.99	1.46	1.49	1.16	0.96
1970	9	12LYTLECR\WH		5.4Mw	5.6	6.4	6.3	15.0	9.99	9.99	0.97	1.53	1.15	1.06
1971	2	9SFERN\CNDH		6.6Mw	6.4	7.3	6.2	66.0	9.99	9.99	0.89	1.16	1.03	0.84
1971	2	9SFERN\CNDH		6.6Mw	6.4	7.3	6.2	66.0	9.99	9.99	0.67	1.22	1.24	0.85
1971	2	9SFERN\CRRH		6.6Mw	6.4	7.3	6.2	25.0	9.99	9.99	1.39	1.78	1.60	1.17
1971	2	9SFERN\CRRH		6.6Mw	6.4	7.3	6.2	25.0	9.99	9.99	1.87	1.82	1.49	1.26

1971	2	9SFERN\CSMH	6.6Mw	6.4	7.3	6.2	87.0	9.99	0.35	0.67	0.47	0.48	0.22
1971	2	9SFERN\CSMH	6.6Mw	6.4	7.3	6.2	87.0	9.99	0.31	0.50	0.27	0.16	0.16
1971	2	9SFERN\CSPH	6.6Mw	6.4	7.3	6.2	87.0	0.21	-0.13	0.69	0.60	0.58	0.14
1971	2	9SFERN\CSPH	6.6Mw	6.4	7.3	6.2	87.0	-0.02	0.58	0.43	0.74	0.34	-0.13
1971	2	9SFERN\FTRH	6.6Mw	6.4	7.3	6.2	29.0	9.99	9.99	1.09	0.64	1.07	0.67
1971	2	9SFERN\FTRH	6.6Mw	6.4	7.3	6.2	29.0	9.99	9.99	1.27	0.72	1.22	0.74
1971	2	9SFERN\FTJH	6.6Mw	6.4	7.3	6.2	65.0	-0.14	0.17	0.01	0.33	0.64	0.33
1971	2	9SFERN\FTJH	6.6Mw	6.4	7.3	6.2	65.0	0.22	0.06	0.10	0.31	0.42	0.36
1971	2	9SFERN\L04H	6.6Mw	6.4	7.3	6.2	24.0	9.99	9.99	1.03	1.33	1.14	1.27
1971	2	9SFERN\L04H	6.6Mw	6.4	7.3	6.2	24.0	9.99	9.99	1.24	1.35	1.31	0.99
1971	2	9SFERN\L09H	6.6Mw	6.4	7.3	6.2	23.0	9.99	9.99	0.95	0.98	1.18	0.93
1971	2	9SFERN\L09H	6.6Mw	6.4	7.3	6.2	23.0	9.99	9.99	0.86	1.00	0.98	1.17
1971	2	9SFERN\L12H	6.6Mw	6.4	7.3	6.2	20.0	9.99	9.99	1.53	1.25	1.85	1.09
1971	2	9SFERN\L12H	6.6Mw	6.4	7.3	6.2	20.0	9.99	9.99	1.20	1.14	1.87	1.19
1971	2	9SFERN\PCDH	6.6Mw	6.4	7.3	6.2	3.0	2.07	2.36	2.27	2.34	2.15	1.81
1971	2	9SFERN\PCDH	6.6Mw	6.4	7.3	6.2	3.0	9.99	9.99	2.07	2.43	2.03	1.76
1971	2	9SFERN\PSLH	6.6Mw	6.4	7.3	6.2	19.0	9.99	9.99	1.05	1.05	1.31	0.85
1971	2	9SFERN\PSLH	6.6Mw	6.4	7.3	6.2	19.0	9.99	9.99	1.47	1.46	1.54	1.03
1971	2	9SFERN\PPPH	6.6Mw	6.4	7.3	6.2	39.0	9.99	1.05	0.92	1.14	1.02	0.95
1971	2	9SFERN\PPPH	6.6Mw	6.4	7.3	6.2	39.0	9.99	0.80	0.87	1.29	1.33	1.13
1971	2	9SFERN\SADH	6.6Mw	6.4	7.3	6.2	27.0	9.99	0.73	0.73	0.79	1.52	1.33
1971	2	9SFERN\SADH	6.6Mw	6.4	7.3	6.2	27.0	9.99	0.75	0.83	0.84	1.42	1.20
1971	2	9SFERN\FSDH	6.6Mw	6.4	7.3	6.2	28.0	1.02	0.70	1.41	1.24	1.06	1.34
1971	2	9SFERN\FSDH	6.6Mw	6.4	7.3	6.2	28.0	0.71	0.80	1.22	0.90	0.96	1.48
1971	2	9SFERN\TEHH	6.6Mw	6.4	7.3	6.2	68.0	9.99	0.03	-0.02	0.64	0.56	0.65
1971	2	9SFERN\TEHH	6.6Mw	6.4	7.3	6.2	68.0	9.99	0.10	0.06	0.40	0.37	0.44
1971	2	9SFERN\SODH	6.6Mw	6.4	7.3	6.2	58.0	9.99	9.99	0.77	1.29	0.87	0.87
1971	2	9SFERN\SODH	6.6Mw	6.4	7.3	6.2	58.0	9.99	9.99	0.71	1.19	1.32	0.94
1971	2	9SFERN\WTWH	6.6Mw	6.4	7.3	6.2	60.0	9.99	0.21	0.82	1.10	1.01	0.54
1971	2	9SFERN\WTWH	6.6Mw	6.4	7.3	6.2	60.0	9.99	0.64	0.67	0.96	0.78	0.46
1975	8	2OROVILLE\H	4.4Mw	5.1	5.2	6.0	11.0	9.99	0.25	0.57	0.54	0.78	0.50

1975	8	2OROVILLE\H	4.4Mw	5.1	5.2	6.0	11.0	9.99	0.20	0.11	0.84	0.47	0.60
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	3.0	9.99	0.91	1.21	1.46	1.18	0.72
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	3.0	9.99	1.12	1.28	1.86	1.25	0.92
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	9.0	9.99	0.60	0.99	0.62	0.96	0.74
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	9.0	9.99	1.07	1.22	0.66	1.19	0.81
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	3.0	1.16	1.69	2.07	1.79	1.54	1.00
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	3.0	9.99	1.47	1.25	1.90	1.51	0.85
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	26.0	1.10	1.14	1.27	1.86	1.40	1.26
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	26.0	1.21	1.52	1.77	1.61	1.44	1.32
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	26.0	1.09	0.68	0.71	1.04	1.05	0.87
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	26.0	0.86	1.07	0.91	1.15	1.32	0.95
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	13.0	0.73	1.37	1.30	1.09	1.24	0.64
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	13.0	0.69	1.65	1.35	1.42	1.53	0.88
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	30.0	9.99	0.73	0.99	0.98	0.68	-0.10
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	30.0	9.99	1.24	0.89	0.96	0.80	-0.24
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	31.0	9.99	0.74	0.57	0.87	0.83	0.39
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	31.0	9.99	0.50	0.63	0.83	1.10	0.38
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	22.0	0.27	0.51	0.68	0.99	0.86	0.54
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	22.0	9.99	1.11	0.77	1.18	0.80	0.28
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	18.0	1.12	1.76	1.83	1.18	0.99	0.05
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	18.0	9.99	1.17	1.24	1.12	0.94	0.26
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	13.0	9.99	0.09	0.23	0.60	0.63	0.56
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	13.0	9.99	0.62	0.84	0.61	0.70	0.42
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	30.0	9.99	0.73	1.15	0.83	0.07	-0.07
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	30.0	9.99	0.83	1.17	0.84	0.49	-0.25
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	31.0	9.99	0.63	1.13	0.84	0.70	0.15
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	31.0	0.10	-0.36	0.41	0.47	0.60	-0.02
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	4.0	9.99	0.43	0.88	1.45	1.12	0.95
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	4.0	9.99	0.44	0.97	1.71	1.16	0.70
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	8.0	9.99	0.85	1.26	1.15	1.47	0.64
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	8.0	9.99	0.21	1.45	1.16	1.56	0.95

1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	18.0	9.99	1.31	1.81	1.50	1.14	0.14
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	18.0	9.99	0.25	1.30	1.19	0.84	0.09
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	22.0	9.99	0.73	1.03	1.14	0.70	0.19
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	22.0	9.99	0.67	1.14	1.03	0.73	0.20
1980	2	25ANZA\PFT0H	4.9Mw	5.4	6.1	5.7	13.0	9.99	0.06	0.24	0.54	0.20	0.53
1980	2	25ANZA\PFT1H	4.9Mw	5.4	6.1	5.7	13.0	9.99	0.43	0.76	1.05	0.82	0.76
1980	2	25ANZA\BAR2H	4.9Mw	5.4	6.1	5.7	41.0	9.99	9.99	0.76	0.87	0.56	0.05
1980	2	25ANZA\BAR3H	4.9Mw	5.4	6.1	5.7	41.0	9.99	9.99	0.20	0.48	0.70	-0.08
1980	5	25MAMMOTH\IH	6.3Mw	6.2	7.0	6.0	15.0	1.02	1.02	1.29	1.96	1.64	1.26
1980	5	25MAMMOTH\IH	6.3Mw	6.2	7.0	6.0	15.0	0.73	0.89	1.58	1.59	1.34	1.20
1980	5	25MAMMOTH\JH	5.7Mw	5.9	6.5	6.0	25.0	9.99	9.99	0.96	1.27	0.90	0.81
1980	5	25MAMMOTH\JH	5.7Mw	5.9	6.5	6.0	25.0	9.99	9.99	0.95	1.28	0.70	0.51
1980	5	25MAMMOTH\BH	5.7Mw	5.9	6.5	6.0	14.0	0.27	0.88	0.98	1.02	1.08	0.76
1980	5	25MAMMOTH\BH	5.7Mw	5.9	6.5	6.0	14.0	9.99	0.66	0.43	0.91	0.71	0.39
1980	5	25MAMMOTH\BH	5.7Mw	5.9	6.5	6.0	14.0	9.99	0.64	1.15	1.00	1.07	0.66
1980	5	25MAMMOTH\BH	5.7Mw	5.9	6.5	6.0	14.0	9.99	0.79	0.67	0.94	1.02	0.60
1980	5	25MAMMOTH\BH	5.7Mw	5.9	6.5	6.0	14.0	9.99	1.06	1.40	1.78	1.57	1.17
1980	5	25MAMMOTH\BH	5.7Mw	5.9	6.5	6.0	14.0	0.83	0.82	0.87	1.55	1.33	0.99
1980	5	25MAMMOTH\AH	6.0Mw	6.1	6.6	5.8	19.0	9.99	9.99	1.12	0.65	1.01	0.55
1980	5	25MAMMOTH\AH	6.0Mw	6.1	6.6	5.8	19.0	9.99	0.54	0.53	0.65	0.61	0.54
1980	5	25MAMMOTH\AH	6.0Mw	6.1	6.6	5.8	19.0	9.99	9.99	1.43	1.70	1.24	0.99
1980	5	25MAMMOTH\AH	6.0Mw	6.1	6.6	5.8	19.0	9.99	0.63	1.14	1.52	0.90	0.84
1980	5	25MAMMOTH\AH	6.0Mw	6.1	6.6	5.8	19.0	9.99	9.99	1.44	1.70	1.23	0.99
1980	5	25MAMMOTH\AH	6.0Mw	6.1	6.6	5.8	19.0	9.99	0.54	1.08	1.48	0.90	0.83
1980	5	27MAMMOTH\LH	6.0Mw	6.8	7.7	6.0	44.0	9.99	0.77	1.11	0.71	0.77	0.76
1980	5	27MAMMOTH\LH	6.0Mw	6.8	7.7	6.0	44.0	9.99	0.76	0.56	0.82	0.93	0.99
1980	5	27MAMMOTH\LH	6.0Mw	6.8	7.7	6.0	20.0	9.99	9.99	1.73	2.04	1.73	1.28
1980	5	27MAMMOTH\LH	6.0Mw	6.8	7.7	6.0	20.0	9.99	1.55	2.05	1.83	1.53	1.23
1980	5	27MAMMOTH\CH	4.9Mw	5.2	4.9	5.2	9.0	9.99	9.99	0.72	0.92	0.83	0.15
1980	5	27MAMMOTH\CH	4.9Mw	5.2	4.9	5.2	9.0	9.99	9.99	0.68	1.15	1.06	0.19
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	9.0	9.99	9.99	0.83	1.19	1.08	0.90

1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	9.0	9.99	1.12	1.06	1.05	0.90
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	7.0	9.99	0.74	1.09	1.07	0.85
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	7.0	9.99	0.98	1.13	1.23	0.81
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	9.0	9.99	0.71	1.22	1.36	0.73
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	9.0	9.99	0.69	0.75	1.13	0.96
1980	6	11MAMMOTH\HH	5.0Mw	4.8	5.2	5.3	8.0	9.99	0.17	0.50	0.65	0.91
1980	6	11MAMMOTH\HH	5.0Mw	4.8	5.2	5.3	12.0	9.99	0.26	0.02	0.23	0.18
1980	6	11MAMMOTH\HH	5.0Mw	4.8	5.2	5.3	12.0	9.99	0.14	-0.02	0.64	0.18
1980	6	11MAMMOTH\HH	5.0Mw	4.8	5.2	5.3	11.0	9.99	0.08	-0.01	0.85	0.75
9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	26.0	9.99	0.48	0.99	0.67	0.50
9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	26.0	9.99	1.15	1.39	1.25	0.81
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	41.0	9.99	0.74	0.84	0.42	0.18
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	41.0	9.99	0.89	0.91	0.77	0.10
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	38.0	9.99	0.99	1.18	0.83	0.28
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	38.0	9.99	0.99	1.14	0.78	0.25
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	35.0	9.99	1.49	1.32	0.69	0.05
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	35.0	9.99	1.23	1.23	0.62	-0.10
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	33.0	9.99	1.18	1.24	0.88	0.21
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	33.0	9.99	1.27	0.99	0.94	0.16
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.58	1.49	1.35	0.36
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.48	1.35	1.18	0.52
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	32.0	9.99	1.35	1.25	0.51	0.14
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	32.0	9.99	1.57	1.11	0.58	0.15
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	28.0	9.99	1.38	1.29	1.06	0.30
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	28.0	9.99	1.11	1.25	1.09	0.43
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.88	1.74	1.10	0.38
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.62	1.47	1.09	0.44
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	36.0	9.99	1.39	1.23	0.89	0.23
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	36.0	9.99	1.30	1.28	0.81	0.00
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	39.0	9.99	1.35	1.44	1.30	0.52
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	39.0	9.99	1.22	1.24	1.17	0.53

1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	41.0	9.99	1.06	1.10	1.18	0.99	0.42
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	41.0	9.99	0.89	0.93	1.00	1.05	0.47
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	44.0	9.99	1.07	1.58	1.26	0.96	0.41
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	44.0	9.99	1.18	1.34	1.25	0.86	0.50
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	35.0	9.99	1.11	1.12	1.39	0.67	0.20
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	35.0	9.99	1.17	0.96	1.28	0.76	0.28
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	32.0	9.99	1.09	1.24	1.56	1.06	0.87
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	32.0	9.99	1.15	1.08	1.31	1.28	1.09
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.26	1.27	1.28	1.05	0.26
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.24	1.01	1.27	1.03	0.24
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	25.0	9.99	1.51	1.47	1.89	1.36	0.73
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	32.0	9.99	1.49	1.77	1.38	0.92	0.27
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	32.0	9.99	1.34	1.76	1.18	1.02	0.46
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	35.0	9.99	0.75	1.26	0.93	0.74	0.32
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	35.0	9.99	0.85	1.34	1.22	0.54	0.16
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	37.0	9.99	1.14	1.57	1.34	0.85	0.23
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	28.0	9.99	1.49	1.89	1.58	0.93	0.19
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	28.0	9.99	1.22	1.62	1.25	1.28	0.06
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	0.17	0.95	1.27	1.88	1.31
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	9.99	0.94	1.38	1.84	1.14
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	9.99	0.68	1.28	1.94	1.07
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	9.99	1.05	1.37	1.79	0.75
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	0.65	0.96	1.41	1.23	0.87
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	0.52	0.48	1.58	0.88	1.05
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	0.49	0.98	1.21	0.97	0.68
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	-0.03	0.93	0.73	0.67	0.76
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	9.99	0.86	0.72	1.41	0.86
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	9.99	0.94	0.75	1.42	1.04
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	12.0	9.99	9.99	0.62	1.06	1.35	0.76
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	12.0	9.99	9.99	0.43	0.90	1.29	1.14
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	9.99	0.54	1.12	1.33	0.98

1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	9.99	0.91	1.13	1.47	1.39
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	9.99	0.70	1.12	1.05	1.26
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	9.99	0.54	0.99	1.20	1.37	1.13
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	14.0	-0.11	0.61	0.85	0.60	1.27	0.94
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	14.0	-0.33	0.43	0.69	0.39	1.36	0.89
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	12.0	9.99	0.37	0.84	1.00	1.23	0.73
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	12.0	9.99	0.26	0.45	1.01	1.06	0.69
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	20.0	9.99	9.99	0.06	0.42	-0.11	-0.45
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	20.0	9.99	9.99	-0.04	-0.01	-0.13	-0.62
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	-0.03	0.65	0.96	1.20	0.82	0.65
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	-0.25	0.42	0.39	1.43	0.75	0.63
1983	6	11COALINGA\H	5.3Mw	5.6	5.6	5.9	10.0	9.99	0.67	0.89	0.67	0.52	0.36
1983	6	11COALINGA\H	5.3Mw	5.6	5.6	5.9	10.0	9.99	0.83	0.75	0.66	0.87	0.49
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	11.0	9.99	0.97	1.11	1.62	1.69	0.83
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	11.0	9.99	9.99	0.85	1.43	1.49	0.88
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	11.0	9.99	0.91	1.07	1.55	1.66	0.92
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	11.0	9.99	0.53	0.85	1.52	1.51	0.94
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	10.0	9.99	0.95	1.31	1.54	1.41	1.37
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	10.0	9.99	0.71	1.10	1.33	1.49	1.47
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	12.0	9.99	9.99	0.91	1.16	1.01	0.86
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	12.0	0.32	0.23	0.78	1.24	1.06	1.01
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	12.0	-0.62	0.54	0.93	1.17	1.00	0.88
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	12.0	9.99	0.17	0.78	1.25	1.06	1.09
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	14.0	9.99	9.99	0.58	0.75	0.82	1.09
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	14.0	9.99	9.99	0.56	0.92	1.33	1.16
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	13.0	9.99	0.38	0.82	1.21	1.28	0.47
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	13.0	9.99	0.46	0.48	0.74	1.22	0.74
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	17.0	9.99	0.14	0.30	0.60	0.27	0.61
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	17.0	9.99	0.14	0.41	0.64	0.70	0.68
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	10.0	9.99	1.04	1.29	1.68	1.02	0.79
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	10.0	9.99	0.79	1.14	1.53	1.08	0.97

1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	8.0	1.25	1.36	1.74	2.10	2.03	1.45
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	8.0	9.99	9.99	1.67	1.71	1.98	1.51
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	11.0	9.99	0.88	1.84	1.29	1.22	1.10
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	11.0	0.67	1.37	1.52	1.34	1.12	1.01
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	11.0	1.08	0.91	1.83	1.30	1.22	1.09
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	11.0	0.75	1.35	1.56	1.34	1.16	1.06
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	12.0	0.58	1.06	1.32	1.57	1.26	1.52
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	12.0	0.75	1.36	1.19	1.62	1.22	1.43
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	12.0	1.34	1.09	1.67	1.43	1.54	0.82
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	12.0	1.13	1.02	1.28	1.23	1.45	1.02
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	10.0	9.99	0.60	1.01	1.08	0.98	0.91
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	10.0	9.99	0.54	0.86	1.10	1.21	0.89
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	9.0	1.02	1.25	2.14	2.06	1.53	1.25
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	9.0	0.97	1.08	1.87	2.01	1.82	1.19
1984	4	24MORGAN\CAH	6.2Mw	6.3	6.6	5.8	38.0	9.99	0.44	0.84	1.17	1.39	0.89
1984	4	24MORGAN\CAH	6.2Mw	6.3	6.6	5.8	38.0	9.99	0.78	1.13	1.50	1.31	0.98
1984	4	24MORGAN\CLH	6.2Mw	6.3	6.6	5.8	23.0	9.99	0.92	1.33	1.28	1.02	0.38
1984	4	24MORGAN\CLH	6.2Mw	6.3	6.6	5.8	23.0	9.99	0.93	1.55	1.60	0.75	0.29
1984	4	24MORGAN\CYH	6.2Mw	6.3	6.6	5.8	1.0	1.22	1.46	2.04	1.90	1.71	1.22
1984	4	24MORGAN\CYH	6.2Mw	6.3	6.6	5.8	1.0	0.97	1.76	2.41	1.92	1.93	1.32
1984	4	24MORGAN\FMH	6.2Mw	6.3	6.6	5.8	32.0	9.99	9.99	0.75	0.80	0.45	0.15
1984	4	24MORGAN\FMH	6.2Mw	6.3	6.6	5.8	32.0	9.99	0.78	0.73	0.76	0.37	0.07
1984	4	24MORGAN\G0H	6.2Mw	6.3	6.6	5.8	16.0	0.58	0.52	0.84	0.74	1.10	0.69
1984	4	24MORGAN\G0H	6.2Mw	6.3	6.6	5.8	16.0	0.12	0.62	0.28	1.04	1.02	0.73
1984	4	24MORGAN\G0H	6.2Mw	6.3	6.6	5.8	12.0	0.67	0.63	1.51	1.23	1.60	1.18
1984	4	24MORGAN\G0H	6.2Mw	6.3	6.6	5.8	12.0	0.59	1.42	2.11	1.67	1.75	0.82
1984	4	24MORGAN\GMH	6.2Mw	6.3	6.6	5.8	14.0	0.47	0.63	0.80	1.36	1.15	0.94
1984	4	24MORGAN\GMH	6.2Mw	6.3	6.6	5.8	14.0	0.26	0.90	0.75	1.38	1.22	0.99
1984	4	24MORGAN\GIH	6.2Mw	6.3	6.6	5.8	16.0	0.45	0.59	0.78	0.71	1.00	0.88
1984	4	24MORGAN\GIH	6.2Mw	6.3	6.6	5.8	16.0	0.32	0.62	0.32	0.86	1.03	0.78
1984	4	24MORGAN\LOH	6.2Mw	6.3	6.6	5.8	44.0	9.99	9.99	0.41	0.65	1.01	0.55

1984	4	24MORGAN\LOH	6.2Mw	6.3	6.6	5.8	44.0	9.99	9.99	0.95	1.30	1.24	0.71
1986	1	26HOLLISTR\H	5.4Mw	6.1	6.2	5.7	15.0	9.99	0.97	1.13	0.67	0.58	0.47
1986	1	26HOLLISTR\H	5.4Mw	6.1	6.2	5.7	15.0	-0.14	1.01	1.33	0.77	1.02	0.23
1986	7	8PALMSPR\AH	6.0Mw	6.3	7.3	6.0	46.0	9.99	0.50	0.61	1.18	0.92	0.74
1986	7	8PALMSPR\AH	6.0Mw	6.3	7.3	6.0	46.0	9.99	9.99	0.70	1.10	0.86	0.82
1986	7	8PALMSPR\AH	6.0Mw	6.3	7.3	6.0	55.0	9.99	0.12	0.88	1.17	0.74	0.56
1986	7	8PALMSPR\AH	6.0Mw	6.3	7.3	6.0	55.0	9.99	0.34	1.13	1.05	0.48	0.78
1986	7	8PALMSPR\CH	6.0Mw	6.3	7.3	6.0	35.0	9.99	9.99	1.23	1.21	1.06	1.04
1986	7	8PALMSPR\CH	6.0Mw	6.3	7.3	6.0	35.0	9.99	9.99	1.23	1.62	1.08	0.98
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	35.0	9.99	9.99	1.00	1.15	1.38	0.93
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	35.0	9.99	9.99	1.18	1.45	1.11	0.88
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	63.0	9.99	9.99	0.43	0.23	0.55	0.64
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	63.0	9.99	9.99	0.22	0.17	0.55	0.88
1986	7	8PALMSPR\PH	6.0Mw	6.3	7.3	6.0	72.0	9.99	-0.06	0.39	0.40	1.24	0.92
1986	7	8PALMSPR\PH	6.0Mw	6.3	7.3	6.0	72.0	9.99	-0.04	0.36	0.16	0.83	0.82
1986	7	8PALMSPR\RH	6.0Mw	6.3	7.3	6.0	71.0	9.99	9.99	-0.06	-0.19	0.81	0.50
1986	7	8PALMSPR\RH	6.0Mw	6.3	7.3	6.0	71.0	9.99	9.99	0.15	0.10	0.80	0.49
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	26.0	9.99	9.99	0.74	0.86	0.78	1.23
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	26.0	9.99	9.99	0.93	0.87	1.04	1.00
1986	7	8PALMSPR\TH	6.0Mw	6.3	7.3	6.0	72.0	9.99	9.99	1.00	1.11	1.16	0.45
1986	7	8PALMSPR\TH	6.0Mw	6.3	7.3	6.0	72.0	9.99	9.99	1.22	0.91	1.21	0.52
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	58.0	9.99	9.99	0.47	0.51	0.70	0.94
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	58.0	9.99	9.99	0.43	0.50	0.58	0.99
1986	7	20CHALFANT\H	5.9Mw	5.9	6.3	5.9	18.0	-0.64	-0.02	0.59	0.54	0.67	0.47
1986	7	20CHALFANT\H	5.9Mw	5.9	6.3	5.9	18.0	0.70	0.99	1.16	0.82	0.51	0.90
1986	7	20CHALFANT\H	5.9Mw	5.9	6.3	5.9	26.0	9.99	0.08	0.37	0.77	0.95	0.45
1986	7	20CHALFANT\H	5.9Mw	5.9	6.3	5.9	26.0	9.99	0.33	0.38	0.63	0.63	0.44
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	23.0	9.99	1.16	0.48	0.72	1.07	0.62
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	23.0	0.86	1.48	0.99	1.05	0.96	0.99
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	36.0	9.99	9.99	0.68	1.19	1.21	0.68
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	36.0	9.99	9.99	0.76	1.46	1.21	0.65

1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	33.0	0.51	0.95	0.51	0.93	1.02	0.59
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	33.0	1.06	1.31	0.81	1.01	0.75	0.40
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	33.0	0.57	0.89	0.84	1.05	0.99	0.79
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	33.0	1.02	1.40	0.90	1.27	0.96	0.54
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	51.0	9.99	9.99	0.35	1.15	0.64	-0.02
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	51.0	9.99	9.99	0.44	1.05	0.76	-0.26
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	41.0	9.99	9.99	0.94	0.97	0.63	0.30
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	41.0	9.99	9.99	0.98	1.05	0.59	0.22
1986	7	21CHALFANT\H	5.6Mw	5.5	6.0	6.2	14.0	9.99	0.67	0.52	0.57	0.38	0.33
1986	7	21CHALFANT\H	5.6Mw	5.5	6.0	6.2	14.0	9.99	0.58	0.07	0.08	0.35	0.73
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	23.0	9.99	9.99	1.16	0.92	1.42	0.76
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	23.0	9.99	9.99	0.98	1.18	1.48	0.76
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	27.0	9.99	9.99	0.67	1.28	1.56	1.09
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	27.0	9.99	9.99	0.67	1.45	1.50	1.09
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	27.0	9.99	0.79	1.33	1.39	0.98	0.75
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	27.0	9.99	0.72	1.53	1.05	1.03	0.86
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	71.0	9.99	9.99	0.52	0.70	0.83	0.16
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	71.0	9.99	9.99	0.75	1.13	0.93	0.25
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	78.0	9.99	9.99	1.19	1.10	1.12	0.07
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	78.0	9.99	9.99	0.95	1.28	0.99	0.25
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	12.0	0.67	1.14	1.62	1.83	1.53	1.31
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	12.0	9.99	0.50	1.89	1.55	1.68	1.50
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	65.0	9.99	0.35	0.71	1.07	0.82	0.46
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	65.0	9.99	9.99	0.94	0.83	0.88	0.36
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	21.0	9.99	9.99	1.08	0.97	1.07	1.12
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	21.0	9.99	9.99	0.61	0.77	1.15	0.97
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	23.0	9.99	0.31	0.87	1.48	1.55	1.06
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	23.0	9.99	0.68	0.71	1.30	1.39	1.11
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	38.0	9.99	0.67	1.13	1.12	1.11	0.78
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	38.0	9.99	9.99	1.43	1.10	1.27	0.59
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	43.0	9.99	9.99	1.05	1.80	1.52	1.25

1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	43.0	9.99	9.99	1.19	1.82	1.67	1.46
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	20.0	9.99	9.99	0.62	0.73	0.96	0.71
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	20.0	9.99	9.99	0.23	0.93	0.53	0.54
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	43.0	9.99	9.99	0.30	1.08	0.72	0.73
1989	10	18LOMAP\ANAH	6.9Mw	7.4	7.7	6.4	21.0	1.40	1.85	1.34	0.89	0.84	0.58
1989	10	18LOMAP\ANAH	6.9Mw	7.4	7.7	6.4	21.0	1.20	1.53	1.37	1.13	1.12	0.58
1989	10	18LOMAP\A3EH	6.9Mw	7.4	7.7	6.4	58.0	9.99	0.78	1.25	0.99	1.00	0.72
1989	10	18LOMAP\A3EH	6.9Mw	7.4	7.7	6.4	58.0	9.99	1.20	1.10	1.04	1.05	0.64
1989	10	18LOMAP\A07H	6.9Mw	7.4	7.7	6.4	48.0	0.79	1.26	1.70	1.57	1.29	0.58
1989	10	18LOMAP\A07H	6.9Mw	7.4	7.7	6.4	48.0	1.12	1.39	1.57	1.29	0.98	0.70
1989	10	18LOMAP\A09H	6.9Mw	7.4	7.7	6.4	47.0	9.99	1.72	1.38	1.38	1.11	0.39
1989	10	18LOMAP\A09H	6.9Mw	7.4	7.7	6.4	47.0	9.99	1.44	1.56	1.22	1.14	0.75
1989	10	18LOMAP\A10H	6.9Mw	7.4	7.7	6.4	48.0	1.35	1.75	1.39	1.51	1.04	0.16
1989	10	18LOMAP\A10H	6.9Mw	7.4	7.7	6.4	48.0	0.79	1.86	1.67	1.42	0.76	-0.01
1989	10	18LOMAP\BESH	6.9Mw	7.4	7.7	6.4	50.0	9.99	1.15	1.42	1.55	0.77	0.21
1989	10	18LOMAP\BESH	6.9Mw	7.4	7.7	6.4	50.0	9.99	1.17	1.65	1.26	1.05	0.32
1989	10	18LOMAP\BRKH	6.9Mw	7.4	7.7	6.4	83.0	9.99	0.70	1.64	1.08	0.69	-0.13
1989	10	18LOMAP\BRKH	6.9Mw	7.4	7.7	6.4	83.0	9.99	1.40	1.85	1.31	0.61	0.15
1989	10	18LOMAP\BRNH	6.9Mw	7.4	7.7	6.4	10.0	1.12	1.52	2.26	2.35	1.77	1.55
1989	10	18LOMAP\BRNH	6.9Mw	7.4	7.7	6.4	10.0	0.98	1.00	1.95	2.27	1.79	1.76
1989	10	18LOMAP\CAPH	6.9Mw	7.4	7.7	6.4	14.0	9.99	1.95	1.83	2.00	1.80	1.51
1989	10	18LOMAP\CAPH	6.9Mw	7.4	7.7	6.4	14.0	9.99	1.27	1.93	1.98	1.66	1.45
1989	10	18LOMAP\CLSH	6.9Mw	7.4	7.7	6.4	5.0	9.99	1.71	1.72	1.97	1.70	1.27
1989	10	18LOMAP\CLSH	6.9Mw	7.4	7.7	6.4	5.0	9.99	1.75	2.20	1.73	1.76	1.23
1989	10	18LOMAP\CYCH	6.9Mw	7.4	7.7	6.4	22.0	1.32	1.42	1.75	1.52	1.34	1.00
1989	10	18LOMAP\CYCH	6.9Mw	7.4	7.7	6.4	22.0	1.39	1.71	1.96	1.80	1.55	1.15
1989	10	18LOMAP\FMSH	6.9Mw	7.4	7.7	6.4	44.0	0.96	1.25	1.60	1.54	1.44	0.94
1989	10	18LOMAP\FMSH	6.9Mw	7.4	7.7	6.4	44.0	0.77	1.45	1.49	1.59	1.41	0.96
1989	10	18LOMAP\MSJH	6.9Mw	7.4	7.7	6.4	43.0	9.99	1.36	1.36	1.26	1.21	0.96
1989	10	18LOMAP\MSJH	6.9Mw	7.4	7.7	6.4	43.0	9.99	1.10	1.13	1.39	1.30	1.00
1989	10	18LOMAP\GILH	6.9Mw	7.4	7.7	6.4	11.0	9.99	1.59	1.38	1.98	1.50	1.40

1989	10	18LOMAP\GILH	6.9Mw	7.4	7.7	6.4	11.0	9.99	1.31	1.40	1.82	1.64	1.22
1989	10	18LOMAP\G01H	6.9Mw	7.4	7.7	6.4	11.0	9.99	1.23	1.42	1.78	1.80	1.35
1989	10	18LOMAP\G01H	6.9Mw	7.4	7.7	6.4	11.0	9.99	1.59	1.43	2.19	1.60	1.27
1989	10	18LOMAP\G06H	6.9Mw	7.4	7.7	6.4	20.0	9.99	1.49	1.28	1.45	1.28	0.83
1989	10	18LOMAP\G06H	6.9Mw	7.4	7.7	6.4	20.0	9.99	1.41	1.51	1.48	1.56	0.88
1989	10	18LOMAP\GMRH	6.9Mw	7.4	7.7	6.4	24.0	9.99	1.14	1.27	1.92	1.58	1.02
1989	10	18LOMAP\GMRH	6.9Mw	7.4	7.7	6.4	24.0	9.99	0.99	1.28	2.13	1.39	1.10
1989	10	18LOMAP\GGBH	6.9Mw	7.4	7.7	6.4	85.0	9.99	1.84	2.05	1.65	1.12	0.30
1989	10	18LOMAP\GGBH	6.9Mw	7.4	7.7	6.4	85.0	9.99	1.27	1.67	1.58	0.91	0.19
1989	10	18LOMAP\SGIH	6.9Mw	7.4	7.7	6.4	31.0	1.02	1.00	1.28	0.86	0.77	0.53
1989	10	18LOMAP\SGIH	6.9Mw	7.4	7.7	6.4	31.0	0.72	0.93	1.28	1.05	0.76	0.69
1989	10	18LOMAP\LGPH	6.9Mw	7.4	7.7	6.4	6.0	2.08	2.41	2.26	2.21	1.59	1.42
1989	10	18LOMAP\LGPH	6.9Mw	7.4	7.7	6.4	6.0	1.50	1.87	2.13	2.21	1.68	1.45
1989	10	18LOMAP\MCHH	6.9Mw	7.4	7.7	6.4	45.0	9.99	0.64	0.69	1.07	1.18	0.77
1989	10	18LOMAP\MCHH	6.9Mw	7.4	7.7	6.4	45.0	9.99	0.60	1.06	1.13	0.84	0.57
1989	10	18LOMAP\SLCH	6.9Mw	7.4	7.7	6.4	36.0	9.99	1.78	1.86	1.50	1.32	0.86
1989	10	18LOMAP\SLCH	6.9Mw	7.4	7.7	6.4	36.0	9.99	1.64	1.72	1.84	1.31	0.85
1989	10	18LOMAP\PJHH	6.9Mw	7.4	7.7	6.4	78.0	9.99	0.93	0.88	1.20	0.78	0.42
1989	10	18LOMAP\PJHH	6.9Mw	7.4	7.7	6.4	78.0	9.99	0.92	0.99	1.26	0.71	0.33
1989	10	18LOMAP\PTBH	6.9Mw	7.4	7.7	6.4	89.0	9.99	1.63	1.37	1.21	0.80	0.16
1989	10	18LOMAP\PTBH	6.9Mw	7.4	7.7	6.4	89.0	9.99	1.63	1.39	1.22	0.71	0.03
1989	10	18LOMAP\SG3H	6.9Mw	7.4	7.7	6.4	35.0	0.63	1.15	1.63	1.16	0.86	0.30
1989	10	18LOMAP\SG3H	6.9Mw	7.4	7.7	6.4	35.0	1.05	1.28	1.68	0.71	1.00	0.22
1989	10	18LOMAP\CFHH	6.9Mw	7.4	7.7	6.4	85.0	9.99	1.25	1.29	1.39	0.67	-0.11
1989	10	18LOMAP\CFHH	6.9Mw	7.4	7.7	6.4	85.0	9.99	1.46	1.76	1.29	0.71	0.10
1989	10	18LOMAP\DMHH	6.9Mw	7.4	7.7	6.4	78.0	9.99	1.16	1.15	1.36	0.94	0.62
1989	10	18LOMAP\DMHH	6.9Mw	7.4	7.7	6.4	78.0	9.99	1.41	1.25	1.54	0.95	0.55
1989	10	18LOMAP\PHTH	6.9Mw	7.4	7.7	6.4	81.0	9.99	1.48	1.55	1.00	0.58	0.08
1989	10	18LOMAP\PHTH	6.9Mw	7.4	7.7	6.4	81.0	9.99	1.34	1.42	1.08	0.76	0.09
1989	10	18LOMAP\PRSH	6.9Mw	7.4	7.7	6.4	83.0	1.10	1.33	1.58	1.36	1.03	0.28
1989	10	18LOMAP\PRSH	6.9Mw	7.4	7.7	6.4	83.0	1.23	1.67	1.86	1.56	1.03	0.40

1989	10	18LOMAP\RINH	6.9Mw	7.4	7.7	6.4	79.0	9.99	1.06	1.26	1.19	0.78	0.74
1989	10	18LOMAP\RINH	6.9Mw	7.4	7.7	6.4	79.0	9.99	1.50	1.36	0.99	0.78	0.54
1989	10	18LOMAP\TLHH	6.9Mw	7.4	7.7	6.4	81.0	0.90	0.68	0.82	0.79	0.67	0.14
1989	10	18LOMAP\TLHH	6.9Mw	7.4	7.7	6.4	81.0	0.93	1.10	1.18	0.80	0.86	0.09
1989	10	18LOMAP\SSFH	6.9Mw	7.4	7.7	6.4	68.0	0.75	1.25	1.19	1.14	0.94	0.58
1989	10	18LOMAP\SSFH	6.9Mw	7.4	7.7	6.4	68.0	0.97	1.02	1.47	1.26	0.66	0.48
1989	10	18LOMAP\UC2H	6.9Mw	7.4	7.7	6.4	18.0	1.11	1.09	1.31	1.66	1.49	1.31
1989	10	18LOMAP\UC2H	6.9Mw	7.4	7.7	6.4	18.0	0.76	1.07	1.48	1.53	1.64	1.55
1989	10	18LOMAP\LOBH	6.9Mw	7.4	7.7	6.4	18.0	9.99	1.04	1.56	1.87	1.84	1.41
1989	10	18LOMAP\LOBH	6.9Mw	7.4	7.7	6.4	18.0	9.99	1.10	1.31	1.60	1.57	1.47
1989	10	18LOMAP\WDSH	6.9Mw	7.4	7.7	6.4	40.0	1.41	1.36	1.54	1.14	0.74	0.31
1989	10	18LOMAP\WDSH	6.9Mw	7.4	7.7	6.4	40.0	1.10	1.40	1.46	1.23	0.82	0.31
1989	10	18LOMAP\YBIH	6.9Mw	7.4	7.7	6.4	81.0	9.99	1.39	1.05	1.20	0.60	0.41
1989	10	18LOMAP\YBIH	6.9Mw	7.4	7.7	6.4	81.0	9.99	1.97	2.17	2.06	2.17	1.69
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	9.0	2.08	1.96	1.75	1.97	1.96	1.54
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	9.0	1.76	1.96	1.52	0.89	1.65	1.14
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	34.0	9.99	9.99	0.59	0.96	1.62	1.05
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	34.0	9.99	1.62	1.71	1.49	1.55	1.22
1992	6	28LANDERS\AH	7.3Mw	7.4	8.1	6.6	69.0	1.54	1.80	1.73	1.56	1.58	1.26
1992	6	28LANDERS\AH	7.3Mw	7.4	8.1	6.6	69.0	9.99	0.69	0.62	0.67	1.09	1.02
1992	6	28LANDERS\PH	7.3Mw	7.4	8.1	6.6	95.0	9.99	0.61	0.70	0.78	1.23	1.04
1992	6	28LANDERS\PH	7.3Mw	7.4	8.1	6.6	95.0	9.99	0.83	0.80	0.71	1.24	0.88
1992	6	28LANDERS\RH	7.3Mw	7.4	8.1	6.6	95.0	9.99	0.88	0.93	0.76	1.23	0.76
1992	6	28LANDERS\RH	7.3Mw	7.4	8.1	6.6	95.0	0.85	0.77	0.77	0.90	0.96	1.02
1992	6	28LANDERS\SH	7.3Mw	7.4	8.1	6.6	51.0	0.60	0.68	1.07	0.94	0.93	0.89
1992	6	28LANDERS\SH	7.3Mw	7.4	8.1	6.6	51.0	0.99	0.84	0.89	0.96	1.15	0.92
1992	6	28LANDERS\2H	7.3Mw	7.4	8.1	6.6	43.0	0.86	0.69	0.70	0.78	0.93	0.99
1992	6	28LANDERS\2H	7.3Mw	7.4	8.1	6.6	43.0	1.14	2.07	2.12	2.04	1.77	1.07
1994	1	17NORTH\ORH	6.7Mw	7.1	7.6	6.4	22.0	1.61	1.97	2.34	1.92	1.68	0.95
1994	1	17NORTH\ORH	6.7Mw	7.1	7.6	6.4	22.0	9.99	1.33	1.37	1.63	1.70	1.27
1994	1	17NORTH\LAH	6.7Mw	7.1	7.6	6.4	37.0	9.99	1.33	1.37	1.63	1.70	1.27

1994	1	17NORTH\LAH	6.7Mw	7.1	7.6	6.4	37.0	9.99	1.25	1.67	1.67	1.63	1.44
1994	1	17NORTH\TEH	6.7Mw	7.1	7.6	6.4	32.0	9.99	1.71	1.47	1.42	1.41	0.96
1994	1	17NORTH\TEH	6.7Mw	7.1	7.6	6.4	32.0	9.99	1.37	1.71	1.71	1.52	1.13
1994	1	17NORTH\UNH	6.7Mw	7.1	7.6	6.4	35.0	9.99	1.18	1.54	2.12	1.64	1.26
1994	1	17NORTH\UNH	6.7Mw	7.1	7.6	6.4	35.0	9.99	1.22	1.03	1.62	1.60	1.21
1994	1	17NORTH\LHH	6.7Mw	7.1	7.6	6.4	27.0	1.16	0.97	0.75	0.97	1.46	1.07
1994	1	17NORTH\LHH	6.7Mw	7.1	7.6	6.4	27.0	1.02	0.91	0.63	0.86	1.44	0.86
1994	1	17NORTH\LIH	6.7Mw	7.1	7.6	6.4	47.0	9.99	0.19	1.54	1.01	0.98	0.30
1994	1	17NORTH\LIH	6.7Mw	7.1	7.6	6.4	47.0	9.99	0.67	1.26	0.99	0.93	0.65
1994	1	17NORTH\MAH	6.7Mw	7.1	7.6	6.4	35.0	9.99	1.24	1.29	1.43	1.28	0.75
1994	1	17NORTH\MAH	6.7Mw	7.1	7.6	6.4	35.0	9.99	1.37	1.47	1.36	1.06	0.71
1994	1	17NORTH\BAH	6.7Mw	7.1	7.6	6.4	71.0	9.99	0.38	1.23	1.39	1.08	0.69
1994	1	17NORTH\BAH	6.7Mw	7.1	7.6	6.4	71.0	9.99	0.50	0.81	1.30	0.99	0.70
1994	1	17NORTH\MTH	6.7Mw	7.1	7.6	6.4	36.0	0.01	0.82	0.82	1.17	1.61	1.16
1994	1	17NORTH\MTH	6.7Mw	7.1	7.6	6.4	36.0	-0.10	0.57	1.11	1.01	1.54	0.83
1994	1	17NORTH\NEH	6.7Mw	7.1	7.6	6.4	85.0	0.70	0.89	1.26	1.29	1.16	0.32
1994	1	17NORTH\NEH	6.7Mw	7.1	7.6	6.4	85.0	0.18	0.71	1.32	1.41	0.86	0.35
1994	1	17NORTH\PAH	6.7Mw	7.1	7.6	6.4	8.0	9.99	1.48	1.72	2.12	1.36	1.03
1994	1	17NORTH\PAH	6.7Mw	7.1	7.6	6.4	8.0	9.99	1.23	1.65	1.90	1.61	1.13
1994	1	17NORTH\PUH	6.7Mw	7.1	7.6	6.4	8.0	9.99	1.15	2.03	2.37	2.22	1.81
1994	1	17NORTH\PUH	6.7Mw	7.1	7.6	6.4	8.0	9.99	1.96	2.40	2.04	1.93	1.79
1994	1	17NORTH\KAH	6.7Mw	7.1	7.6	6.4	8.0	1.66	1.45	2.19	1.99	1.51	0.74
1994	1	17NORTH\KAH	6.7Mw	7.1	7.6	6.4	8.0	1.43	1.86	2.19	2.05	1.69	1.05
1994	1	17NORTH\MUH	6.7Mw	7.1	7.6	6.4	45.0	9.99	1.09	1.57	1.81	1.58	0.92
1994	1	17NORTH\MUH	6.7Mw	7.1	7.6	6.4	45.0	9.99	0.85	1.60	1.78	1.61	0.75
1994	1	17NORTH\CUH	6.7Mw	7.1	7.6	6.4	79.0	9.99	0.92	0.82	0.99	1.10	0.56
1994	1	17NORTH\CUH	6.7Mw	7.1	7.6	6.4	79.0	9.99	0.34	1.07	1.10	1.05	0.44
1994	1	17NORTH\SAH	6.7Mw	7.1	7.6	6.4	44.0	1.18	1.31	1.69	1.69	0.55	-0.02
1994	1	17NORTH\SAH	6.7Mw	7.1	7.6	6.4	44.0	0.93	0.72	1.20	1.65	0.82	0.17
1994	1	17NORTH\CHH	6.7Mw	7.1	7.6	6.4	17.0	1.74	2.22	2.21	2.53	2.23	1.94
1994	1	17NORTH\CHH	6.7Mw	7.1	7.6	6.4	17.0	1.91	2.04	1.96	2.61	2.14	1.84

1994	1	17NORTH\VAH	6.7Mw	7.1	7.6	6.4	24.0	0.23	1.44	1.44	1.70	1.26	1.23
1994	1	17NORTH\VAH	6.7Mw	7.1	7.6	6.4	24.0	0.79	1.14	1.43	1.46	1.40	1.15
C/D sites:													
1952	7	21KERN\TAF0H	7.4Mw	7.6	8.0	6.4	41.0	0.92	1.35	1.76	1.60	1.39	0.80
1952	7	21KERN\TAF1H	7.4Mw	7.6	8.0	6.4	41.0	1.08	1.74	1.71	1.79	1.59	0.98
1966	6	28PARKF\C02H	6.1Mw	5.8	6.2	6.5	1.0	9.99	2.09	2.07	1.98	1.18	9.99
1966	6	28PARKF\C05H	6.1Mw	5.8	6.2	6.5	5.0	9.99	1.54	1.28	1.92	1.46	1.30
1966	6	28PARKF\C05H	6.1Mw	5.8	6.2	6.5	5.0	9.99	0.88	1.49	1.93	1.04	1.03
1968	4	9BORREGO\AH	6.8Mw	6.9	7.4	6.5	46.0	9.99	1.88	0.99	1.11	0.96	0.22
1968	4	9BORREGO\AH	6.8Mw	6.9	7.4	6.5	46.0	9.99	0.90	0.96	0.87	0.98	0.29
1970	9	12LYTLECR\CH	5.4Mw	5.6	6.4	6.3	32.0	9.99	0.19	0.50	0.80	0.96	0.15
1970	9	12LYTLECR\CH	5.4Mw	5.6	6.4	6.3	32.0	9.99	9.99	0.59	0.62	0.94	9.99
1970	9	12LYTLECR\LH	5.4Mw	5.6	6.4	6.3	93.0	9.99	9.99	0.07	0.44	0.16	9.99
1970	9	12LYTLECR\LH	5.4Mw	5.6	6.4	6.3	93.0	9.99	-0.05	0.19	0.48	0.24	-0.51
1970	9	12LYTLECR\PH	5.4Mw	5.6	6.4	6.3	76.0	9.99	0.07	0.22	0.27	0.48	0.18
1970	9	12LYTLECR\PH	5.4Mw	5.6	6.4	6.3	76.0	9.99	-0.10	-0.02	0.48	0.40	0.07
1971	2	9SFERN\PVEH	6.6Mw	6.4	7.3	6.2	65.0	9.99	0.72	0.68	0.81	0.82	0.13
1971	2	9SFERN\PVEH	6.6Mw	6.4	7.3	6.2	65.0	9.99	0.60	1.07	0.93	0.79	0.06
1971	2	9SFERN\OPPH	6.6Mw	6.4	7.3	6.2	48.0	-0.24	1.48	1.03	1.16	1.24	0.66
1971	2	9SFERN\OPPH	6.6Mw	6.4	7.3	6.2	48.0	0.20	0.99	0.88	1.16	0.88	0.44
1971	2	9SFERN\PELH	6.6Mw	6.4	7.3	6.2	21.0	9.99	1.04	1.68	1.51	1.50	1.27
1971	2	9SFERN\PELH	6.6Mw	6.4	7.3	6.2	21.0	9.99	1.24	1.45	1.46	1.46	1.33
1971	2	9SFERN\L01H	6.6Mw	6.4	7.3	6.2	26.0	9.99	9.99	1.65	1.25	0.94	0.58
1971	2	9SFERN\L01H	6.6Mw	6.4	7.3	6.2	26.0	9.99	9.99	1.64	1.22	0.92	0.73
1971	2	9SFERN\TLIH	6.6Mw	6.4	7.3	6.2	69.0	0.83	0.80	1.00	1.06	0.52	-0.30
1971	2	9SFERN\TLIH	6.6Mw	6.4	7.3	6.2	69.0	1.36	0.58	0.93	1.07	0.45	-0.15
1971	2	9SFERN\PDH	6.6Mw	6.4	7.3	6.2	25.0	9.99	9.99	1.51	1.35	1.32	1.22
1971	2	9SFERN\PDH	6.6Mw	6.4	7.3	6.2	25.0	9.99	9.99	1.46	1.25	1.36	1.17
1971	2	9SFERN\PASH	6.6Mw	6.4	7.3	6.2	32.0	9.99	9.99	1.55	1.45	0.99	0.95
1971	2	9SFERN\PASH	6.6Mw	6.4	7.3	6.2	32.0	9.99	1.02	1.63	1.61	1.27	0.79
1971	2	9SFERN\PHNH	6.6Mw	6.4	7.3	6.2	63.0	9.99	9.99	1.01	0.72	0.61	0.01

1971	2	9SFERN\PHNH	6.6Mw	6.4	7.3	6.2	63.0	9.99	9.99	1.02	0.71	0.52	0.02
1971	2	9SFERN\PUDH	6.6Mw	6.4	7.3	6.2	50.0	9.99	9.99	1.14	1.11	1.11	0.62
1971	2	9SFERN\PUDH	6.6Mw	6.4	7.3	6.2	50.0	9.99	9.99	1.04	1.05	0.89	0.69
1971	2	9SFERN\WRPH	6.6Mw	6.4	7.3	6.2	81.0	0.32	0.63	0.41	0.18	0.26	0.21
1971	2	9SFERN\WRPH	6.6Mw	6.4	7.3	6.2	81.0	-0.45	0.27	0.59	0.49	0.45	0.45
1971	2	9SFERN\WNDH	6.6Mw	6.4	7.3	6.2	45.0	1.18	0.93	0.99	1.06	1.28	0.74
1971	2	9SFERN\WNDH	6.6Mw	6.4	7.3	6.2	45.0	0.34	1.13	0.91	1.25	1.30	1.00
1974	11	28HOLLISTR\H	5.2Mw	5.5	5.9	6.0	11.0	9.99	0.91	0.52	1.38	0.75	0.57
1974	11	28HOLLISTR\H	5.2Mw	5.5	5.9	6.0	11.0	9.99	1.12	0.93	1.62	1.33	9.99
1974	11	28HOLLISTR\H	5.2Mw	5.5	5.9	6.0	11.0	9.99	9.99	0.63	1.04	0.76	0.80
1974	11	28HOLLISTR\H	5.2Mw	5.5	5.9	6.0	11.0	9.99	0.86	1.18	1.09	1.14	0.61
1975	6	7NCALIF\D-H	5.2Mw	6.1	6.8	6.0	23.0	9.99	0.90	1.02	1.28	1.40	0.87
1975	6	7NCALIF\D-H	5.2Mw	6.1	6.8	6.0	23.0	9.99	-0.17	0.72	0.88	0.61	0.29
1975	6	7NCALIF\D-H	5.2Mw	6.1	6.8	6.0	30.0	9.99	9.99	1.03	1.77	1.13	1.02
1975	6	7NCALIF\D-H	5.2Mw	6.1	6.8	6.0	30.0	9.99	0.01	0.96	1.39	1.08	1.10
1975	8	2OROVILLE\H	4.4Mw	5.1	5.2	6.0	15.0	9.99	0.87	0.43	0.28	0.37	0.10
1975	8	2OROVILLE\H	4.4Mw	5.1	5.2	6.0	15.0	9.99	9.99	0.02	0.12	0.30	0.30
1975	8	2OROVILLE\H	4.4Mw	5.1	5.2	6.0	12.0	9.99	0.75	0.41	0.61	0.86	0.52
1975	8	2OROVILLE\H	4.4Mw	5.1	5.2	6.0	12.0	9.99	0.73	0.91	0.52	0.75	0.58
1975	8	8OROVILLE\H	4.7Mw	5.2	5.7	6.0	10.0	9.99	9.99	0.71	1.10	0.76	0.64
1975	8	8OROVILLE\H	4.7Mw	5.2	5.7	6.0	10.0	9.99	9.99	0.76	0.91	1.08	0.60
1975	8	8OROVILLE\H	4.7Mw	5.2	5.7	6.0	11.0	9.99	9.99	0.66	0.75	0.55	0.55
1975	8	8OROVILLE\H	4.7Mw	5.2	5.7	6.0	11.0	9.99	9.99	0.59	0.53	0.54	0.47
1975	8	8OROVILLE\H	4.7Mw	5.2	5.7	6.0	12.0	9.99	9.99	-0.18	0.36	0.32	0.53
1975	8	8OROVILLE\H	4.7Mw	5.2	5.7	6.0	12.0	9.99	0.25	0.55	0.91	0.76	0.65
1975	8	8OROVILLE\H	4.7Mw	5.2	5.7	6.0	12.0	9.99	9.99	0.83	0.90	0.71	0.44
1975	8	8OROVILLE\H	4.7Mw	5.2	5.7	6.0	13.0	9.99	9.99	0.68	0.02	1.00	0.96
1975	8	8OROVILLE\H	4.7Mw	5.2	5.7	6.0	13.0	9.99	0.41	0.97	0.30	0.78	0.60
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	8.0	9.99	1.37	1.19	1.17	1.52	0.97
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	8.0	9.99	1.71	1.85	1.52	1.21	1.09
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	6.0	9.99	1.32	1.82	1.49	1.12	1.19

1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	6.0	0.89	1.59	1.84	1.49	1.00	1.15
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	4.0	9.99	1.52	1.91	1.70	1.43	0.82
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	4.0	0.96	1.47	1.87	1.61	1.23	0.91
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	31.0	9.99	0.01	0.95	0.89	0.69	-0.24
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	31.0	9.99	0.52	1.00	1.06	0.69	-0.31
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	15.0	9.99	0.49	0.93	1.47	1.31	0.65
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	15.0	9.99	0.66	1.14	1.14	1.10	0.61
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	17.0	9.99	9.99	1.05	1.12	1.20	0.35
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	17.0	9.99	0.69	1.25	1.67	0.67	0.56
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	17.0	9.99	0.28	0.99	1.02	1.10	0.50
1979	8	6COYOTELK\H	5.7Mw	5.8	6.1	5.9	17.0	9.99	0.78	1.23	1.58	0.66	0.55
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	9.0	1.18	2.15	1.74	1.68	1.42	1.51
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	9.0	0.94	1.45	1.75	1.63	1.49	1.48
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	13.0	1.23	1.98	1.75	1.67	1.18	1.28
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	13.0	1.41	2.07	1.90	1.34	1.06	1.28
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	3.0	1.51	1.94	2.21	2.25	1.76	1.63
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	3.0	1.53	1.83	2.13	2.16	1.97	1.57
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	9.0	1.92	1.58	1.34	1.20	1.32	1.00
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	9.0	1.66	1.74	1.62	1.37	1.28	0.85
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	11.0	1.36	1.45	1.57	1.90	1.53	1.09
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	11.0	9.99	1.67	1.43	1.48	1.38	1.25
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	24.0	1.53	1.18	1.23	1.23	1.18	0.56
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	24.0	1.43	1.08	1.26	1.09	1.09	0.60
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	29.0	1.24	1.60	1.58	1.74	1.50	1.09
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	29.0	1.29	1.79	1.96	1.79	1.46	1.13
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	49.0	9.99	1.37	1.48	1.42	1.01	-0.05
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	49.0	9.99	1.31	1.39	1.47	0.56	-0.01
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	32.0	9.99	1.07	1.38	1.53	1.31	1.15
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	32.0	9.99	0.93	0.96	1.34	1.19	0.92
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	23.0	1.30	1.79	1.78	1.67	1.67	1.36
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	44.0	1.07	1.37	1.71	1.84	1.38	1.49

1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	44.0	1.29	1.67	1.92	1.73	1.41	1.58
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	8.0	1.62	1.63	1.85	1.71	1.35	1.00
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	8.0	1.88	1.92	1.66	1.36	1.30	0.95
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	1.0	1.76	1.95	1.98	1.63	1.30	0.69
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	1.0	2.01	2.32	1.89	1.58	0.94	0.68
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	15.0	1.42	1.48	1.27	1.24	1.10	1.25
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	15.0	1.28	1.38	0.63	0.95	1.07	1.09
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	10.0	1.57	1.88	1.64	1.81	1.69	1.43
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	9.0	1.71	1.93	1.69	1.65	1.67	1.28
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	9.0	1.89	1.29	1.49	1.44	1.56	1.28
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	4.0	1.49	2.06	2.19	1.77	1.51	1.23
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	4.0	2.27	1.72	1.71	1.68	1.37	1.00
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	1.0	1.38	1.68	1.89	1.93	1.63	1.27
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	1.0	2.30	1.76	1.97	1.94	1.44	1.11
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	1.0	1.93	2.06	2.12	1.68	1.55	1.10
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	1.0	2.34	1.89	1.86	1.80	1.76	1.20
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	1.0	1.77	1.57	2.08	1.54	1.47	0.79
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	1.0	2.22	2.06	2.24	1.87	1.22	0.83
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	4.0	1.77	1.99	1.72	1.78	1.68	1.62
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	4.0	2.14	1.61	1.82	1.78	1.67	1.52
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	9.0	1.83	1.81	1.42	1.78	1.24	1.09
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	9.0	1.21	1.97	1.53	1.61	1.61	0.94
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	13.0	9.99	1.98	1.62	1.83	1.90	1.24
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	13.0	1.64	1.65	1.61	1.85	1.91	1.08
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	18.0	1.26	1.50	1.12	1.48	1.28	0.92
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	18.0	1.28	1.50	1.38	1.43	1.28	1.08
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	22.0	9.99	1.45	1.29	1.46	1.44	1.05
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	22.0	9.99	1.10	0.91	1.46	1.48	1.03
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	5.0	2.02	1.86	1.64	1.74	1.71	1.38
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	5.0	1.71	1.89	1.83	2.03	1.67	1.38
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	8.0	2.05	1.07	1.68	1.66	1.52	1.16

1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	8.0	1.86	1.67	1.47	1.54	1.61	1.10
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	36.0	1.14	0.88	1.26	1.56	1.08	0.63
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	36.0	0.66	1.00	1.12	1.18	1.25	0.62
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	14.0	1.68	1.47	1.34	1.35	1.34	0.79
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	14.0	1.47	1.36	1.33	1.60	1.14	0.72
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	32.0	0.48	0.77	0.45	0.85	0.89	0.45
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	32.0	0.79	0.89	1.18	0.97	1.17	0.68
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	11.0	9.99	1.60	1.80	1.60	1.70	1.28
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	11.0	9.99	1.68	1.80	1.95	1.81	1.39
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	54.0	0.74	1.09	1.14	1.01	1.41	0.98
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	54.0	9.99	1.02	0.98	1.34	1.35	0.94
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	15.0	1.90	1.33	1.20	1.19	0.88	0.64
1979	10	15IMPVALL\HH	6.5Mw	6.4	6.8	6.3	15.0	1.49	1.55	1.28	1.19	0.92	0.68
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	15.0	9.99	9.99	0.76	1.05	0.77	0.61
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	15.0	9.99	0.99	1.31	0.64	0.92	0.28
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	27.0	9.99	9.99	0.55	0.45	0.36	0.22
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	15.0	9.99	9.99	1.16	1.35	0.49	0.25
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	15.0	9.99	0.61	1.03	0.88	0.60	0.37
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	52.0	9.99	9.99	0.67	0.61	0.85	0.83
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	52.0	9.99	0.56	1.16	0.72	0.92	1.02
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	26.0	9.99	9.99	0.88	1.13	0.26	-0.03
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	26.0	9.99	9.99	0.31	0.34	0.22	0.35
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	20.0	9.99	9.99	1.21	1.45	0.60	0.69
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	18.0	9.99	9.99	1.28	1.38	0.90	0.47
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	18.0	9.99	9.99	0.72	1.07	0.76	0.45
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	14.0	9.99	9.99	0.95	1.33	1.24	0.75
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	14.0	9.99	9.99	1.06	1.45	1.18	0.73
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	14.0	9.99	9.99	0.96	1.45	1.36	0.95
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	14.0	9.99	9.99	1.26	1.49	1.14	1.04
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	13.0	9.99	9.99	1.33	1.55	1.03	0.77
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	13.0	9.99	1.10	1.62	1.66	1.54	0.54

1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	13.0	9.99	9.99	0.98	1.15	1.28	0.83
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	13.0	9.99	1.00	1.17	1.37	1.43	0.79
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	13.0	9.99	9.99	0.83	1.08	0.93	0.96
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	13.0	9.99	9.99	1.11	1.44	1.01	0.74
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	15.0	9.99	9.99	0.78	0.65	0.47	0.39
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	17.0	9.99	9.99	1.21	0.81	0.97	0.51
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	17.0	9.99	9.99	1.08	1.58	0.90	0.51
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	13.0	9.99	9.99	1.21	1.38	1.24	1.12
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	13.0	9.99	9.99	0.69	1.22	1.12	0.97
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	12.0	9.99	9.99	0.95	1.20	1.24	0.72
1979	10	15IMPVALL\AH	5.2Mw	6.0	6.3	6.5	12.0	9.99	9.99	1.55	1.54	0.69	0.75
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	20.0	9.99	0.78	1.24	1.12	0.67	-0.19
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	20.0	9.99	0.93	0.81	0.86	0.43	-0.11
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	37.0	0.58	1.14	1.13	1.08	0.73	-0.31
1980	1	24LIVERMOR\H	5.8Mw	6.1	6.4	6.0	37.0	0.04	0.72	1.33	1.21	0.71	0.00
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	31.0	9.99	0.54	1.04	0.87	1.00	-0.30
1980	1	27LIVERMOR\H	5.4Mw	5.8	6.1	5.8	31.0	9.99	0.67	0.74	0.74	0.70	-0.05
1980	2	25ANZA\AZF2H	4.9Mw	5.4	6.1	5.7	12.0	9.99	0.46	0.70	0.72	0.56	0.72
1980	2	25ANZA\AZF3H	4.9Mw	5.4	6.1	5.7	12.0	9.99	9.99	0.26	0.61	0.86	0.41
1980	2	25ANZA\RDA0H	4.9Mw	5.4	6.1	5.7	19.0	9.99	9.99	0.78	1.23	1.00	0.58
1980	2	25ANZA\RDA1H	4.9Mw	5.4	6.1	5.7	19.0	9.99	9.99	0.54	1.47	0.91	0.22
1980	5	25MAMMOTH\IH	6.3Mw	6.2	7.0	6.0	9.0	1.11	1.81	1.63	1.71	1.97	1.38
1980	5	25MAMMOTH\IH	6.3Mw	6.2	7.0	6.0	9.0	0.77	1.73	1.18	1.60	1.88	1.72
1980	5	25MAMMOTH\IH	6.3Mw	6.2	7.0	6.0	14.0	9.99	9.99	1.03	1.49	1.49	1.39
1980	5	25MAMMOTH\IH	6.3Mw	6.2	7.0	6.0	14.0	9.99	9.99	1.17	1.85	1.47	1.40
1980	5	25MAMMOTH\JH	5.7Mw	5.9	6.5	6.0	16.0	9.99	9.99	1.40	1.44	1.22	0.84
1980	5	25MAMMOTH\JH	5.7Mw	5.9	6.5	6.0	16.0	9.99	9.99	1.40	1.19	1.24	1.00
1980	5	25MAMMOTH\JH	5.7Mw	5.9	6.5	6.0	14.0	9.99	9.99	1.22	1.59	1.99	1.49
1980	5	25MAMMOTH\JH	5.7Mw	5.9	6.5	6.0	14.0	0.70	1.23	1.33	1.41	1.62	1.41
1980	5	25MAMMOTH\BH	5.7Mw	5.9	6.5	6.0	3.0	0.71	1.21	1.52	1.59	1.50	0.99
1980	5	25MAMMOTH\BH	5.7Mw	5.9	6.5	6.0	3.0	0.20	1.22	0.87	1.49	1.44	1.06

1980	5	25MAMMOTH\AH	6.0Mw	6.1	6.6	5.8	17.0	9.99	0.64	1.29	1.23	1.53	1.36
1980	5	25MAMMOTH\AH	6.0Mw	6.1	6.6	5.8	17.0	9.99	1.26	1.12	1.18	1.45	1.52
1980	5	27MAMMOTH\LH	6.0Mw	6.8	7.7	6.0	49.0	9.99	9.99	1.51	1.05	1.29	1.09
1980	5	27MAMMOTH\LH	6.0Mw	6.8	7.7	6.0	49.0	9.99	9.99	1.41	1.25	1.42	1.05
1980	5	27MAMMOTH\LH	6.0Mw	6.8	7.7	6.0	19.0	0.78	0.85	1.62	1.54	1.39	1.15
1980	5	27MAMMOTH\LH	6.0Mw	6.8	7.7	6.0	19.0	0.49	1.31	1.31	1.58	1.41	1.18
1980	5	27MAMMOTH\CH	4.9Mw	5.2	4.9	5.2	5.0	9.99	0.20	0.81	1.32	0.88	0.75
1980	5	27MAMMOTH\CH	4.9Mw	5.2	4.9	5.2	5.0	-0.04	0.44	1.29	0.85	0.52	0.43
1980	5	27MAMMOTH\CH	4.9Mw	5.2	4.9	5.2	5.0	9.99	0.44	1.25	1.49	1.12	0.21
1980	5	27MAMMOTH\CH	4.9Mw	5.2	4.9	5.2	5.0	9.99	0.49	1.15	1.42	0.87	0.32
1980	5	27MAMMOTH\CH	4.9Mw	5.2	4.9	5.2	4.0	9.99	9.99	0.82	0.63	0.47	0.25
1980	5	27MAMMOTH\CH	4.9Mw	5.2	4.9	5.2	4.0	9.99	9.99	0.52	0.46	0.40	0.20
1980	5	27MAMMOTH\CH	4.9Mw	5.2	4.9	5.2	10.0	9.99	9.99	1.19	0.81	0.60	0.01
1980	5	27MAMMOTH\CH	4.9Mw	5.2	4.9	5.2	10.0	9.99	-0.01	1.13	0.93	0.60	0.18
1980	5	27MAMMOTH\CH	4.9Mw	5.2	4.9	5.2	2.0	9.99	9.99	1.02	1.16	1.32	1.04
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	12.0	-0.12	-0.11	0.34	0.79	1.23	0.74
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	12.0	9.99	-0.14	0.65	1.13	1.12	0.74
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	8.0	9.99	9.99	1.00	1.42	1.48	1.27
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	8.0	9.99	0.66	1.41	1.11	1.30	0.81
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	9.0	9.99	9.99	0.54	0.78	0.46	0.06
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	9.0	9.99	9.99	0.19	0.76	0.35	-0.05
1980	5	31MAMMOTH\DH	4.9Mw	5.1	5.6	5.3	7.0	9.99	9.99	0.45	0.88	1.27	1.22
1980	6	11MAMMOTH\HH	5.0Mw	4.8	5.2	5.3	11.0	9.99	9.99	0.21	-0.13	0.19	0.62
1980	6	11MAMMOTH\HH	5.0Mw	4.8	5.2	5.3	12.0	9.99	9.99	0.54	0.40	0.35	0.12
1980	6	11MAMMOTH\HH	5.0Mw	4.8	5.2	5.3	12.0	9.99	0.19	0.30	0.48	0.47	0.35
1980	6	11MAMMOTH\HH	5.0Mw	4.8	5.2	5.3	13.0	9.99	9.99	-0.01	-0.17	0.37	0.78
1980	6	11MAMMOTH\HH	5.0Mw	4.8	5.2	5.3	13.0	9.99	9.99	0.33	0.03	0.47	0.88
1980	6	11MAMMOTH\HH	5.0Mw	4.8	5.2	5.3	14.0	9.99	9.99	0.00	-0.20	0.12	0.01
1980	6	11MAMMOTH\HH	5.0Mw	4.8	5.2	5.3	14.0	9.99	9.99	-0.05	-0.07	-0.19	-0.18
9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	22.0	0.72	1.39	1.46	1.42	1.38	1.12
9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	22.0	9.99	9.99	0.80	1.21	1.27	1.15

9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	19.0	9.99	0.72	0.96	1.14	1.18	0.86
9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	19.0	9.99	0.82	1.00	1.18	1.25	0.91
9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	24.0	0.94	1.36	1.32	1.49	1.52	0.81
9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	24.0	0.65	0.73	1.35	1.41	1.47	0.56
9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	10.0	1.22	1.59	1.50	1.33	1.54	1.29
9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	10.0	0.75	1.09	1.48	1.15	1.63	1.15
9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	13.0	1.11	1.92	2.09	1.83	1.65	1.38
9810	42	60WESTMORL\H	5.8Mw	6.4	6.9	6.1	13.0	1.50	1.79	1.95	1.73	1.81	1.47
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	26.0	9.99	1.45	1.85	1.85	1.52	0.45
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	26.0	9.99	1.18	1.79	1.99	1.58	0.76
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	42.0	9.99	1.26	1.32	1.45	0.61	0.11
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	42.0	9.99	1.61	1.47	1.48	0.74	0.07
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	43.0	9.99	1.52	1.34	1.67	1.17	0.38
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	43.0	9.99	1.49	1.54	1.46	1.22	0.23
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	44.0	9.99	1.19	1.43	1.58	1.09	0.17
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	44.0	9.99	1.17	1.46	1.54	0.94	0.27
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	46.0	9.99	0.61	1.24	1.14	0.70	0.38
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	46.0	9.99	1.16	1.38	1.30	0.85	0.28
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	45.0	9.99	1.12	1.37	1.71	0.99	0.15
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	45.0	9.99	1.03	1.39	1.86	1.22	0.30
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	47.0	9.99	1.17	1.17	1.77	1.24	0.51
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	47.0	9.99	0.78	1.49	1.63	0.93	0.34
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	49.0	9.99	9.99	1.40	1.81	0.93	0.38
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	49.0	9.99	1.10	1.37	1.49	1.02	0.26
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	51.0	9.99	0.90	1.35	1.39	0.62	0.30
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	51.0	9.99	9.99	1.21	1.70	0.63	0.28
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	55.0	9.99	0.93	1.16	0.94	0.78	0.13
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	55.0	9.99	1.04	1.33	0.93	0.76	0.14
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	41.0	9.99	1.57	1.65	1.47	1.03	0.33
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	41.0	9.99	1.81	1.55	1.62	1.08	0.28
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	38.0	9.99	1.66	1.16	1.34	1.11	0.30

1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	38.0	9.99	1.85	1.29	1.25	1.11	0.45
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	36.0	0.88	1.55	1.61	1.66	1.05	0.60
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	36.0	0.87	1.43	1.59	1.82	1.05	0.56
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	31.0	9.99	1.51	1.33	1.44	1.05	0.37
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	31.0	9.99	1.59	1.27	1.32	0.97	0.29
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.21	1.60	1.07	0.97	0.30
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.55	1.59	1.27	0.86	0.14
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.11	1.25	1.52	0.80	0.19
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.55	1.52	1.08	1.05	-0.02
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.58	2.13	1.84	1.18	0.41
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	0.68	1.51	2.05	1.65	1.18	0.35
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	28.0	9.99	1.10	1.73	1.69	1.54	0.69
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	28.0	9.99	1.28	1.42	1.57	1.41	0.73
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	47.0	9.99	1.41	1.55	1.36	0.64	-0.04
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	47.0	9.99	1.37	1.23	1.19	0.48	-0.14
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	32.0	9.99	0.87	1.14	1.57	0.81	0.37
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	32.0	9.99	1.04	1.11	1.55	0.92	0.40
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	1.24	1.20	1.44	1.07	0.19
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	0.98	1.06	1.26	1.02	0.36
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	48.0	9.99	1.18	1.12	1.08	0.91	0.39
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	48.0	9.99	0.28	1.25	1.01	0.89	0.47
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	27.0	9.99	1.67	1.73	1.70	1.11	0.52
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	27.0	9.99	1.60	1.74	1.61	1.12	0.67
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	9.99	1.66	1.07	0.98	0.29
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	30.0	9.99	9.99	1.64	1.42	1.21	0.21
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	31.0	9.99	1.34	1.18	1.13	1.10	0.44
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	31.0	9.99	1.33	0.96	1.37	1.20	0.46
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	41.0	9.99	1.44	1.54	1.20	0.76	0.74
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	41.0	9.99	1.17	1.18	1.29	0.97	0.51
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	9.0	9.99	1.66	1.69	2.00	1.57	0.59
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	9.0	9.99	1.04	1.64	1.60	1.53	0.67

1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	9.0	9.99	1.73	1.86	2.16	1.95	1.60
1983	5	2COALINGA\H	6.4Mw	7.1	7.4	6.3	9.0	9.99	1.52	1.90	1.79	1.73	1.57
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	20.0	9.99	0.41	0.71	0.93	0.68	0.06
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	20.0	9.99	-0.16	0.28	0.11	0.42	-0.07
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	18.0	9.99	9.99	0.62	1.25	0.61	0.56
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	18.0	9.99	-0.15	0.47	1.13	0.75	0.29
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	17.0	9.99	0.40	0.55	1.06	1.03	0.88
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	17.0	9.99	9.99	0.59	1.31	0.96	0.57
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	18.0	9.99	9.99	0.12	0.45	1.20	0.27
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	18.0	9.99	0.62	1.03	1.16	1.05	0.41
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	13.0	-0.39	0.39	0.93	1.04	0.82	0.79
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	14.0	9.99	0.88	1.21	1.23	0.82	0.38
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	14.0	9.99	9.99	0.73	1.27	1.37	0.25
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	14.0	-0.16	0.74	1.00	1.08	1.17	0.19
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	14.0	0.25	0.76	1.16	1.36	1.38	0.29
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	15.0	9.99	0.64	1.10	1.44	0.75	0.39
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	15.0	9.99	0.68	0.83	1.32	0.65	0.32
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	20.0	9.99	9.99	0.49	0.34	0.43	0.08
1983	5	9COALINGA\H	5.0Mw	5.4	6.1	5.6	20.0	9.99	-0.53	0.19	0.28	0.45	0.22
1983	6	11COALINGA\H	5.3Mw	5.6	5.6	5.9	10.0	0.60	1.06	1.33	0.97	1.40	0.36
1983	6	11COALINGA\H	5.3Mw	5.6	5.6	5.9	10.0	0.67	1.13	0.82	1.23	1.36	0.32
1983	6	11COALINGA\H	5.3Mw	5.6	5.6	5.9	10.0	1.04	1.02	0.78	0.97	0.86	0.39
1983	6	11COALINGA\H	5.3Mw	5.6	5.6	5.9	10.0	0.81	1.12	1.23	0.91	0.56	0.58
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	16.0	9.99	9.99	0.46	1.32	1.11	0.54
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	16.0	9.99	0.46	0.76	1.19	1.43	0.67
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	15.0	9.99	0.60	0.75	1.10	1.10	1.04
1983	7	9COALINGA\H	5.2Mw	5.4	6.3	5.5	15.0	9.99	0.29	0.48	0.64	1.13	1.31
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	10.0	9.99	1.01	1.30	1.71	1.37	0.97
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	10.0	9.99	9.99	1.41	1.63	1.83	0.89
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	10.0	9.99	1.15	1.23	1.69	1.61	1.39
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	10.0	9.99	1.32	1.21	1.65	1.62	1.69

1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	17.0	1.37	1.41	1.38	1.52	1.43	1.01
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	17.0	1.11	1.17	1.22	1.55	1.55	0.92
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	17.0	1.36	1.38	1.56	1.84	1.76	1.36
1983	7	22COALINGA\H	5.8Mw	6.2	6.7	5.9	17.0	0.88	1.09	1.03	1.26	1.30	1.39
1984	4	24MORGAN\AGH	6.2Mw	6.3	6.6	5.8	30.0	9.99	0.60	0.97	0.99	0.75	-0.12
1984	4	24MORGAN\AGH	6.2Mw	6.3	6.6	5.8	30.0	9.99	1.06	1.07	0.79	0.67	-0.09
1984	4	24MORGAN\ANH	6.2Mw	6.3	6.6	5.8	3.0	0.69	0.99	1.60	1.93	1.25	1.11
1984	4	24MORGAN\ANH	6.2Mw	6.3	6.6	5.8	3.0	1.10	1.50	1.88	2.01	1.49	1.13
1984	4	24MORGAN\A1H	6.2Mw	6.3	6.6	5.8	51.0	9.99	0.36	0.61	0.81	0.73	0.01
1984	4	24MORGAN\A1H	6.2Mw	6.3	6.6	5.8	51.0	9.99	0.48	0.88	0.73	0.61	0.05
1984	4	24MORGAN\G0H	6.2Mw	6.3	6.6	5.8	15.0	9.99	0.90	0.90	1.17	1.35	0.86
1984	4	24MORGAN\G0H	6.2Mw	6.3	6.6	5.8	15.0	0.78	1.06	1.04	1.15	1.27	0.87
1984	4	24MORGAN\G0H	6.2Mw	6.3	6.6	5.8	14.0	1.06	0.83	1.24	1.20	1.35	0.77
1984	4	24MORGAN\G0H	6.2Mw	6.3	6.6	5.8	14.0	0.42	1.11	1.38	1.44	1.20	1.07
1984	4	24MORGAN\G0H	6.2Mw	6.3	6.6	5.8	13.0	1.20	0.79	1.50	1.49	1.60	0.91
1984	4	24MORGAN\G0H	6.2Mw	6.3	6.6	5.8	13.0	0.78	1.07	1.36	1.77	1.61	1.10
1984	4	24MORGAN\HVH	6.2Mw	6.3	6.6	5.8	3.0	9.99	0.90	1.58	1.68	1.25	0.74
1984	4	24MORGAN\HVH	6.2Mw	6.3	6.6	5.8	3.0	9.99	1.39	2.02	1.78	1.38	0.94
1984	4	24MORGAN\HCH	6.2Mw	6.3	6.6	5.8	32.0	9.99	1.26	1.17	1.29	0.95	-0.02
1984	4	24MORGAN\HCH	6.2Mw	6.3	6.6	5.8	32.0	9.99	1.29	1.63	1.14	1.00	0.16
1984	4	24MORGAN\HCH	6.2Mw	6.3	6.6	5.8	28.0	9.99	0.77	1.39	1.27	1.10	0.24
1984	4	24MORGAN\HDH	6.2Mw	6.3	6.6	5.8	28.0	9.99	1.08	1.09	1.29	1.10	0.24
1984	4	24MORGAN\HDH	6.2Mw	6.3	6.6	5.8	28.0	9.99	0.96	1.47	1.25	1.07	0.40
1984	4	24MORGAN\HDH	6.2Mw	6.3	6.6	5.8	28.0	9.99	1.06	1.38	1.09	0.97	0.37
1984	4	24MORGAN\HDH	6.2Mw	6.3	6.6	5.8	28.0	9.99	1.03	1.28	1.25	1.15	0.19
1984	4	24MORGAN\HDH	6.2Mw	6.3	6.6	5.8	28.0	0.56	0.83	1.38	1.21	1.05	0.28
1984	4	24MORGAN\HDH	6.2Mw	6.3	6.6	5.8	28.0	9.99	1.06	1.38	1.09	0.97	0.37
1984	4	24MORGAN\HDH	6.2Mw	6.3	6.6	5.8	28.0	0.63	0.90	1.52	1.41	1.14	0.38
1984	4	24MORGAN\HDH	6.2Mw	6.3	6.6	5.8	28.0	9.99	1.02	1.44	1.22	1.05	0.38
1984	4	24MORGAN\HDH	6.2Mw	6.3	6.6	5.8	28.0	9.99	0.90	1.48	1.22	1.06	0.26
1984	4	24MORGAN\HDH	6.2Mw	6.3	6.6	5.8	28.0	9.99	1.04	1.25	1.33	1.10	0.39
1984	4	24MORGAN\LBH	6.2Mw	6.3	6.6	5.8	65.0	9.99	9.99	1.11	1.09	0.39	-0.48

1984	4	24MORGAN\LBH	6.2Mw	6.3	6.6	5.8	65.0	9.99	9.99	1.14	1.17	0.50	-0.59
1984	4	24MORGAN\SJH	6.2Mw	6.3	6.6	5.8	30.0	0.57	0.78	1.02	0.93	0.80	-0.01
1984	4	24MORGAN\SJH	6.2Mw	6.3	6.6	5.8	30.0	0.40	0.89	1.17	0.97	0.54	0.09
1984	4	24MORGAN\SJH	6.2Mw	6.3	6.6	5.8	35.0	9.99	0.82	1.26	1.58	1.21	0.25
1984	4	24MORGAN\SJH	6.2Mw	6.3	6.6	5.8	35.0	9.99	0.39	0.97	1.35	1.13	0.55
1984	4	24MORGAN\SJH	6.2Mw	6.3	6.6	5.8	35.0	9.99	0.95	1.22	0.97	1.16	0.38
1984	4	24MORGAN\SJH	6.2Mw	6.3	6.6	5.8	35.0	9.99	0.96	1.30	1.15	1.08	0.47
1984	4	24MORGAN\WVH	6.2Mw	6.3	6.6	5.8	29.0	9.99	9.99	0.85	1.23	1.00	0.54
1984	4	24MORGAN\WNH	6.2Mw	6.3	6.6	5.8	29.0	9.99	0.77	0.85	0.94	0.92	0.30
1984	4	24MORGAN\WSH	6.2Mw	6.3	6.6	5.8	29.0	9.99	9.99	0.86	0.94	1.00	0.41
1984	4	24MORGAN\SFH	6.2Mw	6.3	6.6	5.8	71.0	9.99	9.99	0.41	0.96	0.87	0.08
1984	4	24MORGAN\SFH	6.2Mw	6.3	6.6	5.8	71.0	9.99	9.99	0.88	1.08	0.87	0.13
1986	1	26HOLLISTR\H	5.4Mw	6.1	6.2	5.7	17.0	0.23	0.90	1.00	1.24	1.26	0.69
1986	1	26HOLLISTR\H	5.4Mw	6.1	6.2	5.7	17.0	0.80	1.23	1.06	1.38	1.24	0.78
1986	1	26HOLLISTR\H	5.4Mw	6.1	6.2	5.7	17.0	9.99	0.72	1.02	1.40	1.10	0.73
1986	1	26HOLLISTR\H	5.4Mw	6.1	6.2	5.7	17.0	9.99	1.18	1.14	1.31	1.07	0.87
1986	1	26HOLLISTR\H	5.4Mw	6.1	6.2	5.7	17.0	-0.18	0.83	1.05	1.32	0.97	0.78
1986	7	8PALMSPR\AH	6.0Mw	6.3	7.3	6.0	47.0	9.99	9.99	0.87	0.75	1.14	0.88
1986	7	8PALMSPR\AH	6.0Mw	6.3	7.3	6.0	47.0	9.99	9.99	0.75	0.98	0.72	0.56
1986	7	8PALMSPR\CH	6.0Mw	6.3	7.3	6.0	16.0	0.38	1.09	1.16	1.00	1.32	1.22
1986	7	8PALMSPR\CH	6.0Mw	6.3	7.3	6.0	16.0	0.43	1.05	1.41	1.20	1.57	1.11
1986	7	8PALMSPR\CH	6.0Mw	6.3	7.3	6.0	58.0	9.99	0.94	0.76	1.03	0.55	0.13
1986	7	8PALMSPR\CH	6.0Mw	6.3	7.3	6.0	58.0	9.99	0.81	0.88	1.20	0.47	0.16
1986	7	8PALMSPR\DH	6.0Mw	6.3	7.3	6.0	8.0	9.99	9.99	1.71	1.79	1.77	1.38
1986	7	8PALMSPR\DH	6.0Mw	6.3	7.3	6.0	8.0	9.99	9.99	1.79	1.85	1.83	1.34
1986	7	8PALMSPR\FH	6.0Mw	6.3	7.3	6.0	16.0	9.99	0.79	1.27	0.96	0.83	1.03
1986	7	8PALMSPR\FH	6.0Mw	6.3	7.3	6.0	16.0	9.99	1.00	1.32	1.14	0.77	1.06
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	44.0	9.99	9.99	1.25	1.06	1.11	1.12
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	44.0	9.99	9.99	0.96	1.01	1.02	1.27
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	76.0	9.99	0.29	0.56	0.89	0.70	0.51
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	76.0	9.99	0.40	0.42	0.55	0.59	0.65

1986	7	8PALMSPR\IH	6.0Mw	6.3	7.3	6.0	46.0	9.99	9.99	1.39	1.09	0.76	0.55
1986	7	8PALMSPR\IH	6.0Mw	6.3	7.3	6.0	46.0	9.99	9.99	1.15	0.98	0.66	0.67
1986	7	8PALMSPR\IH	6.0Mw	6.3	7.3	6.0	40.0	0.40	1.07	1.10	0.94	0.69	0.83
1986	7	8PALMSPR\IH	6.0Mw	6.3	7.3	6.0	40.0	0.81	1.06	1.39	0.93	1.07	0.83
1986	7	8PALMSPR\JH	6.0Mw	6.3	7.3	6.0	30.0	9.99	9.99	1.15	0.95	0.91	0.46
1986	7	8PALMSPR\JH	6.0Mw	6.3	7.3	6.0	30.0	9.99	9.99	0.96	1.14	0.92	0.49
1986	7	8PALMSPR\LH	6.0Mw	6.3	7.3	6.0	38.0	9.99	9.99	0.84	1.11	0.87	0.84
1986	7	8PALMSPR\LH	6.0Mw	6.3	7.3	6.0	38.0	9.99	9.99	0.52	0.97	0.90	0.90
1986	7	8PALMSPR\MH	6.0Mw	6.3	7.3	6.0	10.0	1.17	2.05	1.72	1.63	1.25	0.84
1986	7	8PALMSPR\MH	6.0Mw	6.3	7.3	6.0	10.0	1.29	2.32	1.69	1.58	1.12	0.81
1986	7	8PALMSPR\NH	6.0Mw	6.3	7.3	6.0	8.0	1.35	2.06	2.06	1.51	1.82	1.49
1986	7	8PALMSPR\NH	6.0Mw	6.3	7.3	6.0	8.0	9.99	1.48	1.73	1.75	1.70	1.56
1986	7	8PALMSPR\PH	6.0Mw	6.3	7.3	6.0	17.0	9.99	1.43	1.62	1.29	1.47	0.92
1986	7	8PALMSPR\PH	6.0Mw	6.3	7.3	6.0	17.0	9.99	1.29	1.50	1.27	1.10	1.26
1986	7	8PALMSPR\RH	6.0Mw	6.3	7.3	6.0	83.0	9.99	0.32	0.35	0.16	0.43	0.30
1986	7	8PALMSPR\RH	6.0Mw	6.3	7.3	6.0	83.0	9.99	0.04	0.28	0.11	0.18	0.33
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	32.0	9.99	9.99	1.08	1.51	1.62	0.88
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	32.0	9.99	9.99	1.34	1.05	1.53	0.97
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	40.0	9.99	0.93	0.89	1.07	0.92	0.77
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	40.0	9.99	0.93	0.82	1.01	0.88	0.59
1986	7	8PALMSPR\SH	6.0Mw	6.3	7.3	6.0	45.0	9.99	0.68	0.56	1.10	0.98	0.68
1986	7	8PALMSPR\SH	6.0Mw	6.3	7.3	6.0	45.0	9.99	0.30	0.62	1.19	1.14	0.87
1986	7	8PALMSPR\WH	6.0Mw	6.3	7.3	6.0	7.0	1.04	1.62	1.84	1.87	1.94	1.16
1986	7	8PALMSPR\WH	6.0Mw	6.3	7.3	6.0	7.0	0.73	1.20	1.85	1.82	1.86	1.35
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	47.0	9.99	9.99	1.17	0.99	1.18	0.76
1986	7	8PALMSPR\HH	6.0Mw	6.3	7.3	6.0	47.0	9.99	9.99	1.05	1.23	1.11	0.64
1986	7	20CHALFANT\H	5.9Mw	5.9	6.3	5.9	27.0	9.99	0.40	0.78	1.16	0.93	0.71
1986	7	20CHALFANT\H	5.9Mw	5.9	6.3	5.9	27.0	9.99	-0.14	0.69	0.92	0.99	0.62
1986	7	20CHALFANT\H	5.9Mw	5.9	6.3	5.9	24.0	0.44	1.03	1.33	1.15	0.95	0.43
1986	7	20CHALFANT\H	5.9Mw	5.9	6.3	5.9	24.0	0.86	1.05	1.30	1.23	1.08	0.26
1986	7	20CHALFANT\H	5.9Mw	5.9	6.3	5.9	11.0	0.77	1.29	1.38	1.69	1.29	1.33

1986	7	20CHALFANT\H	5.9Mw	5.9	6.3	5.9	11.0	1.19	1.29	1.31	1.96	1.30	1.11
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	37.0	0.93	1.65	1.53	1.45	1.45	1.03
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	37.0	9.99	0.83	1.75	1.39	1.25	1.00
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	9.0	1.59	1.07	1.64	1.37	1.54	0.83
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	9.0	0.96	1.29	1.59	1.47	1.13	0.68
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	45.0	-0.37	0.82	0.78	1.11	0.69	0.64
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	45.0	9.99	0.99	1.06	1.04	0.97	0.55
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	36.0	0.16	0.32	0.09	0.77	1.16	0.82
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	36.0	-0.08	0.54	0.19	0.87	1.06	0.83
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	19.0	0.93	1.89	1.74	1.96	1.85	1.36
1986	7	21CHALFANT\H	6.2Mw	6.3	7.1	6.0	19.0	1.56	1.54	2.21	1.90	1.61	1.14
1986	7	21CHALFANT\H	5.6Mw	5.5	6.0	6.2	14.0	9.99	0.22	0.79	0.89	1.44	0.56
1986	7	21CHALFANT\H	5.6Mw	5.5	6.0	6.2	14.0	9.99	0.69	0.91	1.07	1.11	0.55
1986	7	21CHALFANT\H	5.6Mw	5.5	6.0	6.2	20.0	-0.10	0.73	0.94	1.04	1.16	1.06
1986	7	21CHALFANT\H	5.6Mw	5.5	6.0	6.2	20.0	9.99	0.48	0.72	1.18	0.93	0.92
1986	7	31CHALFANT\H	5.8Mw	5.9	6.3	5.7	13.0	0.78	1.07	1.20	1.17	1.17	0.93
1986	7	31CHALFANT\H	5.8Mw	5.9	6.3	5.7	13.0	0.29	1.06	1.33	1.58	1.31	0.76
1986	7	31CHALFANT\H	5.8Mw	5.9	6.3	5.7	21.0	-0.05	0.57	1.12	1.01	0.55	0.73
1986	7	31CHALFANT\H	5.8Mw	5.9	6.3	5.7	21.0	-0.06	0.80	0.90	1.37	0.85	0.96
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	13.0	9.99	9.99	1.90	1.69	1.72	1.18
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	13.0	9.99	1.36	1.67	1.55	1.61	1.43
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	17.0	9.99	1.04	1.50	1.57	1.42	1.20
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	17.0	9.99	0.69	0.88	0.95	1.24	1.08
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	39.0	9.99	0.16	0.84	1.30	1.07	0.70
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	39.0	9.99	9.99	0.98	1.32	1.11	0.78
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	23.0	9.99	9.99	0.88	1.14	1.49	0.92
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	23.0	9.99	9.99	0.72	1.30	1.72	0.98
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	18.0	9.99	1.22	1.89	1.59	1.16	1.08
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	18.0	9.99	0.41	1.65	1.28	1.11	1.08
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	39.0	9.99	9.99	0.56	1.22	1.04	0.43
1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	43.0	9.99	-0.06	0.31	0.74	0.79	0.62

1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	43.0	9.99	0.32	0.40	0.67	0.78	0.66
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	25.0	9.99	9.99	0.91	1.37	1.27	1.39
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	25.0	9.99	0.41	1.68	1.24	1.16	1.14
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	22.0	9.99	0.25	1.68	1.00	1.52	1.32
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	22.0	9.99	0.51	1.52	1.44	1.49	1.40
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	27.0	9.99	1.01	0.99	1.46	1.09	0.96
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	27.0	9.99	0.65	1.16	1.28	1.41	0.83
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	32.0	9.99	9.99	0.96	1.07	0.90	0.82
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	32.0	9.99	0.67	1.24	1.12	1.36	0.91
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	32.0	9.99	0.49	0.97	1.17	0.75	0.58
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	32.0	9.99	0.76	1.26	0.89	1.06	0.41
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	25.0	9.99	0.80	1.04	1.27	1.42	1.34
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	25.0	9.99	0.40	1.04	1.26	0.89	0.98
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	14.0	9.99	1.28	1.70	1.74	1.68	1.40
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	14.0	9.99	1.22	1.72	1.75	1.70	1.36
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	74.0	9.99	9.99	0.97	0.64	0.67	0.26
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	69.0	9.99	9.99	0.67	1.13	1.01	0.63
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	69.0	9.99	9.99	0.04	0.96	0.97	0.61
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	34.0	9.99	9.99	1.07	0.97	0.71	0.56
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	34.0	9.99	-0.19	0.72	0.73	0.66	0.51
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	26.0	9.99	1.01	1.77	1.57	1.22	0.79
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	26.0	9.99	9.99	1.63	1.37	1.39	0.84
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	30.0	9.99	0.19	0.81	0.84	0.92	0.73
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	30.0	9.99	0.77	0.82	1.00	0.95	0.66
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	62.0	9.99	9.99	0.48	0.68	1.02	0.42
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	62.0	9.99	9.99	0.84	0.74	0.82	0.41
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	65.0	9.99	9.99	0.41	0.97	0.64	0.77
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	27.0	9.99	9.99	0.55	0.56	0.49	0.16
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	27.0	9.99	9.99	0.90	0.75	0.57	-0.08
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	55.0	9.99	9.99	0.72	0.82	0.96	0.29
1987 10	1WHITTTIER\H	6.0Mw	6.3	7.1	5.9	55.0	9.99	9.99	0.92	0.82	0.86	0.42

1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	17.0	0.14	0.80	1.35	1.33	0.96	0.85
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	17.0	0.94	1.36	1.68	1.53	1.28	1.09
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.46	1.58	1.45	1.31	0.86
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.14	1.42	1.46	1.42	0.91
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.15	1.34	1.47	1.22	0.93
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	0.76	1.32	1.22	1.23	0.76
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.09	1.27	1.59	1.34	0.82
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.40	1.50	1.72	1.27	0.87
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	0.85	1.35	1.44	1.42	1.01
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.21	1.51	1.59	1.62	1.32
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	0.76	1.42	1.06	1.52	1.11
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.21	1.44	1.63	1.54	1.27
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	0.72	1.01	1.31	1.06	1.16
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.20	1.37	1.61	1.37	0.64
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	17.0	9.99	1.07	0.84	1.39	0.91	0.71
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	17.0	9.99	9.99	0.41	1.27	1.02	0.71
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.13	1.05	1.46	1.60	1.49
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.37	1.48	1.85	1.57	1.48
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.19	1.28	1.51	1.19	1.09
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.43	1.46	1.70	1.26	1.02
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	29.0	9.99	9.99	0.66	0.79	0.78	0.75
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	29.0	9.99	9.99	0.14	1.08	0.60	0.64
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	45.0	9.99	9.99	0.54	0.59	0.82	0.80
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	45.0	9.99	9.99	0.58	0.76	0.80	0.73
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	85.0	9.99	0.53	0.99	1.31	0.76	0.46
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	85.0	9.99	9.99	0.68	0.90	1.04	0.40
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	0.85	0.95	0.82	1.10	0.93
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	15.0	9.99	1.30	1.76	1.31	1.11	1.27
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	48.0	9.99	0.87	0.64	1.01	0.99	0.66
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	48.0	9.99	0.87	1.08	1.22	1.07	0.66
1987 10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	12.0	9.99	1.22	1.20	1.74	1.40	1.30

1987	10	1WHITTIER\H	6.0Mw	6.3	7.1	5.9	12.0	9.99	1.19	0.94	1.52	1.31	1.39
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	13.0	9.99	9.99	1.24	0.97	1.49	1.06
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	13.0	9.99	9.99	1.15	1.37	1.22	0.85
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	16.0	9.99	9.99	1.22	1.11	1.32	0.98
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	16.0	9.99	0.72	1.08	1.17	0.70	0.81
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	20.0	9.99	0.54	1.11	0.96	0.56	0.58
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	20.0	9.99	9.99	0.76	0.81	0.82	0.64
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	28.0	9.99	0.82	1.15	1.35	0.96	0.91
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	28.0	9.99	0.49	1.26	1.13	0.75	0.79
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	25.0	9.99	0.66	1.23	1.44	0.85	0.68
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	25.0	-0.35	0.81	1.21	1.09	1.15	0.73
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	28.0	9.99	0.92	0.99	1.14	0.78	0.61
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	28.0	9.99	0.73	1.22	1.46	0.92	0.35
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	25.0	9.99	9.99	0.79	0.96	0.83	0.43
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	25.0	9.99	9.99	1.06	1.07	0.72	0.63
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	15.0	9.99	9.99	1.20	1.04	1.69	1.09
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	15.0	9.99	1.29	1.57	1.26	1.56	1.20
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	13.0	9.99	9.99	1.26	0.81	1.07	0.69
1987	10	4WHITTIER\H	5.3Mw	6.1	6.5	5.7	13.0	9.99	0.92	1.34	0.69	1.28	0.87
1987	11	24SUPERST\BH	6.7Mw	7.0	7.3	6.4	14.0	1.41	1.87	1.91	1.59	1.56	1.07
1987	11	24SUPERST\BH	6.7Mw	7.0	7.3	6.4	14.0	1.45	2.05	1.29	1.70	1.51	1.12
1987	11	24SUPERST\BH	6.7Mw	7.0	7.3	6.4	13.0	1.64	1.75	1.72	1.69	1.52	1.27
1987	11	24SUPERST\BH	6.7Mw	7.0	7.3	6.4	13.0	1.60	1.63	2.00	1.75	1.42	1.36
1987	11	24SUPERST\BH	6.7Mw	7.0	7.3	6.4	25.0	1.07	1.39	1.52	1.55	1.35	1.36
1987	11	24SUPERST\BH	6.7Mw	7.0	7.3	6.4	25.0	1.17	1.75	1.91	1.54	1.35	1.28
1989	10	18LOMAP\AGWH	6.9Mw	7.4	7.7	6.4	28.0	9.99	1.32	1.54	1.42	1.31	0.80
1989	10	18LOMAP\AGWH	6.9Mw	7.4	7.7	6.4	28.0	9.99	1.53	1.60	1.42	1.40	1.00
1989	10	18LOMAP\ANDH	6.9Mw	7.4	7.7	6.4	21.0	9.99	1.80	1.64	1.78	1.70	1.16
1989	10	18LOMAP\ANDH	6.9Mw	7.4	7.7	6.4	21.0	9.99	1.60	1.38	1.65	1.47	1.15
1989	10	18LOMAP\A02H	6.9Mw	7.4	7.7	6.4	48.0	1.46	1.61	1.90	1.40	0.89	0.16
1989	10	18LOMAP\A02H	6.9Mw	7.4	7.7	6.4	48.0	0.81	1.24	1.80	1.28	0.95	0.18

1989	10	18LOMAP\A2EH	6.9Mw	7.4	7.7	6.4	58.0	9.99	1.11	1.70	1.42	1.32	0.87
1989	10	18LOMAP\A2EH	6.9Mw	7.4	7.7	6.4	58.0	9.99	1.64	1.31	1.33	1.38	0.81
1989	10	18LOMAP\CLDH	6.9Mw	7.4	7.7	6.4	22.0	1.23	1.22	1.56	1.33	1.53	0.90
1989	10	18LOMAP\CLDH	6.9Mw	7.4	7.7	6.4	22.0	1.35	1.63	1.65	1.72	1.47	0.85
1989	10	18LOMAP\GOFH	6.9Mw	7.4	7.7	6.4	13.0	9.99	1.90	1.51	1.95	1.12	0.94
1989	10	18LOMAP\GOFH	6.9Mw	7.4	7.7	6.4	13.0	9.99	1.46	1.72	1.69	1.29	0.79
1989	10	18LOMAP\G02H	6.9Mw	7.4	7.7	6.4	13.0	9.99	1.70	1.66	1.94	1.53	0.92
1989	10	18LOMAP\G02H	6.9Mw	7.4	7.7	6.4	13.0	9.99	2.04	1.58	1.62	1.54	1.18
1989	10	18LOMAP\G03H	6.9Mw	7.4	7.7	6.4	14.0	1.06	1.47	1.82	2.10	2.01	1.39
1989	10	18LOMAP\G03H	6.9Mw	7.4	7.7	6.4	14.0	1.41	2.06	1.58	1.59	1.80	1.27
1989	10	18LOMAP\G04H	6.9Mw	7.4	7.7	6.4	16.0	9.99	1.72	1.86	2.08	1.42	0.99
1989	10	18LOMAP\G04H	6.9Mw	7.4	7.7	6.4	16.0	9.99	1.56	1.76	1.78	1.40	0.86
1989	10	18LOMAP\HVRH	6.9Mw	7.4	7.7	6.4	32.0	9.99	1.34	1.79	1.41	0.90	0.59
1989	10	18LOMAP\HVRH	6.9Mw	7.4	7.7	6.4	32.0	9.99	1.49	1.66	1.52	1.03	0.57
1989	10	18LOMAP\HWBH	6.9Mw	7.4	7.7	6.4	59.0	9.99	0.85	1.94	1.38	1.49	1.13
1989	10	18LOMAP\HWBH	6.9Mw	7.4	7.7	6.4	59.0	9.99	1.06	1.55	1.50	1.56	1.00
1989	10	18LOMAP\HCAH	6.9Mw	7.4	7.7	6.4	28.0	1.40	1.97	2.05	1.61	1.16	0.51
1989	10	18LOMAP\HCAH	6.9Mw	7.4	7.7	6.4	28.0	1.60	2.18	2.07	1.52	1.04	0.49
1989	10	18LOMAP\HDAH	6.9Mw	7.4	7.7	6.4	26.0	1.32	2.03	1.87	1.66	1.42	0.77
1989	10	18LOMAP\HDAH	6.9Mw	7.4	7.7	6.4	26.0	1.08	1.77	2.15	1.77	1.32	0.80
1989	10	18LOMAP\HSPH	6.9Mw	7.4	7.7	6.4	29.0	1.63	2.31	2.23	1.76	1.34	0.73
1989	10	18LOMAP\HSPH	6.9Mw	7.4	7.7	6.4	29.0	1.74	1.74	1.82	1.58	1.44	0.66
1989	10	18LOMAP\TIBH	6.9Mw	7.4	7.7	6.4	78.0	9.99	1.33	1.76	1.35	1.31	0.42
1989	10	18LOMAP\TIBH	6.9Mw	7.4	7.7	6.4	78.0	9.99	1.76	1.80	1.64	1.40	0.50
1989	10	18LOMAP\PAEH	6.9Mw	7.4	7.7	6.4	36.0	9.99	1.57	1.72	1.57	1.39	0.51
1989	10	18LOMAP\PAEH	6.9Mw	7.4	7.7	6.4	36.0	9.99	1.30	1.88	1.83	1.43	0.59
1989	10	18LOMAP\RCHH	6.9Mw	7.4	7.7	6.4	93.0	9.99	1.10	1.93	1.05	0.86	0.57
1989	10	18LOMAP\RCHH	6.9Mw	7.4	7.7	6.4	93.0	9.99	1.10	1.68	1.00	0.82	0.60
1989	10	18LOMAP\SALH	6.9Mw	7.4	7.7	6.4	32.0	1.43	1.14	1.27	1.20	1.15	0.76
1989	10	18LOMAP\SALH	6.9Mw	7.4	7.7	6.4	32.0	1.40	1.47	1.35	1.38	1.40	0.66
1989	10	18LOMAP\STGH	6.9Mw	7.4	7.7	6.4	13.0	1.28	2.17	1.79	1.62	1.67	1.36

1989	10	18LOMAP\STGH	6.9Mw	7.4	7.7	6.4	13.0	1.90	1.82	1.67	1.84	1.72	1.24
1989	10	18LOMAP\WVCH	6.9Mw	7.4	7.7	6.4	14.0	1.07	2.12	1.85	1.64	1.24	0.98
1989	10	18LOMAP\WVCH	6.9Mw	7.4	7.7	6.4	14.0	2.07	1.85	1.92	1.61	1.52	1.01
1989	10	18LOMAP\SFOH	6.9Mw	7.4	7.7	6.4	65.0	9.99	1.67	1.88	1.92	1.38	0.72
1989	10	18LOMAP\SFOH	6.9Mw	7.4	7.7	6.4	65.0	9.99	1.54	1.93	1.86	1.26	0.60
1989	10	18LOMAP\SVLH	6.9Mw	7.4	7.7	6.4	29.0	1.62	1.57	1.65	1.49	1.37	0.98
1989	10	18LOMAP\SVLH	6.9Mw	7.4	7.7	6.4	29.0	1.50	1.60	1.67	1.53	1.41	0.78
1989	10	18LOMAP\TRIH	6.9Mw	7.4	7.7	6.4	83.0	0.95	1.71	1.64	1.03	0.52	0.21
1989	10	18LOMAP\TRIH	6.9Mw	7.4	7.7	6.4	83.0	1.24	1.97	1.52	1.19	0.70	0.29
1989	10	18LOMAP\WAHH	6.9Mw	7.4	7.7	6.4	17.0	1.01	1.20	2.15	1.79	1.88	1.87
1989	10	18LOMAP\WAHH	6.9Mw	7.4	7.7	6.4	17.0	1.23	1.47	2.14	1.99	2.03	1.96
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	45.0	9.99	1.79	1.31	1.43	1.24	0.51
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	45.0	9.99	1.75	1.39	1.38	1.14	0.59
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	23.0	1.54	1.66	1.58	1.44	1.09	0.68
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	23.0	1.69	1.47	1.67	1.47	1.25	0.64
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	10.0	1.30	1.63	2.13	1.99	1.77	1.43
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	10.0	1.81	2.07	2.40	2.05	1.57	1.43
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	19.0	1.35	1.52	1.86	1.69	1.79	1.21
1992	4	25CAPEMEND\H	7.1Mw	7.0	7.6	6.5	19.0	1.31	1.48	1.65	2.37	1.55	1.06
1992	6	28LANDERS\BH	7.3Mw	7.4	8.1	6.6	89.0	0.88	1.50	1.37	1.40	1.44	0.90
1992	6	28LANDERS\BH	7.3Mw	7.4	8.1	6.6	89.0	0.98	1.55	1.37	1.58	1.32	0.78
1992	6	28LANDERS\BH	7.3Mw	7.4	8.1	6.6	36.0	1.31	1.52	1.58	1.20	1.24	0.81
1992	6	28LANDERS\BH	7.3Mw	7.4	8.1	6.6	36.0	1.51	1.53	1.49	1.34	1.12	0.72
1992	6	28LANDERS\BH	7.3Mw	7.4	8.1	6.6	91.0	1.24	1.32	1.79	1.10	1.18	0.70
1992	6	28LANDERS\BH	7.3Mw	7.4	8.1	6.6	91.0	1.06	1.20	1.63	1.41	0.93	0.53
1992	6	28LANDERS\CH	7.3Mw	7.4	8.1	6.6	21.0	1.69	1.51	1.86	1.75	1.66	1.07
1992	6	28LANDERS\CH	7.3Mw	7.4	8.1	6.6	21.0	1.53	1.87	1.98	1.98	1.66	1.01
1992	6	28LANDERS\DH	7.3Mw	7.4	8.1	6.6	23.0	1.06	1.58	1.84	1.72	1.35	1.16
1992	6	28LANDERS\DH	7.3Mw	7.4	8.1	6.6	23.0	1.48	1.85	1.83	1.45	1.41	1.07
1992	6	28LANDERS\FH	7.3Mw	7.4	8.1	6.6	65.0	0.56	0.76	1.16	1.46	1.21	0.96
1992	6	28LANDERS\FH	7.3Mw	7.4	8.1	6.6	65.0	1.27	1.44	1.51	1.56	1.19	0.83

1992	6	28LANDERS\HH	7.3Mw	7.4	8.1	6.6	69.0	9.99	0.98	1.42	1.19	1.21	1.36
1992	6	28LANDERS\HH	7.3Mw	7.4	8.1	6.6	69.0	9.99	0.90	1.51	1.36	1.21	1.20
1992	6	28LANDERS\IH	7.3Mw	7.4	8.1	6.6	56.0	1.36	1.48	1.62	1.62	1.26	0.82
1992	6	28LANDERS\IH	7.3Mw	7.4	8.1	6.6	56.0	1.27	1.53	1.68	1.56	1.11	0.72
1992	6	28LANDERS\JH	7.3Mw	7.4	8.1	6.6	11.0	1.42	1.85	2.05	1.92	1.49	0.92
1992	6	28LANDERS\JH	7.3Mw	7.4	8.1	6.6	11.0	1.22	2.05	2.01	1.70	1.60	1.16
1992	6	28LANDERS\PH	7.3Mw	7.4	8.1	6.6	37.0	0.99	1.45	1.65	1.20	1.29	1.03
1992	6	28LANDERS\PH	7.3Mw	7.4	8.1	6.6	37.0	1.28	1.57	1.69	1.11	1.31	1.01
1992	6	28LANDERS\YH	7.3Mw	7.4	8.1	6.6	25.0	1.94	1.90	1.96	1.73	1.38	1.00
1992	6	28LANDERS\YH	7.3Mw	7.4	8.1	6.6	25.0	1.83	1.71	1.71	1.68	1.55	1.19
1994	1	17NORTH\ANH	6.7Mw	7.1	7.6	6.4	38.0	9.99	1.11	1.04	1.16	0.56	0.27
1994	1	17NORTH\ANH	6.7Mw	7.1	7.6	6.4	38.0	9.99	0.97	1.34	1.21	0.98	0.57
1994	1	17NORTH\ARH	6.7Mw	7.1	7.6	6.4	9.0	1.15	1.58	2.05	1.86	1.73	1.37
1994	1	17NORTH\ARH	6.7Mw	7.1	7.6	6.4	9.0	1.26	1.80	1.61	1.71	1.76	1.22
1994	1	17NORTH\CNH	6.7Mw	7.1	7.6	6.4	15.0	1.42	1.74	1.81	1.97	1.67	1.35
1994	1	17NORTH\CNH	6.7Mw	7.1	7.6	6.4	15.0	1.41	2.08	2.10	2.08	1.64	1.37
1994	1	17NORTH\DWH	6.7Mw	7.1	7.6	6.4	48.0	9.99	1.48	1.40	1.77	1.59	0.97
1994	1	17NORTH\DWH	6.7Mw	7.1	7.6	6.4	48.0	9.99	1.00	1.53	1.72	1.49	0.97
1994	1	17NORTH\ELH	6.7Mw	7.1	7.6	6.4	37.0	9.99	1.02	1.47	1.48	1.29	0.65
1994	1	17NORTH\ELH	6.7Mw	7.1	7.6	6.4	37.0	9.99	0.60	1.49	1.34	1.31	0.64
1994	1	17NORTH\JEH	6.7Mw	7.1	7.6	6.4	6.0	9.99	2.15	2.28	1.91	1.39	0.85
1994	1	17NORTH\JEH	6.7Mw	7.1	7.6	6.4	6.0	9.99	2.37	2.44	2.06	1.52	0.83
1994	1	17NORTH\11H	6.7Mw	7.1	7.6	6.4	42.0	9.99	1.43	1.27	1.57	1.49	1.09
1994	1	17NORTH\11H	6.7Mw	7.1	7.6	6.4	42.0	9.99	0.97	1.47	1.73	1.46	1.10
1994	1	17NORTH\BLH	6.7Mw	7.1	7.6	6.4	32.0	9.99	1.61	1.51	1.79	1.50	1.19
1994	1	17NORTH\BLH	6.7Mw	7.1	7.6	6.4	32.0	9.99	1.62	1.51	1.70	1.40	1.20
1994	1	17NORTH\CCH	6.7Mw	7.1	7.6	6.4	26.0	0.83	1.94	1.81	1.71	1.78	1.05
1994	1	17NORTH\CCH	6.7Mw	7.1	7.6	6.4	26.0	0.97	1.65	1.85	1.74	1.47	1.26
1994	1	17NORTH\HOH	6.7Mw	7.1	7.6	6.4	26.0	9.99	1.68	1.56	1.57	1.42	1.33
1994	1	17NORTH\HOH	6.7Mw	7.1	7.6	6.4	26.0	9.99	1.39	2.03	1.97	1.72	1.56
1994	1	17NORTH\OBH	6.7Mw	7.1	7.6	6.4	38.0	9.99	9.99	1.53	1.71	1.83	1.40

1994	1	17NORTH\PIH	6.7Mw	7.1	7.6	6.4	32.0	9.99	1.64	1.27	1.47	1.23	0.96
1994	1	17NORTH\PIH	6.7Mw	7.1	7.6	6.4	32.0	9.99	1.31	1.48	1.40	1.06	0.96
1994	1	17NORTH\H1H	6.7Mw	7.1	7.6	6.4	23.0	1.27	0.98	1.06	1.35	1.40	0.96
1994	1	17NORTH\H1H	6.7Mw	7.1	7.6	6.4	23.0	1.19	1.17	1.19	1.32	1.60	1.23
1994	1	17NORTH\LBH	6.7Mw	7.1	7.6	6.4	58.0	9.99	0.82	0.82	1.20	0.83	0.25
1994	1	17NORTH\LBH	6.7Mw	7.1	7.6	6.4	58.0	9.99	0.78	0.88	1.16	1.03	0.53
1994	1	17NORTH\MRH	6.7Mw	7.1	7.6	6.4	28.0	9.99	1.57	1.71	1.67	1.59	0.81
1994	1	17NORTH\MRH	6.7Mw	7.1	7.6	6.4	28.0	9.99	1.77	1.61	1.77	1.63	0.96
1994	1	17NORTH\NEH	6.7Mw	7.1	7.6	6.4	54.0	1.21	1.55	1.21	1.18	0.77	0.20
1994	1	17NORTH\NEH	6.7Mw	7.1	7.6	6.4	54.0	1.47	1.55	1.30	0.91	0.72	0.22
1994	1	17NORTH\NWH	6.7Mw	7.1	7.6	6.4	7.0	1.62	2.09	2.02	2.04	1.93	1.23
1994	1	17NORTH\NWH	6.7Mw	7.1	7.6	6.4	7.0	1.97	2.06	2.29	2.17	1.84	1.16
1994	1	17NORTH\SAH	6.7Mw	7.1	7.6	6.4	13.0	1.30	1.82	1.77	2.01	1.85	1.37
1994	1	17NORTH\SAH	6.7Mw	7.1	7.6	6.4	13.0	1.78	1.93	2.18	2.26	1.69	1.30
1994	1	17NORTH\PHH	6.7Mw	7.1	7.6	6.4	87.0	9.99	0.53	1.21	1.16	0.80	0.61
1994	1	17NORTH\PHH	6.7Mw	7.1	7.6	6.4	87.0	9.99	0.93	1.30	1.15	0.89	0.64
1994	1	17NORTH\SMH	6.7Mw	7.1	7.6	6.4	35.0	9.99	1.16	1.16	1.55	1.49	0.80
1994	1	17NORTH\SMH	6.7Mw	7.1	7.6	6.4	35.0	9.99	9.99	1.35	1.29	1.36	1.06
1994	1	17NORTH\STH	6.7Mw	7.1	7.6	6.4	28.0	1.54	2.06	1.80	1.82	2.19	1.60
1994	1	17NORTH\STH	6.7Mw	7.1	7.6	6.4	28.0	1.33	1.70	1.48	1.79	1.67	1.53
1994	1	17NORTH\SEH	6.7Mw	7.1	7.6	6.4	65.0	9.99	0.91	1.14	1.33	1.18	0.77
1994	1	17NORTH\SEH	6.7Mw	7.1	7.6	6.4	65.0	9.99	0.53	1.35	1.47	1.22	0.82
1994	1	17NORTH\ROH	6.7Mw	7.1	7.6	6.4	11.0	1.00	1.32	1.93	1.74	1.65	1.18
1994	1	17NORTH\ROH	6.7Mw	7.1	7.6	6.4	11.0	0.84	1.54	2.16	1.54	1.62	1.23
1994	1	17NORTH\SCH	6.7Mw	7.1	7.6	6.4	6.0	1.79	2.25	2.46	1.93	1.51	1.32
1994	1	17NORTH\SCH	6.7Mw	7.1	7.6	6.4	6.0	1.65	2.55	2.52	1.92	1.59	1.23
1994	1	17NORTH\SCH	6.7Mw	7.1	7.6	6.4	6.0	1.92	2.25	2.29	2.07	1.82	1.39
1994	1	17NORTH\SCH	6.7Mw	7.1	7.6	6.4	6.0	0.96	2.30	2.26	1.71	1.99	1.29
1994	1	17NORTH\SYH	6.7Mw	7.1	7.6	6.4	6.0	1.40	2.17	2.26	2.09	1.55	1.28
1994	1	17NORTH\SYH	6.7Mw	7.1	7.6	6.4	6.0	1.47	2.34	2.06	2.31	1.81	1.25
1994	1	17NORTH\WRH	6.7Mw	7.1	7.6	6.4	72.0	9.99	0.57	0.81	1.04	1.03	0.60

1994	1	17NORTH\WRH	6.7Mw	7.1	7.6	6.4	72.0	9.99	0.34	1.05	1.15	0.95	0.77
B.C.: Overall hard rock													
yr	mmdd	station	comp	magtype	m ₁	m _{hf}	M _{lpl}	R (km)	FACCN	(cm/s)	f (Hz)	H/V:	
									A0.5*	A1	A2	A5	A10
80	6	8PGC	VtoH	3.8Mrg	5.2	5.9	6.1	98.0	0.63	1.00	2.00	5.01	10.00
82	1	30SNB	VtoH	3.2Mrg	3.9	3.8	3.9	42.0	1.00	1.12	1.12	1.59	1.59
82	1	30HNB	VtoH	3.2Mrg	3.9	3.8	3.9	58.0	9.99	-0.55	-0.39	-0.09	-0.16
82	1	30PGC	VtoH	3.2Mrg	3.9	3.8	3.9	63.0	9.99	-1.52	-1.23	-0.49	-0.01
82	5	13SNB	VtoH	3.0Mrg	3.8	5.1	5.0	35.0	9.99	-1.75	-1.33	-0.47	-0.76
82	5	13VGZ	VtoH	3.0Mrg	3.8	5.1	5.0	43.0	9.99	-1.94	-1.55	-0.78	-0.63
82	5	13NAB	VtoH	3.0Mrg	3.8	5.1	5.0	68.0	9.99	-1.32	-1.07	-0.12	-0.47
82	5	13HNB	VtoH	3.0Mrg	3.8	5.1	5.0	95.0	9.99	-1.87	-1.38	-0.31	0.12
82	7	22EDB	VtoH	4.7Mrg	5.1	5.1	5.0	68.0	9.99	-2.08	-1.40	-0.78	-0.67
82	10	2EDB	VtoH	4.2Mrg	4.6	6.4	5.0	37.0	9.99	-2.17	-1.32	-0.98	-0.92
83	2	5OZB	VtoH	3.6Mrg	4.3	4.2	4.4	46.0	9.99	-0.27	-0.13	-0.40	-0.36
83	2	5ALB	VtoH	3.6Mrg	4.3	4.2	4.4	81.0	9.99	-0.41	0.05	0.50	0.90
83	3	10EDB	VtoH	4.5Mrg	4.4	4.7	4.4	85.0	9.99	-0.74	0.01	0.61	0.51
83	3	10ETB	VtoH	4.5Mrg	4.4	4.7	4.4	91.0	9.99	-1.52	-0.92	-0.49	-0.67
83	8	28VGZ	VtoH	4.1Mrg	4.4	5.7	4.3	81.0	9.99	-1.17	-0.90	-0.68	-0.72
85	10	27EDB	VtoH	4.7Mrg	5.2	5.7	5.2	87.0	-1.23	-1.21	-0.89	-0.73	-0.93
85	10	27ETB	VtoH	4.7Mrg	5.2	5.7	5.2	100.0	9.99	-1.21	-0.84	0.00	-0.08
86	2	10VDB	VtoH	3.7Mrg	4.2	4.4	4.5	71.0	-0.29	-0.19	-0.26	-0.05	-0.09
86	2	10SNB	VtoH	3.7Mrg	4.2	4.4	4.5	100.0	-0.36	-0.45	-0.24	-0.19	-0.23
86	2	10VGZ	VtoH	3.7Mrg	4.2	4.4	4.5	100.0	9.99	-0.45	-0.24	-0.19	-0.23
86	3	2MGB	VtoH	3.0Mrg	4.2	4.9	4.4	50.0	9.99	-1.36	-0.90	-0.48	-0.66
86	3	2PFB	VtoH	3.0Mrg	4.2	4.9	4.4	58.0	-1.60	-1.35	-0.84	-0.68	-0.87
86	3	2OZB	VtoH	3.0Mrg	4.2	4.9	4.4	62.0	-1.71	-1.77	-1.00	-0.68	-0.75
86	3	2ALB	VtoH	3.0Mrg	4.2	4.9	4.4	71.0	9.99	-1.39	-0.75	-0.19	-0.17
86	3	2NAB	VtoH	3.0Mrg	4.2	4.9	4.4	93.0	9.99	-1.28	-0.77	-0.58	-0.68
86	3	2BTB	VtoH	3.0Mrg	4.2	4.9	4.4	100.0	9.99	-0.91	-0.42	-0.31	-0.30
									9.99	-1.88	-1.27	-0.66	-0.74
									9.99	-2.15	-1.13	-0.52	-0.98
									9.99	-1.34	-0.74	-0.52	-0.46

86	3	26ETB	VtoH	4.3Mrg	4.6	4.9	4.4	85.0	9.99	-1.16	-0.56	-0.27	-0.58
86	3	26EDB	VtoH	4.3Mrg	4.6	4.9	4.4	87.0	9.99	-0.90	-0.68	-0.41	-0.67
86	6	8OZB	VtoH	3.2Mrg	4.2	4.8	4.5	35.0	9.99	-0.94	-0.20	-0.02	-0.09
86	6	8MGB	VtoH	3.2Mrg	4.2	4.8	4.5	56.0	9.99	-1.15	-0.68	0.16	-0.22
86	6	8ALB	VtoH	3.2Mrg	4.2	4.8	4.5	58.0	9.99	-1.53	-0.93	-0.92	-0.82
86	6	8BTB	VtoH	3.2Mrg	4.2	4.8	4.5	63.0	9.99	-1.15	-0.26	0.02	-0.28
86	6	8PFB	VtoH	3.2Mrg	4.2	4.8	4.5	58.0	9.99	-1.37	-0.90	-0.67	-0.93
86	6	16EDB	VtoH	5.2Mrg	6.2	5.1	4.5	60.0	9.99	0.46	1.28	1.08	1.22
86	9	6OZB	VtoH	3.5Mrg	4.5	6.0	5.6	44.0	9.99	-0.70	-0.33	0.31	0.12
86	9	6MGB	VtoH	3.5Mrg	4.5	6.0	5.6	60.0	9.99	-0.82	-0.21	-0.06	0.20
86	9	6PFB	VtoH	3.5Mrg	4.5	6.0	5.6	40.0	9.99	-0.96	-0.41	-0.28	-0.61
86	9	6ALB	VtoH	3.5Mrg	4.5	6.0	5.6	74.0	9.99	-1.34	-0.73	-0.22	-0.42
86	9	6BTB	VtoH	3.5Mrg	4.5	6.0	5.6	89.0	9.99	-0.88	-0.19	-0.14	-0.65
87	6	7EDB	VtoH	3.8Mrg	4.9	6.6	4.2	33.0	9.99	-0.31	0.31	0.97	1.16
87	6	7ETB	VtoH	3.8Mrg	4.9	6.6	4.2	66.0	9.99	-0.33	0.02	-0.03	-0.23
87	9	16HNB	VtoH	3.2Mrg	3.7	3.9	4.6	22.0	9.99	-1.64	-0.98	-0.18	-0.14
87	9	16VDB	VtoH	3.2Mrg	3.7	3.9	4.6	45.0	9.99	-2.29	-1.30	-0.31	-0.48
87	9	16SNB	VtoH	3.2Mrg	3.7	3.9	4.6	48.0	9.99	-1.72	-1.29	-1.00	-0.94
87	9	16BIB	VtoH	3.2Mrg	3.7	3.9	4.6	56.0	9.99	-2.27	-1.21	-0.81	-0.71
87	9	16PGC	VtoH	3.2Mrg	3.7	3.9	4.6	72.0	9.99	-2.30	-1.75	-1.09	-1.04
87	9	16WPB	VtoH	3.2Mrg	3.7	3.9	4.6	72.0	9.99	-1.93	-1.34	-0.72	-0.68
87	9	16VGZ	VtoH	3.2Mrg	3.7	3.9	4.6	87.0	9.99	-2.19	-1.83	-1.10	-1.11
87	9	16NAB	VtoH	3.2Mrg	3.7	3.9	4.6	95.0	9.99	-2.18	-1.57	-0.83	-0.87
87	12	7EDB	VtoH	4.7Mrg	5.0	4.5	5.0	81.0	-0.55	-0.41	-0.29	-0.42	-0.45
87	12	7ETB	VtoH	4.7Mrg	5.0	4.5	5.0	89.0	9.99	-0.68	-0.39	-0.21	-0.52
88	4	29EDB	VtoH	3.5Mrg	4.3	4.5	4.4	74.0	9.99	-1.29	-0.80	-0.64	-0.43
88	9	26SNB	VtoH	3.0Mrg	3.8	4.2	4.4	55.0	9.99	-1.72	-1.16	-1.06	-0.97
88	9	26VGZ	VtoH	3.0Mrg	3.8	4.2	4.4	59.0	9.99	-2.36	-1.65	-0.82	-0.68
88	9	26VDB	VtoH	3.0Mrg	3.8	4.2	4.4	66.0	9.99	-2.16	-1.32	-1.22	-1.02
88	9	26PGC	VtoH	3.0Mrg	3.8	4.2	4.4	68.0	9.99	-1.93	-1.29	-0.72	-0.69
88	9	26HNB	VtoH	3.0Mrg	3.8	4.2	4.4	83.0	9.99	-1.99	-1.47	-1.32	-1.34

88	10	1EDB	VtoH	3.9Mrg	4.9	4.2	4.4	78.0	9.99	-0.49	-0.58	-0.70	-0.88
89	2	6VDB	VtoH	3.5Mrg	4.0	4.0	4.1	68.0	9.99	-1.34	-1.07	-1.16	-1.22
89	2	6SNB	VtoH	3.5Mrg	4.0	4.0	4.1	81.0	-1.75	-1.68	-0.77	-1.10	-1.30
89	2	6VGZ	VtoH	3.5Mrg	4.0	4.0	4.1	81.0	9.99	-1.87	-1.22	-1.14	-1.16
89	2	6PGC	VtoH	3.5Mrg	4.0	4.0	4.1	95.0	-2.00	-1.73	-1.16	-0.89	-1.01
89	2	6HNB	VtoH	3.5Mrg	4.0	4.0	4.1	98.0	-2.01	-1.86	-1.18	-1.35	-1.42
89	2	14VDB	VtoH	3.6Mrg	4.3	3.6	4.2	68.0	9.99	-0.93	-0.77	-0.68	-0.62
89	2	14SNB	VtoH	3.6Mrg	4.3	3.6	4.2	79.0	9.99	-1.49	-0.64	-0.63	-0.97
89	2	14VGZ	VtoH	3.6Mrg	4.3	3.6	4.2	81.0	9.99	-1.60	-1.15	-0.68	-0.88
89	2	14PGC	VtoH	3.6Mrg	4.3	3.6	4.2	93.0	-1.66	-1.49	-0.79	-0.59	-0.80
89	2	14HNB	VtoH	3.6Mrg	4.3	3.6	4.2	98.0	-1.70	-1.41	-0.96	-0.90	-1.15
89	3	5VGZ	VtoH	4.6Mrg	5.2	5.8	4.4	81.0	9.99	-0.27	0.15	-0.24	0.07
89	3	6VDB	VtoH	4.0Mrg	4.5	5.1	4.8	68.0	9.99	-0.76	-0.30	-0.32	-0.70
89	3	6SNB	VtoH	4.0Mrg	4.5	5.1	4.8	79.0	9.99	-0.91	-0.10	-0.35	-0.63
89	3	6VGZ	VtoH	4.0Mrg	4.5	5.1	4.8	81.0	9.99	-1.36	-0.74	-0.49	-0.51
89	3	6PGC	VtoH	4.0Mrg	4.5	5.1	4.8	93.0	-1.30	-1.04	-0.37	-0.13	-0.48
89	3	6HNB	VtoH	4.0Mrg	4.5	5.1	4.8	98.0	-1.40	-1.24	-0.58	-0.56	-0.92
89	9	12EDB	VtoH	4.4Mrg	5.4	5.6	4.9	40.0	9.99	0.38	0.68	0.97	1.20
89	9	12ETB	VtoH	4.4Mrg	5.4	5.6	4.9	62.0	9.99	-0.04	0.34	0.32	0.32
89	9	24CBB	VtoH	3.8Mrg	4.4	5.2	4.4	98.0	-1.51	-1.24	-0.82	-0.43	-0.36
89	10	24OZB	VtoH	3.9Mrg	4.6	6.1	4.2	43.0	9.99	-0.62	-0.04	0.53	0.46
89	10	24MGB	VtoH	3.9Mrg	4.6	6.1	4.2	52.0	9.99	-0.77	-0.38	0.15	0.79
89	10	24ALB	VtoH	3.9Mrg	4.6	6.1	4.2	59.0	9.99	-1.04	-0.52	-0.08	-0.02
89	10	24BTB	VtoH	3.9Mrg	4.6	6.1	4.2	74.0	9.99	-0.46	0.46	0.79	0.44
89	10	24PFB	VtoH	3.9Mrg	4.6	6.1	4.2	58.0	9.99	-0.75	-0.06	-0.05	-0.42
89	10	24NAB	VtoH	3.9Mrg	4.6	6.1	4.2	100.0	9.99	-1.16	-0.64	-0.23	-0.53
90	2	16ETB	VtoH	5.2Mrg	5.7	4.9	5.1	81.0	9.99	0.21	0.30	0.15	0.04
90	2	16EDB	VtoH	5.2Mrg	5.7	4.9	5.1	85.0	-0.16	0.14	0.21	0.03	-0.05
90	4	2VDB	VtoH	4.4Mrg	4.9	5.2	5.0	23.0	9.99	0.11	0.35	0.70	0.24
90	4	2HNB	VtoH	4.4Mrg	4.9	5.2	5.0	56.0	9.99	-0.48	-0.14	-0.22	-0.37
90	4	2SNB	VtoH	4.4Mrg	4.9	5.2	5.0	72.0	9.99	-0.24	-0.05	-0.39	-0.58

90	4	2PGC	VtoH	4.4Mrg	4.9	5.2	5.0	95.0	-0.89	-0.74	-0.30	-0.50	-0.66
90	4	2VGZ	VtoH	4.4Mrg	4.9	5.2	5.0	95.0	-1.01	-0.77	-0.40	-0.31	-0.68
90	4	3VDB	VtoH	3.8Mrg	4.3	4.0	4.7	22.0	9.99	-0.72	-0.21	0.16	0.27
90	4	3HNB	VtoH	3.8Mrg	4.3	4.0	4.7	56.0	9.99	-1.07	-0.77	-0.64	-0.85
90	4	3SNB	VtoH	3.8Mrg	4.3	4.0	4.7	72.0	9.99	-0.91	-0.83	-0.88	-1.05
90	4	3PGC	VtoH	3.8Mrg	4.3	4.0	4.7	95.0	-1.57	-1.41	-0.92	-0.94	-1.02
90	4	3VGZ	VtoH	3.8Mrg	4.3	4.0	4.7	95.0	-1.71	-1.52	-0.93	-0.91	-1.10
90	4	14VDB	VtoH	4.9Mrg	5.3	5.1	4.7	23.0	9.99	0.43	0.90	0.52	0.68
90	4	14HNB	VtoH	4.9Mrg	5.3	5.1	4.7	56.0	9.99	-0.01	0.15	0.16	-0.13
90	4	14SNB	VtoH	4.9Mrg	5.3	5.1	4.7	72.0	9.99	0.20	0.37	0.11	-0.27
90	4	14PGC	VtoH	4.9Mrg	5.3	5.1	4.7	95.0	-0.33	-0.28	0.13	-0.02	-0.39
90	4	14VGZ	VtoH	4.9Mrg	5.3	5.1	4.7	95.0	-0.60	-0.38	0.23	-0.16	-0.42
90	4	14VDB	VtoH	4.0Mrg	4.4	4.4	4.8	25.0	9.99	-0.47	-0.30	0.29	0.13
90	4	14HNB	VtoH	4.0Mrg	4.4	4.4	4.8	58.0	9.99	-0.86	-0.72	-0.43	-0.56
90	4	14SNB	VtoH	4.0Mrg	4.4	4.4	4.8	72.0	-1.03	-0.74	-0.61	-0.64	-0.81
90	4	14PGC	VtoH	4.0Mrg	4.4	4.4	4.8	93.0	-1.60	-1.43	-0.80	-0.75	-0.80
90	4	14VGZ	VtoH	4.0Mrg	4.4	4.4	4.8	95.0	9.99	-1.51	-0.82	-0.53	-0.71
90	9	13ETB	VtoH	4.2Mrg	4.4	4.9	4.6	98.0	9.99	-1.16	-1.09	-0.21	-0.56
90	12	7SHB	VtoH	3.0Mrg	3.7	4.2	4.4	26.0	9.99	-1.37	-0.95	-0.30	-0.58
90	12	7WPB	VtoH	3.0Mrg	3.7	4.2	4.4	28.0	9.99	-1.44	-0.82	-0.67	-0.20
90	12	7BIB	VtoH	3.0Mrg	3.7	4.2	4.4	40.0	9.99	-1.85	-1.34	-0.73	-0.62
90	12	7NAB	VtoH	3.0Mrg	3.7	4.2	4.4	63.0	9.99	-2.28	-1.47	-1.02	-1.11
90	12	7WHB	VtoH	3.0Mrg	3.7	4.2	4.4	65.0	9.99	-2.22	-1.61	-0.90	-1.01
90	12	7HNB	VtoH	3.0Mrg	3.7	4.2	4.4	87.0	9.99	-2.38	-1.73	-0.93	-0.92
91	2	19WPB	VtoH	3.9Mrg	4.4	5.6	4.4	36.0	9.99	-0.73	-0.13	0.28	0.38
91	2	19HNB	VtoH	3.9Mrg	4.4	5.6	4.4	49.0	9.99	-0.83	-0.22	0.35	0.32
91	2	19WHB	VtoH	3.9Mrg	4.4	5.6	4.4	51.0	9.99	-1.24	-0.53	-0.09	-0.09
91	2	19BIB	VtoH	3.9Mrg	4.4	5.6	4.4	54.0	9.99	-1.02	-0.55	0.01	0.37
91	2	19VDB	VtoH	3.9Mrg	4.4	5.6	4.4	87.0	-1.54	-1.44	-0.87	-0.42	-0.53
91	2	23ETB	VtoH	4.9Mrg	4.0	3.9	4.3	41.0	9.99	-1.45	-0.91	-0.38	-0.31
91	2	23EDB	VtoH	4.9Mrg	4.0	3.9	4.3	59.0	9.99	-1.55	-1.13	-0.63	-0.52

91	2	23GDR	VtoH	4.9Mrg	4.0	3.9	4.3	72.0	9.99	-1.38	-0.98	-0.93	-1.07
91	2	23BTB	VtoH	4.9Mrg	4.0	3.9	4.3	98.0	-2.06	-1.82	-1.02	-0.87	-1.38
91	7	3VDB	VtoH	3.1Mrg	3.8	4.0	4.2	39.0	9.99	-1.93	-1.54	-0.76	-0.64
91	7	3BIB	VtoH	3.1Mrg	3.8	4.0	4.2	60.0	9.99	-1.93	-1.48	-0.72	-0.62
91	7	3WPB	VtoH	3.1Mrg	3.8	4.0	4.2	68.0	9.99	-1.69	-1.38	-0.84	-0.40
91	7	3SNB	VtoH	3.1Mrg	3.8	4.0	4.2	71.0	9.99	-2.04	-1.56	-1.09	-0.93
91	7	3PGC	VtoH	3.1Mrg	3.8	4.0	4.2	95.0	9.99	-2.37	-1.88	-1.24	-0.92
91	9	15SNB	VtoH	3.1Mrg	3.9	4.5	4.2	30.0	9.99	-0.94	-0.17	-0.08	0.10
91	9	15PGC	VtoH	3.1Mrg	3.9	4.5	4.2	38.0	9.99	-1.11	-0.40	-0.22	-0.41
91	9	15VGZ	VtoH	3.1Mrg	3.9	4.5	4.2	38.0	9.99	-1.95	-1.28	-0.75	-0.42
91	9	15HNB	VtoH	3.1Mrg	3.9	4.5	4.2	81.0	9.99	-2.16	-1.37	-0.85	-0.90
91	9	15VDB	VtoH	3.1Mrg	3.9	4.5	4.2	83.0	9.99	-2.28	-1.70	-1.21	-1.13
91	9	15BIB	VtoH	3.1Mrg	3.9	4.5	4.2	93.0	9.99	-1.86	-1.30	-0.86	-0.70
91	9	15NAB	VtoH	3.1Mrg	3.9	4.5	4.2	100.0	9.99	-1.86	-1.58	-0.97	-1.02
92	3	13VGZ	VtoH	3.5Mrg	4.2	5.5	4.1	41.0	9.99	-0.91	-0.45	0.26	0.46
92	3	13SNB	VtoH	3.5Mrg	4.2	5.5	4.1	59.0	9.99	-1.24	-0.64	-0.35	-0.42
92	3	13PGC	VtoH	3.5Mrg	4.2	5.5	4.1	59.0	9.99	-1.34	-0.86	0.12	-0.25
92	3	13VDB	VtoH	3.5Mrg	4.2	5.5	4.1	98.0	-2.04	-1.88	-1.10	-0.89	-0.76
92	5	17SHB	VtoH	3.0Mrg	3.8	4.4	4.1	59.0	9.99	-1.94	-1.34	-0.90	-0.41
92	5	17CBB	VtoH	3.0Mrg	3.8	4.4	4.1	59.0	9.99	-2.18	-1.61	-1.12	-0.97
92	5	17ALB	VtoH	3.0Mrg	3.8	4.4	4.1	59.0	9.99	-1.92	-1.63	-1.22	-0.79
92	5	17BTB	VtoH	3.0Mrg	3.8	4.4	4.1	72.0	9.99	-1.88	-1.10	-0.57	-0.23
92	5	17NAB	VtoH	3.0Mrg	3.8	4.4	4.1	78.0	9.99	-1.96	-1.85	-0.90	-0.77
92	5	17MGB	VtoH	3.0Mrg	3.8	4.4	4.1	87.0	9.99	-2.25	-1.35	-0.98	-0.77
87	4	8SHB	VtoH	3.9Mrg	4.3	5.3	4.1	24.0	9.99	-0.54	-0.48	0.47	0.44
87	4	8WPB	VtoH	3.9Mrg	4.3	5.3	4.1	28.0	9.99	-0.49	-0.17	0.40	0.25
87	4	8BIB	VtoH	3.9Mrg	4.3	5.3	4.1	38.0	9.99	-1.08	-0.64	0.01	-0.08
87	4	8NAB	VtoH	3.9Mrg	4.3	5.3	4.1	62.0	9.99	-1.23	-0.52	0.14	-0.23
87	4	8WHB	VtoH	3.9Mrg	4.3	5.3	4.1	66.0	9.99	-1.11	-0.51	0.34	-0.09
87	4	8HNB	VtoH	3.9Mrg	4.3	5.3	4.1	87.0	9.99	-1.58	-0.74	-0.23	-0.56
94	1	3GDR	VtoH	5.5Mrg	4.4	7.6	4.9	79.0	9.99	-1.02	-1.53	-1.91	-1.96

ENA: Overall hard rock				FACCN (cm/s), f (Hz), H/V:									
yr	nmdd	station	comp	magtype	m₁	m_{hf}	M_{lpl}	R(km)	A0.5	A1*	A2	A5*	A10*
86	8	18LPQ	VtoH	3.0Mrg	3.4	2.9	3.6	20.0	0.50	0.87	2.00	4.57	10.47
90	4	23LPQ	VtoH	3.0Mrg	3.3	3.2	3.9	15.0	1.04	1.13	1.22	1.36	1.48
90	4	23A16	VtoH	3.0Mrg	3.3	3.2	3.9	16.0	-2.32	-2.17	-1.60	-0.96	-0.52
90	4	23A11	VtoH	3.0Mrg	3.3	3.2	3.9	19.0	9.99	9.99	-1.29	-0.82	-0.42
90	4	23A54	VtoH	3.0Mrg	3.3	3.2	3.9	20.0	9.99	-2.47	-1.48	-0.85	-0.21
90	4	23A61	VtoH	3.0Mrg	3.3	3.2	3.9	34.0	9.99	-2.08	-1.59	-1.20	-0.68
90	4	23A21	VtoH	3.0Mrg	3.3	3.2	3.9	50.0	9.99	-2.34	-1.62	-1.05	-0.31
90	4	23A64	VtoH	3.0Mrg	3.3	3.2	3.9	52.0	9.99	-2.83	-2.47	-1.76	-0.95
85	3	3LPQ	VtoH	3.1Mrg	3.7	3.4	4.1	38.0	9.99	-2.72	-2.26	-1.30	-0.83
85	4	10LPQ	VtoH	3.1Mrg	3.8	3.7	4.0	23.0	9.99	-2.89	-2.22	-1.61	-0.81
88	1	24LPQ	VtoH	3.1Mrg	3.4	2.8	3.7	36.0	-1.81	-1.80	-1.27	-0.65	-0.47
88	3	13A11	VtoH	3.1Mrg	3.4	3.3	3.9	26.0	9.99	9.99	-1.03	-0.73	-0.15
88	3	13A16	VtoH	3.1Mrg	3.4	3.3	3.9	28.0	-2.39	-2.38	-1.78	-1.04	-0.84
88	3	13LPQ	VtoH	3.1Mrg	3.4	3.3	3.9	30.0	9.99	-2.12	-1.38	-1.16	-0.68
88	3	13A61	VtoH	3.1Mrg	3.4	3.3	3.9	35.0	9.99	-1.95	-1.49	-0.95	-0.48
88	3	13A64	VtoH	3.1Mrg	3.4	3.3	3.9	56.0	-2.04	-2.02	-1.48	-0.51	-0.41
88	3	13A21	VtoH	3.1Mrg	3.4	3.3	3.9	59.0	9.99	-2.75	-2.23	-1.45	-0.83
89	1	31A11	VtoH	3.1Mrg	3.4	3.3	3.9	46.0	9.99	-2.71	-2.14	-1.48	-0.78
89	1	31A16	VtoH	3.1Mrg	3.4	3.7	3.9	54.0	9.99	-2.50	-2.14	-1.15	-0.76
89	1	31LPQ	VtoH	3.1Mrg	3.4	3.7	3.9	54.0	9.99	-2.47	-1.91	-1.34	-0.72
89	1	31A61	VtoH	3.1Mrg	3.4	3.7	3.9	55.0	9.99	-2.26	-1.93	-1.38	-0.75
89	1	31A64	VtoH	3.1Mrg	3.4	3.7	3.9	76.0	-2.67	-2.45	-1.90	-1.28	-0.78
89	1	31A21	VtoH	3.1Mrg	3.4	3.7	3.9	81.0	9.99	-2.68	-2.05	-1.46	-0.77
90	4	21A16	VtoH	3.1Mrg	3.4	3.7	3.9	13.0	9.99	-2.87	-2.26	-1.60	-0.85
90	4	21A61	VtoH	3.1Mrg	3.5	3.4	3.8	18.0	9.99	-2.69	-2.12	-1.43	-0.76
90	4	21LPQ	VtoH	3.1Mrg	3.5	3.4	3.8	25.0	9.99	-2.07	-1.37	-0.71	-0.16
90	4	21A54	VtoH	3.1Mrg	3.5	3.4	3.8	29.0	9.99	-2.01	-1.59	-0.94	-0.33
90	4	21A54	VtoH	3.1Mrg	3.5	3.4	3.8	29.0	-1.85	-2.09	-1.72	-1.01	-0.55
90	4	21A54	VtoH	3.1Mrg	3.5	3.4	3.8	29.0	9.99	-2.04	-1.42	-0.81	-0.35

90	4	21A21	VtoH	3.1Mrg	3.5	3.4	3.8	34.0	9.99	-2.19	-1.36	-0.71	-0.41
90	4	21A64	VtoH	3.1Mrg	3.5	3.4	3.8	35.0	9.99	-2.15	-1.47	-0.85	-0.54
90	4	21A11	VtoH	3.1Mrg	3.5	3.4	3.8	37.0	9.99	-2.37	-1.71	-1.16	-0.70
87	11	11GAC	VtoH	3.2Mrg	3.7	4.5	3.9	25.0	-1.84	-1.80	-1.31	-0.52	-0.03
87	11	11OTT	VtoH	3.2Mrg	3.7	4.5	3.9	56.0	-2.11	-2.12	-1.37	-0.58	-0.21
87	11	11TRQ	VtoH	3.2Mrg	3.7	4.5	3.9	81.0	-2.33	-2.18	-1.42	-0.81	-0.35
87	11	11WBO	VtoH	3.2Mrg	3.7	4.5	3.9	89.0	-2.51	-2.39	-1.74	-1.03	-0.44
89	10	13LPQ	VtoH	3.2Mrg	3.7	3.9	4.5	25.0	9.99	9.99	-1.18	-0.39	0.08
89	10	13A16	VtoH	3.2Mrg	3.7	3.9	4.5	25.0	9.99	-1.98	-1.25	-0.73	-0.17
89	10	13A11	VtoH	3.2Mrg	3.7	3.9	4.5	28.0	9.99	-1.90	-1.32	-0.76	-0.23
89	10	13A54	VtoH	3.2Mrg	3.7	3.9	4.5	32.0	9.99	-1.64	-1.20	-0.59	-0.02
89	10	13A61	VtoH	3.2Mrg	3.7	3.9	4.5	40.0	9.99	-2.02	-1.48	-1.04	-0.68
89	10	13A21	VtoH	3.2Mrg	3.7	3.9	4.5	52.0	9.99	-2.38	-1.90	-1.03	-0.55
89	10	13A64	VtoH	3.2Mrg	3.7	3.9	4.5	56.0	9.99	-2.40	-1.63	-1.13	-0.61
90	3	13A61	VtoH	3.2Mrg	3.5	3.7	4.5	23.0	9.99	-2.28	-1.73	-0.99	-0.26
90	3	13A54	VtoH	3.2Mrg	3.5	3.7	4.5	27.0	9.99	-2.20	-1.67	-1.14	-0.38
90	3	13LPQ	VtoH	3.2Mrg	3.5	3.7	4.5	28.0	9.99	9.99	-1.03	-0.41	-0.27
90	3	13A11	VtoH	3.2Mrg	3.5	3.7	4.5	36.0	9.99	-2.17	-1.40	-1.18	-0.79
90	3	13A64	VtoH	3.2Mrg	3.5	3.7	4.5	41.0	9.99	-2.36	-1.73	-1.08	-0.38
90	3	13A21	VtoH	3.2Mrg	3.5	3.7	4.5	41.0	9.99	-2.30	-1.59	-0.91	-0.48
87	3	18LPQ	VtoH	3.3Mrg	3.6	3.7	3.9	44.0	-2.15	-2.15	-1.47	-0.99	-0.45
88	5	15OTT	VtoH	3.3Mrg	3.5	3.5	3.7	30.0	-2.29	-2.21	-1.31	-0.69	-0.46
88	5	15WBO	VtoH	3.3Mrg	3.5	3.5	3.7	31.0	9.99	9.99	-1.35	-0.73	-0.23
88	5	15GAC	VtoH	3.3Mrg	3.5	3.5	3.7	62.0	-2.68	-2.65	-1.89	-1.31	-1.09
90	10	21A54	VtoH	3.3Mrg	3.4	4.3	4.1	17.0	9.99	-1.84	-1.41	-0.62	0.19
90	10	21A16	VtoH	3.3Mrg	3.4	4.3	4.1	32.0	9.99	-2.11	-1.46	-0.72	0.00
90	10	21A61	VtoH	3.3Mrg	3.4	4.3	4.1	42.0	9.99	-2.56	-1.92	-1.42	-0.61
90	10	21A64	VtoH	3.3Mrg	3.4	4.3	4.1	62.0	9.99	-2.70	-2.13	-1.30	-0.54
90	10	21A21	VtoH	3.3Mrg	3.4	4.3	4.1	63.0	9.99	-2.45	-1.85	-1.18	-0.43
90	12	18A54	VtoH	3.3Mrg	3.5	3.4	4.3	25.0	9.99	-1.88	-1.26	-0.88	-0.53
90	12	18A16	VtoH	3.3Mrg	3.5	3.4	4.3	35.0	9.99	-2.11	-1.59	-0.98	-0.66

90	12	18A61	VtoH	3.3Mrg	3.5	3.4	4.3	52.0	9.99	-2.70	-2.11	-1.60	-1.11
90	12	18A21	VtoH	3.3Mrg	3.5	3.4	4.3	69.0	9.99	-2.32	-1.86	-1.22	-0.91
90	12	18A64	VtoH	3.3Mrg	3.5	3.4	4.3	72.0	9.99	-2.54	-2.01	-1.42	-0.96
87	8	6LPQ	VtoH	3.4Mrg	3.6	3.8	3.9	25.0	-1.90	-1.89	-1.23	-0.56	-0.01
88	8	9WBO	VtoH	3.4Mrg	3.6	3.9	3.9	25.0	9.99	9.99	-1.52	-0.78	-0.13
88	8	9OTT	VtoH	3.4Mrg	3.6	3.9	3.9	72.0	-2.60	-2.73	-2.08	-1.20	-0.61
88	8	9GAC	VtoH	3.4Mrg	3.6	3.9	3.9	87.0	-2.80	-2.74	-2.12	-1.28	-1.05
89	11	4GRQ	VtoH	3.4Mrg	3.4	3.8	3.8	47.0	-2.39	-2.39	-1.75	-1.20	-0.64
89	11	4TRQ	VtoH	3.4Mrg	3.4	3.8	3.8	89.0	-2.67	-2.99	-2.34	-1.66	-0.91
89	11	4OTT	VtoH	3.4Mrg	3.4	3.8	3.8	91.0	-2.67	-2.77	-2.14	-1.29	-0.89
89	11	22A16	VtoH	3.4Mrg	3.6	3.8	3.9	26.0	9.99	-1.71	-1.18	-0.96	-0.34
89	11	22A11	VtoH	3.4Mrg	3.6	3.8	3.9	27.0	9.99	-1.77	-1.05	-0.67	-0.59
89	11	22LPQ	VtoH	3.4Mrg	3.6	3.8	3.9	29.0	-1.93	-1.82	-1.28	-0.75	-0.62
89	11	22A61	VtoH	3.4Mrg	3.6	3.8	3.9	34.0	9.99	-2.38	-1.62	-1.37	-0.55
89	11	22A64	VtoH	3.4Mrg	3.6	3.8	3.9	55.0	9.99	-2.31	-1.71	-1.22	-0.48
89	11	22A21	VtoH	3.4Mrg	3.6	3.8	3.9	56.0	9.99	-2.28	-1.47	-0.96	-0.34
80	3	11GNT	VtoH	3.7Mrg	4.1	4.5	4.3	62.0	-1.62	-1.51	-0.90	-0.53	-0.37
81	6	16LPQ	VtoH	3.7Mrg	4.4	4.5	4.4	17.0	9.99	9.99	-0.34	0.33	0.35
81	7	4WBO	VtoH	3.7Mrg	3.9	5.0	4.2	56.0	-1.15	-1.44	-1.26	-0.62	-0.08
81	7	4MNT	VtoH	3.7Mrg	3.9	5.0	4.2	89.0	-2.11	-1.92	-1.22	-0.84	-0.39
81	7	4OTT	VtoH	3.7Mrg	3.9	5.0	4.2	91.0	-2.22	-2.05	-1.26	-0.47	-0.13
81	7	4GAC	VtoH	3.7Mrg	3.9	5.0	4.2	93.0	-2.39	-2.28	-1.60	-0.90	-0.42
81	9	18TRQ	VtoH	3.5Mrg	3.9	4.3	4.1	39.0	9.99	9.99	-1.04	-0.50	-0.21
81	9	18GAC	VtoH	3.5Mrg	3.9	4.3	4.1	59.0	-2.46	-2.31	-1.59	-1.06	-0.65
81	9	18GRQ	VtoH	3.5Mrg	3.9	4.3	4.1	85.0	-2.44	-2.48	-1.70	-1.18	-0.61
81	9	18OTT	VtoH	3.5Mrg	3.9	4.3	4.1	98.0	-2.09	-2.09	-1.50	-0.97	-0.57
81	9	30GRQ	VtoH	3.5Mrg	3.7	3.9	3.9	36.0	-2.07	-2.11	-1.34	-0.96	-0.33
81	9	30GAC	VtoH	3.5Mrg	3.7	3.9	3.9	76.0	-2.47	-2.23	-2.04	-1.29	-0.81
82	3	16KLN	VtoH	3.5Mrg	3.8	3.7	4.2	25.0	-1.45	-1.48	-0.76	-0.44	-0.23
82	3	31KLN	VtoH	5.0Mrg	5.0	5.7	5.5	25.0	0.47	0.23	0.44	0.72	0.81
82	4	2KLN	VtoH	4.3Mrg	4.4	4.6	4.9	25.0	-0.45	-0.55	-0.08	0.06	0.26

82	4	11KLN	VtoH	4.0Mrg	4.9	4.8	4.9	25.0	9.99	9.99	-0.35	0.10	0.36
82	4	18KLN	VtoH	4.1Mrg	4.8	4.9	4.6	25.0	9.99	9.99	-0.36	0.12	0.41
82	5	6KLN	VtoH	4.0Mrg	4.7	4.7	4.8	25.0	9.99	9.99	-0.56	-0.47	0.42
82	6	16KLN	VtoH	4.7Mrg	4.8	6.0	4.9	49.0	-0.62	-0.42	-0.01	0.38	0.69
82	7	13TRQ	VtoH	3.8Mrg	3.9	4.5	4.1	18.0	-1.42	-1.40	-0.85	-0.28	-0.12
82	7	13GAC	VtoH	3.8Mrg	3.9	4.5	4.1	85.0	-1.86	-1.93	-1.37	-0.73	-0.21
82	7	13MNT	VtoH	3.8Mrg	3.9	4.5	4.1	98.0	-2.33	-1.95	-1.56	-1.02	-0.64
82	8	6GAC	VtoH	3.7Mrg	3.7	4.3	3.9	23.0	-1.82	-2.04	-1.12	-0.58	-0.10
82	8	6OTT	VtoH	3.7Mrg	3.7	4.3	3.9	60.0	-2.53	-2.35	-1.21	-0.72	-0.30
82	8	6TRQ	VtoH	3.7Mrg	3.7	4.3	3.9	79.0	-2.14	-2.13	-1.73	-1.01	-0.55
82	8	6WBO	VtoH	3.7Mrg	3.7	4.3	3.9	100.0	-2.39	-2.39	-1.44	-1.01	-0.55
82	9	3OTT	VtoH	3.7Mrg	3.8	4.7	4.2	78.0	-1.83	-1.99	-1.44	-0.88	-0.30
82	9	3GAC	VtoH	3.7Mrg	3.8	4.7	4.2	89.0	-2.24	-2.08	-1.61	-0.94	-0.56
82	10	26KLN	VtoH	3.5Mrg	3.7	4.1	4.0	25.0	-1.82	-1.76	-1.08	-0.58	-0.23
82	12	4LPQ	VtoH	3.9Mrg	4.4	5.2	4.4	31.0	9.99	9.99	0.01	0.52	0.56
83	1	17GSQ	VtoH	4.1Mrg	4.4	5.6	4.7	25.0	9.99	9.99	-0.05	0.54	0.96
83	1	17HTQ	VtoH	4.1Mrg	4.4	5.6	4.7	98.0	-1.25	-1.28	-0.57	-0.51	-0.13
83	5	13KLN	VtoH	3.5Mrg	3.7	3.6	4.1	25.0	-1.59	-1.80	-0.90	-0.68	-0.38
83	5	13KLN	VtoH	3.9Mrg	4.3	5.1	4.4	25.0	9.99	9.99	-0.21	0.38	0.49
83	5	16LPQ	VtoH	3.8Mrg	4.1	4.3	4.3	42.0	-1.56	-1.36	-0.73	-0.22	-0.14
83	8	12GGN	VtoH	3.5Mrg	3.6	5.1	4.0	72.0	-2.21	-2.44	-1.76	-0.78	-0.12
83	10	11OTT	VtoH	4.1Mrg	4.2	5.2	4.5	25.0	-0.82	-0.75	-0.09	0.32	0.51
83	10	11WBO	VtoH	4.1Mrg	4.2	5.2	4.5	46.0	-1.30	-0.98	-0.71	-0.15	0.34
83	10	11GAC	VtoH	4.1Mrg	4.2	5.2	4.5	62.0	-1.75	-1.54	-0.88	-0.58	-0.04
83	11	17KLN	VtoH	3.7Mrg	3.8	4.2	4.2	25.0	-1.45	-1.59	-0.68	-0.28	-0.02
83	12	28GRQ	VtoH	3.5Mrg	4.4	3.6	4.6	62.0	9.99	9.99	-1.77	-1.05	-0.74
84	2	24KLN	VtoH	3.7Mrg	4.1	4.4	4.2	25.0	9.99	9.99	-0.59	-0.01	0.08
84	4	11GSQ	VtoH	3.8Mrg	4.0	4.8	4.2	54.0	-1.74	-1.56	-0.99	-0.18	0.00
84	4	11HTQ	VtoH	3.8Mrg	4.0	4.8	4.2	65.0	-1.99	-1.73	-1.08	-0.52	-0.11
84	9	23LMN	VtoH	3.6Mrg	4.6	3.9	4.6	19.0	9.99	9.99	-0.57	-0.26	-0.04
84	11	30KLN	VtoH	3.8Mrg	4.2	4.8	4.5	25.0	9.99	9.99	-0.53	-0.06	0.17

85	4	12SBQ	VtoH	3.5Mrg	3.8	4.7	4.1	98.0	-2.25	-2.19	-1.82	-1.02	-0.43
85	10	5KLN	VtoH	4.0Mrg	4.1	4.8	4.2	25.0	9.99	9.99	-0.46	-0.02	0.18
86	1	11LPQ	VtoH	4.0Mrg	4.8	5.2	4.7	43.0	9.99	9.99	-0.68	0.00	0.29
86	8	6TRQ	VtoH	3.5Mrg	3.8	4.4	4.0	54.0	-2.27	-2.13	-1.25	-0.78	-0.43
86	8	6GRQ	VtoH	3.5Mrg	3.8	4.4	4.0	56.0	-1.66	-1.85	-1.16	-0.65	-0.30
86	8	6GAC	VtoH	3.5Mrg	3.8	4.4	4.0	78.0	-2.44	-2.08	-1.57	-1.18	-0.76
86	9	19LPQ	VtoH	4.2Mrg	4.5	5.5	4.4	32.0	9.99	9.99	-0.09	0.60	0.55
86	11	9GSQ	VtoH	4.2Mrg	4.4	5.0	4.6	43.0	-1.14	-0.87	-0.15	0.02	0.19
86	11	9HTQ	VtoH	4.2Mrg	4.4	5.0	4.6	72.0	-1.11	-1.19	-0.62	-0.19	-0.05
87	9	26WBO	VtoH	3.8Mrg	4.0	4.6	4.4	83.0	-1.72	-1.74	-1.23	-0.59	-0.39
87	10	23MNT	VtoH	3.7Mrg	3.8	4.5	4.1	76.0	-2.05	-2.12	-1.80	-1.05	-0.57
87	10	23GAC	VtoH	3.7Mrg	3.8	4.5	4.1	78.0	-2.07	-1.96	-1.44	-0.85	-0.42
87	11	11GAC	VtoH	3.5Mrg	3.7	4.5	4.0	22.0	-1.99	-1.78	-1.28	-0.50	-0.01
87	11	11OTT	VtoH	3.5Mrg	3.7	4.5	4.0	54.0	-2.11	-2.12	-1.37	-0.59	-0.21
87	11	11TRQ	VtoH	3.5Mrg	3.7	4.5	4.0	79.0	-1.97	-2.04	-1.37	-0.77	-0.34
87	11	11WBO	VtoH	3.5Mrg	3.7	4.5	4.0	87.0	-2.20	-2.18	-1.62	-1.00	-0.43
88	1	2LPQ	VtoH	3.6Mrg	3.8	3.9	4.1	35.0	-1.80	-1.79	-1.14	-0.49	-0.26
88	1	28KLN	VtoH	3.8Mrg	4.2	3.5	4.5	58.0	-1.35	-1.23	-1.05	-0.87	-0.68
88	3	10GRQ	VtoH	3.7Mrg	3.8	4.9	4.1	35.0	-1.89	-1.66	-0.96	-0.38	0.15
88	3	10GAC	VtoH	3.7Mrg	3.8	4.9	4.1	74.0	-2.18	-2.17	-1.59	-0.92	-0.37
88	3	10TRQ	VtoH	3.7Mrg	3.8	4.9	4.1	87.0	-1.97	-2.05	-1.44	-0.74	-0.14
88	4	24LMN	VtoH	3.7Mrg	3.9	4.3	4.3	21.0	-1.29	-1.38	-0.80	-0.20	0.20
88	5	9KLN	VtoH	3.5Mrg	3.6	4.4	4.1	25.0	-1.55	-1.74	-1.10	-0.61	0.17
88	8	26KLN	VtoH	3.8Mrg	4.3	4.5	4.2	25.0	9.99	9.99	-0.66	-0.46	0.08
88	11	23A54	VtoH	4.6Mrg	5.0	6.4	4.7	100.0	9.99	-0.63	-0.16	0.25	0.55
88	11	23A61	VtoH	4.6Mrg	5.0	6.4	4.7	100.0	9.99	9.99	-0.40	0.00	9.99
89	1	19A61	VtoH	3.6Mrg	3.8	5.0	4.3	83.0	9.99	-2.01	-1.43	-0.90	-0.33
89	1	19A54	VtoH	3.6Mrg	3.8	5.0	4.3	83.0	9.99	-2.01	-1.53	-0.81	-0.29
89	1	19A64	VtoH	3.6Mrg	3.8	5.0	4.3	91.0	9.99	-2.02	-1.63	-0.89	-0.37
89	3	9LPQ	VtoH	4.3Mrg	4.2	4.5	4.5	45.0	-1.29	-1.21	-0.42	-0.01	-0.05
89	8	10KLN	VtoH	3.5Mrg	3.8	4.3	4.3	49.0	-1.63	-1.77	-1.23	-0.66	-0.28

89	11	16GRQ	VtoH	4.0Mrg	4.1	5.1	4.2	58.0	9.99	9.99	-0.83	-0.42	-0.12
89	11	16CKO	VtoH	4.0Mrg	4.1	5.1	4.2	93.0	-2.21	-2.02	-1.27	-0.62	-0.11
90	3	3A64	VtoH	3.6Mrg	3.9	4.4	4.7	21.0	9.99	-1.51	-0.99	-0.34	-0.01
90	3	3A61	VtoH	3.6Mrg	3.9	4.4	4.7	29.0	9.99	-1.72	-0.97	-0.51	-0.19
90	3	3A16	VtoH	3.6Mrg	3.9	4.4	4.7	48.0	9.99	-1.48	-1.04	-0.58	-0.30
90	3	3A54	VtoH	3.6Mrg	3.9	4.4	4.7	59.0	9.99	-1.93	-1.35	-0.67	-0.21
90	3	3LPQ	VtoH	3.6Mrg	3.9	4.4	4.7	62.0	-1.77	-1.68	-1.05	-0.43	-0.32
90	3	3A11	VtoH	3.6Mrg	3.9	4.4	4.7	74.0	9.99	-2.09	-1.51	-0.87	-0.55
90	10	7TRQ	VtoH	3.9Mrg	3.8	4.6	4.1	45.0	-1.69	-1.71	-1.06	-0.57	-0.28
90	10	7GRQ	VtoH	3.9Mrg	3.8	4.6	4.1	69.0	-2.09	-1.93	-1.32	-0.67	-0.13
90	10	19GRQ	VtoH	5.1Mrg	5.0	7.0	4.9	27.0	9.99	9.99	0.54	0.91	1.20
90	10	19TRQ	VtoH	5.1Mrg	5.0	7.0	4.9	87.0	-0.40	-0.49	0.16	0.82	0.96
91	3	6CKO	VtoH	3.9Mrg	4.9	6.3	4.8	56.0	9.99	9.99	-0.91	-0.58	0.17
91	3	6GRQ	VtoH	3.9Mrg	4.9	6.3	4.8	87.0	9.99	9.99	-1.31	-0.87	-0.27
91	7	5MNT	VtoH	3.8Mrg	4.3	6.0	4.2	38.0	9.99	9.99	-1.15	-0.69	0.11
92	11	17TRQ	VtoH	3.8Mrg	4.5	5.7	4.2	58.0	9.99	9.99	-0.58	-0.01	0.44
92	11	17OTT	VtoH	3.8Mrg	4.5	5.7	4.2	76.0	9.99	9.99	-0.62	0.02	0.32
92	11	17WBO	VtoH	3.8Mrg	4.5	5.7	4.2	91.0	9.99	9.99	-0.98	-0.36	0.17
93	5	6GRQ	VtoH	3.5Mrg	4.9	7.3	4.2	44.0	9.99	9.99	-1.33	-0.90	-0.38
93	5	6TRQ	VtoH	3.5Mrg	4.9	7.3	4.2	76.0	9.99	9.99	-1.96	-1.25	-0.68
93	9	23TRQ	VtoH	3.8Mrg	4.3	5.2	4.2	21.0	9.99	9.99	-0.38	0.36	0.46
93	12	25GRQ	VtoH	4.2Mrg	4.5	5.5	3.9	25.0	9.99	9.99	-0.09	0.20	0.45
93	12	25TRQ	VtoH	4.2Mrg	4.5	5.5	3.9	87.0	9.99	9.99	-0.61	-0.17	0.17

Note:

* FACCN amplitude is not exactly at the node point of frequency.
 $m_1 = 4.4665 + 0.7817\text{LogA1} + 0.1399(\text{LogA1})^{**2} + 0.0351(\text{LogA1})^{**3}$
 $m_{hf} = 1.9202\text{LogA}_{hf} + 3.0959$
M_lpl is estimated from the LPL of Fourier displacement spectrum,
where LPL is $R^{**}(-1)\text{corrected}$.
For details about calculation of the magnitudes see the text of the thesis.

Appendix 5B

Vertical component

Japan:		yr	mmdd	station	comp	magtype	R (km)	A0.2	A0.5	A1	A2	A5	A10
								0.20	0.50	1.00	2.00	5.01	10.00
1998	2	10AIC002		U-D	4.3JMA	50.0	-2.05	-2.04	-1.41	-1.37	-0.85	-0.79	
1998	2	10AIC004		U-D	4.3JMA	73.0	-1.92	-1.95	-1.08	-0.89	-0.54	-0.35	
1998	2	10AIC008		U-D	4.3JMA	86.0	-1.66	-2.01	-1.45	-1.07	-0.58	-1.05	
1998	2	10AIC009		U-D	4.3JMA	70.0	-1.85	-1.86	-1.01	-0.41	-0.37	-0.50	
1998	2	10AIC010		U-D	4.3JMA	90.0	-2.21	-2.18	-1.60	-0.24	0.23	-0.14	
1998	2	10AIC012		U-D	4.3JMA	88.0	-2.01	-1.90	-1.15	-0.77	-0.51	-0.81	
1998	2	10AIC014		U-D	4.3JMA	98.0	-1.54	-1.88	-1.59	-1.30	-0.64	-0.84	
1998	2	10FKI011		U-D	4.3JMA	53.0	-1.76	-1.84	-1.27	-1.36	-1.16	-0.80	
1998	2	21FKS028		U-D	5.0JMA	61.0	-1.65	-0.75	-0.34	0.09	-0.15	-0.49	
1998	2	21FKS029		U-D	5.0JMA	77.0	-1.56	-0.92	-0.87	-0.84	-0.31	-0.30	
1998	2	21FKS030		U-D	5.0JMA	84.0	-1.74	-1.05	-0.81	-0.45	-0.63	-0.50	
1998	2	22FKS030		U-D	3.9JMA	84.0	-2.12	-2.25	-2.08	-1.89	-1.45	-1.05	
1998	2	10GIF001		U-D	4.3JMA	68.0	-2.18	-2.12	-1.23	-0.93	-1.03	-0.88	
1998	2	10GIF002		U-D	4.3JMA	64.0	-1.78	-2.00	-1.64	-1.26	-0.87	-0.66	
1998	2	10GIF003		U-D	4.3JMA	75.0	-1.20	-1.09	-1.36	-1.28	-1.28	-1.08	
1998	2	10GIF004		U-D	4.3JMA	77.0	-2.42	-1.91	-1.77	-1.39	-1.01	-0.65	
1998	2	10GIF006		U-D	4.3JMA	41.0	-2.21	-1.84	-1.49	-0.95	-0.11	-0.63	
1998	2	10GIF007		U-D	4.3JMA	58.0	-2.12	-1.79	-1.29	-1.27	-0.73	0.10	
1998	2	10GIF008		U-D	4.3JMA	35.0	-2.20	-1.51	-1.18	-0.74	-0.79	-0.36	
1998	2	10GIF009		U-D	4.3JMA	39.0	-2.15	-1.64	-1.18	-0.68	-0.36	-0.77	
1998	2	10GIF010		U-D	4.3JMA	22.0	-1.97	-1.46	-0.58	-0.19	-0.41	-0.32	
1998	2	10GIF011		U-D	4.3JMA	18.0	-1.80	-1.45	-0.93	-0.62	0.11	-0.29	
1998	2	10GIF012		U-D	4.3JMA	68.0	-1.38	-1.59	-1.16	-1.13	-1.27	-0.64	

1998	2	10GIF013	U-D	4.3JMA	13.0	-1.76	-1.77	-1.11	-0.38	-0.37	-0.35
1998	2	10GIF014	U-D	4.3JMA	38.0	-2.13	-1.49	-0.97	-0.62	-0.73	-0.71
1998	2	10GIF015	U-D	4.3JMA	29.0	-2.18	-1.69	-1.13	-0.65	-0.86	-0.65
1998	2	10GIF016	U-D	4.3JMA	21.0	-2.11	-1.98	-1.32	-0.85	-0.75	-0.60
1998	2	10GIF018	U-D	4.3JMA	51.0	-1.65	-1.67	-1.21	-0.52	-0.36	-0.57
1998	2	10GIF019	U-D	4.3JMA	46.0	-1.60	-1.98	-1.26	-0.64	-0.53	-0.64
1998	2	10GIF021	U-D	4.3JMA	32.0	-2.33	-1.90	-1.05	-0.65	-0.37	-0.54
1998	2	10GIF025	U-D	4.3JMA	36.0	-2.15	-1.75	-1.26	-0.61	-0.79	-0.35
1998	2	21GNM001	U-D	5.0JMA	78.0	-1.17	-0.95	-0.77	-0.50	-0.15	0.47
1998	2	21GNM002	U-D	5.0JMA	63.0	-1.46	-0.93	-0.74	-0.42	-0.40	0.07
1998	2	22GNM002	U-D	3.9JMA	63.0	-2.26	-2.31	-2.39	-1.99	-1.39	-1.07
1998	2	21GNM003	U-D	5.0JMA	80.0	-1.82	-0.95	-0.28	0.03	0.28	0.19
1998	2	21GNM004	U-D	5.0JMA	82.0	-1.70	-0.80	-0.40	-0.11	-0.38	-0.49
1998	2	21GNM006	U-D	5.0JMA	91.0	-1.81	-0.91	-0.43	-0.63	-0.53	-0.11
1998	2	21GNM007	U-D	5.0JMA	98.0	-1.38	-0.69	-0.44	-0.18	-0.39	-0.36
1998	2	5HKD069	U-D	5.1JMA	92.0	-1.10	-0.91	-0.32	0.19	0.12	0.32
1998	2	5HKD070	U-D	5.1JMA	78.0	-1.26	-0.68	-0.42	0.24	0.07	0.18
1998	2	5HKD071	U-D	5.1JMA	77.0	-1.96	-1.41	-0.76	-0.50	0.03	0.14
1998	2	5HKD072	U-D	5.1JMA	59.0	-1.44	-0.74	-0.59	-0.13	0.26	0.80
1998	2	5HKD073	U-D	5.1JMA	57.0	-1.62	-1.00	-0.57	-0.19	0.11	0.34
1998	2	5HKD074	U-D	5.1JMA	53.0	-1.73	-1.03	-0.36	-0.18	0.30	0.80
1998	2	5HKD075	U-D	5.1JMA	91.0	-1.79	-0.91	-0.54	-0.32	-0.28	0.44
1998	2	4HKD105	U-D	4.7JMA	92.0	-2.13	-1.32	-0.84	-0.55	-0.61	-0.65
1998	2	11HKD105	U-D	5.0JMA	89.0	-1.56	-0.74	-0.69	-0.50	-0.29	-0.36
1998	2	4HKD106	U-D	4.7JMA	78.0	-2.37	-1.29	-0.75	-0.15	-0.47	-0.71
1998	2	11HKD106	U-D	5.0JMA	71.0	-1.40	-0.70	-0.47	-0.08	-0.34	-0.47
1998	2	11HKD107	U-D	5.0JMA	77.0	-1.52	-0.76	-0.58	-0.54	-0.70	-1.12
1998	2	4HKD108	U-D	4.7JMA	78.0	-2.01	-1.37	-1.02	-0.56	-0.26	-0.59
1998	2	4HKD109	U-D	4.7JMA	85.0	-1.83	-1.21	-1.02	-0.55	-0.29	-0.32
1998	2	11HKD109	U-D	5.0JMA	75.0	-1.46	-0.70	-0.15	-0.14	0.15	0.03
1998	2	4HKD110	U-D	4.7JMA	97.0	-2.21	-1.58	-0.85	-0.59	-0.21	-0.34

1998	2	11HKD110	U-D	5.0JMA	86.0	-1.50	-0.80	-0.39	-0.32	0.12	-0.12
1998	2	15KGS002	U-D	3.7JMA	34.0	-2.10	-2.18	-1.29	-1.32	-0.91	-0.99
1998	2	15KGS003	U-D	3.7JMA	44.0	-2.05	-2.15	-1.33	-1.41	-0.66	-0.66
1998	2	15KGS005	U-D	3.7JMA	22.0	-2.03	-2.08	-1.16	-1.00	-0.58	-0.30
1998	2	15KGS006	U-D	3.7JMA	48.0	-2.10	-1.86	-1.50	-1.22	-0.41	-0.58
1998	2	15KGS007	U-D	3.7JMA	10.0	-1.60	-1.75	-0.63	-0.13	0.11	0.25
1998	2	15KGS010	U-D	3.7JMA	14.0	-2.13	-1.51	-0.91	-0.31	-0.12	-0.17
1998	2	15KGS011	U-D	3.7JMA	27.0	-1.73	-2.03	-1.90	-1.35	-0.63	-0.51
1998	2	15KGS016	U-D	3.7JMA	44.0	-2.21	-2.18	-1.95	-1.58	-1.30	-1.04
1998	2	15KMM015	U-D	3.7JMA	49.0	-2.38	-2.20	-1.73	-1.40	-0.75	-0.94
1998	2	10MIE003	U-D	4.3JMA	96.0	-1.91	-1.73	-1.43	-0.90	-0.81	-0.99
1998	2	21NGN001	U-D	5.0JMA	72.0	-1.64	-0.48	0.15	0.30	0.08	-0.17
1998	2	21NGN002	U-D	5.0JMA	87.0	-1.34	-0.32	0.05	-0.02	-0.01	-0.36
1998	2	21NGN003	U-D	5.0JMA	78.0	-1.64	-1.22	-0.64	-0.57	-0.26	-0.38
1998	2	21NGN004	U-D	5.0JMA	100.0	-1.53	-0.60	-0.33	-0.23	-0.49	-0.52
1998	2	10NGN018	U-D	4.3JMA	50.0	-2.33	-1.84	-1.33	-0.98	-0.40	-0.50
1998	2	10NGN019	U-D	4.3JMA	70.0	-1.99	-1.84	-1.44	-0.80	-0.22	-0.31
1998	2	10NGN020	U-D	4.3JMA	96.0	-2.25	-1.77	-1.18	-0.99	-0.92	-1.05
1998	2	10NGN025	U-D	4.3JMA	96.0	-1.89	-2.26	-2.25	-1.68	-1.15	-1.30
1998	2	21NIG002	U-D	5.0JMA	95.0	-1.85	-0.57	-0.53	-0.13	-0.57	-0.63
1998	2	21NIG003	U-D	5.0JMA	95.0	-1.70	-0.58	-0.54	-0.31	-0.25	-0.21
1998	2	21NIG004	U-D	5.0JMA	84.0	-1.57	-0.99	-1.11	-0.60	-0.25	-0.41
1998	2	21NIG005	U-D	5.0JMA	78.0	-1.89	-1.18	-1.20	-0.67	-0.43	-0.60
1998	2	21NIG009	U-D	5.0JMA	95.0	-1.67	-1.04	-1.18	-0.69	-0.41	-0.81
1998	2	21NIG011	U-D	5.0JMA	70.0	-1.41	-0.77	-0.79	-0.34	-0.37	-1.03
1998	2	21NIG012	U-D	5.0JMA	89.0	-1.11	-0.82	-0.67	-0.29	-0.31	-0.60
1998	2	21NIG013	U-D	5.0JMA	56.0	-1.06	-0.49	-0.41	-0.29	-0.22	-0.65
1998	2	21NIG015	U-D	5.0JMA	65.0	-1.69	-0.79	-0.64	-0.41	-0.44	-0.85
1998	2	21NIG016	U-D	5.0JMA	43.0	-1.42	-0.82	-0.69	-0.83	-0.49	-0.64
1998	2	21NIG017	U-D	5.0JMA	26.0	-1.00	0.00	-0.08	-0.02	0.14	0.26
1998	2	22NIG017	U-D	3.9JMA	26.0	-2.23	-2.03	-1.47	-1.29	-0.44	-0.31

1998	2	21NIG018	U-D	5.0JMA	34.0	-0.74	0.07	0.60	0.41	0.42	-0.05
1998	2	22NIG018	U-D	3.9JMA	34.0	-2.14	-1.94	-1.02	-0.80	-0.53	-0.74
1998	2	21NIG019	U-D	5.0JMA	20.0	-0.38	0.32	0.65	0.68	0.83	0.64
1998	2	22NIG019	U-D	3.9JMA	20.0	-1.74	-1.73	-1.20	-0.43	0.10	0.25
1998	2	21NIG020	U-D	5.0JMA	28.0	-1.36	-0.35	0.42	0.17	0.33	0.50
1998	2	22NIG020	U-D	3.9JMA	28.0	-2.33	-2.27	-1.38	-0.96	-0.47	0.05
1998	2	21NIG021	U-D	5.0JMA	29.0	-0.83	0.18	0.59	0.69	0.21	0.44
1998	2	22NIG021	U-D	3.9JMA	29.0	-2.14	-1.95	-1.21	-1.00	-0.81	-0.63
1998	2	21NIG022	U-D	5.0JMA	36.0	-1.24	-0.49	0.13	0.25	0.63	0.04
1998	2	22NIG022	U-D	3.9JMA	36.0	-2.40	-2.17	-1.88	-1.35	-0.68	-0.87
1998	2	21NIG023	U-D	5.0JMA	41.0	-1.00	-0.28	0.09	0.54	0.07	-0.17
1998	2	21NIG024	U-D	5.0JMA	48.0	-0.86	-0.16	0.33	0.35	-0.10	0.21
1998	2	22NIG024	U-D	3.9JMA	48.0	-2.35	-2.30	-1.79	-1.52	-1.22	-1.29
1998	2	21NIG025	U-D	5.0JMA	69.0	-1.25	-0.46	-0.03	0.37	0.02	-0.18
1998	2	21NIG026	U-D	5.0JMA	70.0	-1.54	-0.41	-0.15	-0.02	-0.17	-0.34
1998	2	21TCG004	U-D	5.0JMA	91.0	-1.59	-1.43	-0.87	-0.46	-0.14	-0.29
1997	5	13KGS001	U-D	6.2JMA	26.0	0.03	0.41	0.53	0.72	0.66	0.71
1997	5	13KGS002	U-D	6.2JMA	14.0	-0.47	0.35	1.31	1.07	1.04	1.04
1997	5	13KGS003	U-D	6.2JMA	33.0	-0.12	0.87	1.23	0.90	0.58	0.85
1997	5	13KGS004	U-D	6.2JMA	14.0	0.31	0.66	0.79	0.82	1.02	0.94
1997	5	13KGS005	U-D	6.2JMA	22.0	0.35	0.71	1.21	1.60	1.39	1.24
1997	5	13KGS006	U-D	6.2JMA	46.0	-0.28	0.81	1.07	1.28	0.89	0.91
1997	5	13KGS007	U-D	6.2JMA	22.0	0.07	0.60	1.11	1.56	1.27	1.22
1997	5	13KGS008	U-D	6.2JMA	42.0	0.35	0.73	1.47	1.13	0.67	0.61
1997	5	13KGS009	U-D	6.2JMA	59.0	-0.07	0.94	1.40	0.74	0.49	0.36
1997	5	13KGS010	U-D	6.2JMA	33.0	-0.30	0.96	1.07	1.35	0.65	1.24
1997	5	13KGS011	U-D	6.2JMA	47.0	0.08	0.31	0.23	0.78	0.89	1.01
1997	5	13KGS012	U-D	6.2JMA	54.0	0.16	0.71	1.00	0.56	0.61	0.58
1997	5	13KGS013	U-D	6.2JMA	89.0	-0.16	0.48	0.44	0.34	-0.17	-0.05
1997	5	13KGS014	U-D	6.2JMA	73.0	-0.14	0.37	0.29	0.06	0.00	-0.20
1997	5	13KGS016	U-D	6.2JMA	65.0	-0.11	0.16	0.44	0.42	0.48	0.52

1997	5	13KGS017	U-D	6.2JMA	94.0	-0.47	0.09	0.05	0.78	0.27	0.19
1997	5	13KGS018	U-D	6.2JMA	75.0	-0.40	-0.09	0.72	0.82	1.30	0.80
1997	5	13KGS019	U-D	6.2JMA	82.0	-0.18	0.05	0.00	0.32	0.42	0.57
1997	5	13KGS020	U-D	6.2JMA	87.0	-0.22	0.36	0.47	0.63	0.71	0.84
1997	5	13KGS021	U-D	6.2JMA	92.0	-0.01	0.34	0.19	0.87	0.48	0.37
1997	5	13KGS036	U-D	6.2JMA	52.0	0.02	0.23	0.13	0.61	1.02	0.40
1997	5	13KGS037	U-D	6.2JMA	78.0	-0.21	-0.22	-0.26	-0.05	0.15	0.33
1997	5	13KMM008	U-D	6.2JMA	85.0	-0.54	0.46	0.37	0.26	0.16	-0.39
1997	5	13KMM010	U-D	6.2JMA	71.0	-0.52	0.40	0.42	0.20	0.13	-0.37
1997	5	13KMM011	U-D	6.2JMA	94.0	-0.35	0.15	0.10	-0.05	0.20	0.35
1997	5	13KMM012	U-D	6.2JMA	67.0	-0.40	0.49	0.58	0.31	0.24	-0.14
1997	5	13KMM013	U-D	6.2JMA	47.0	-0.37	0.58	0.67	0.31	0.31	0.28
1997	5	13KMM014	U-D	6.2JMA	73.0	-0.40	0.05	0.25	-0.13	0.32	0.61
1997	5	13KMM015	U-D	6.2JMA	27.0	-0.24	0.59	0.90	0.93	0.71	0.31
1997	5	13KMM016	U-D	6.2JMA	54.0	-0.34	0.51	0.82	0.45	0.58	0.79
1997	5	13KMM017	U-D	6.2JMA	76.0	-0.25	0.83	0.77	0.32	0.29	0.30
1997	5	13KMM018	U-D	6.2JMA	45.0	-0.80	0.53	0.30	0.23	-0.02	0.27
1997	5	13KMM020	U-D	6.2JMA	42.0	-0.27	0.61	0.46	0.38	-0.06	-0.05
1997	5	13KMM021	U-D	6.2JMA	54.0	-0.41	0.15	0.15	0.20	0.25	0.06
1997	5	13KMM022	U-D	6.2JMA	38.0	-0.07	0.56	0.24	0.36	0.73	0.44
1997	5	13MYZ007	U-D	6.2JMA	94.0	-0.48	0.03	0.29	-0.11	-0.35	-0.29
1997	5	13MYZ010	U-D	6.2JMA	75.0	-0.02	0.62	0.57	0.00	-0.30	-0.47
1997	5	13MYZ015	U-D	6.2JMA	92.0	-0.30	0.35	0.72	0.51	0.38	0.83
1997	5	13NGS009	U-D	6.2JMA	98.0	-0.17	0.01	0.04	-0.07	-0.48	-0.49
1997	5	13NGS010	U-D	6.2JMA	94.0	-0.49	-0.23	-0.16	0.12	0.06	0.21
1997	5	13NGS012	U-D	6.2JMA	87.0	-0.49	0.29	0.16	-0.03	0.03	-0.58
1997	5	13NGS013	U-D	6.2JMA	87.0	-0.57	-0.17	-0.23	-0.26	-0.37	-0.52
1997	5	13NGS014	U-D	6.2JMA	70.0	-0.61	0.76	0.55	0.62	0.82	0.22
1997	3	26KGS001	U-D	6.3JMA	33.0	0.47	0.20	0.69	0.89	0.60	0.65
1997	3	26KGS002	U-D	6.3JMA	14.0	0.49	0.21	1.05	1.08	0.89	1.15
1997	3	26KGS003	U-D	6.3JMA	23.0	0.06	1.25	1.28	1.02	0.83	0.93

1997	3	26KGS004	U-D	6.3JMA	24.0	-0.39	0.73	1.42	0.79	0.78	1.04
1997	3	26KGS005	U-D	6.3JMA	15.0	0.74	0.75	1.67	1.33	1.30	1.20
1997	3	26KGS006	U-D	6.3JMA	36.0	-0.38	0.69	1.11	0.88	0.91	1.06
1997	3	26KGS007	U-D	6.3JMA	25.0	-0.31	0.71	1.38	1.05	0.90	1.13
1997	3	26KGS008	U-D	6.3JMA	34.0	0.34	1.09	1.62	1.28	0.67	0.73
1997	3	26KGS009	U-D	6.3JMA	51.0	0.24	0.95	1.36	0.71	0.70	0.60
1997	3	26KGS010	U-D	6.3JMA	36.0	-0.19	0.45	1.22	1.17	0.71	1.07
1997	3	26KGS011	U-D	6.3JMA	47.0	-0.14	0.28	0.04	0.49	0.55	0.73
1997	3	26KGS012	U-D	6.3JMA	49.0	0.11	0.70	1.08	0.54	0.45	0.47
1997	3	26KGS013	U-D	6.3JMA	80.0	-0.27	0.40	0.36	0.37	-0.14	0.14
1997	3	26KGS014	U-D	6.3JMA	67.0	-0.19	0.07	0.70	0.03	-0.10	-0.25
1997	3	26KGS015	U-D	6.3JMA	94.0	-0.20	0.27	0.60	0.37	0.32	0.16
1997	3	26KGS016	U-D	6.3JMA	67.0	-0.39	-0.18	-0.18	0.32	0.32	0.58
1997	3	26KGS017	U-D	6.3JMA	85.0	-0.41	0.09	0.39	0.61	0.25	0.19
1997	3	26KGS018	U-D	6.3JMA	71.0	-0.49	0.08	0.68	0.60	1.10	0.71
1997	3	26KGS019	U-D	6.3JMA	82.0	-0.36	-0.19	0.20	0.08	0.20	0.46
1997	3	26KGS020	U-D	6.3JMA	85.0	-0.43	0.33	0.50	0.57	0.51	0.68
1997	3	26KGS021	U-D	6.3JMA	87.0	0.04	0.38	0.33	0.53	0.43	0.26
1997	3	26KGS036	U-D	6.3JMA	62.0	0.24	0.16	0.28	0.56	0.82	0.48
1997	3	26KGS037	U-D	6.3JMA	87.0	-0.05	-0.39	-0.26	-0.05	0.13	0.47
1997	3	26KMM006	U-D	6.3JMA	96.0	-0.48	0.12	0.33	0.03	0.41	-0.17
1997	3	26KMM008	U-D	6.3JMA	82.0	-0.25	0.48	0.61	0.45	0.38	-0.14
1997	3	26KMM010	U-D	6.3JMA	70.0	-0.17	0.29	0.39	0.60	0.20	-0.17
1997	3	26KMM011	U-D	6.3JMA	85.0	0.01	0.13	0.37	0.16	0.43	0.46
1997	3	26KMM012	U-D	6.3JMA	61.0	-0.18	0.19	0.69	0.48	0.51	0.02
1997	3	26KMM013	U-D	6.3JMA	42.0	-0.04	0.29	0.56	0.49	0.47	0.43
1997	3	26KMM014	U-D	6.3JMA	65.0	-0.09	0.07	0.19	0.16	0.42	0.67
1997	3	26KMM015	U-D	6.3JMA	25.0	-0.01	0.44	0.87	1.18	0.74	0.43
1997	3	26KMM016	U-D	6.3JMA	44.0	0.19	0.68	0.81	0.50	0.60	0.91
1997	3	26KMM017	U-D	6.3JMA	65.0	-0.07	0.99	0.71	0.51	0.37	0.50
1997	3	26KMM018	U-D	6.3JMA	44.0	-0.06	-0.06	0.03	0.06	0.23	0.38

1997	3	26KMM020	U-D	6.3JMA	47.0	0.30	0.16	0.29	0.35	0.18	0.15
1997	3	26KMM021	U-D	6.3JMA	61.0	0.09	0.07	0.17	0.38	0.31	0.11
1997	3	26KMM022	U-D	6.3JMA	47.0	0.22	0.44	0.81	0.53	0.82	0.54
1997	3	26MYZ007	U-D	6.3JMA	84.0	-0.21	0.09	0.24	0.05	-0.20	-0.04
1997	3	26MYZ009	U-D	6.3JMA	46.0	0.21	1.16	1.34	0.90	0.49	0.60
1997	3	26MYZ010	U-D	6.3JMA	64.0	-0.36	0.67	0.50	0.33	0.09	-0.11
1997	3	26MYZ011	U-D	6.3JMA	96.0	-0.59	0.14	0.33	0.23	-0.17	-0.38
1997	3	26MYZ012	U-D	6.3JMA	76.0	-0.52	0.28	0.25	-0.13	0.17	0.16
1997	3	26MYZ015	U-D	6.3JMA	80.0	0.58	0.63	0.98	0.52	0.42	0.83
1997	3	26MYZ020	U-D	6.3JMA	98.0	-0.10	0.11	0.00	0.00	0.12	0.03
1997	3	26NGS012	U-D	6.3JMA	87.0	-0.13	-0.04	0.10	0.08	0.22	-0.44
1997	3	26NGS013	U-D	6.3JMA	96.0	-0.22	-0.59	-0.16	0.01	-0.46	-0.44
1997	3	26NGS014	U-D	6.3JMA	71.0	0.14	0.26	0.49	0.72	0.65	0.41
1997	3	3CHB015	U-D	5.0JMA	89.0	-0.72	-0.58	-0.36	0.23	-0.19	-0.68
1997	3	3CHB019	U-D	5.0JMA	73.0	-0.68	-0.41	-0.14	0.50	-0.32	-0.79
1997	3	3CHB021	U-D	5.0JMA	79.0	-1.09	-0.57	-0.42	-0.33	-0.55	-0.66
1997	3	3CHB022	U-D	5.0JMA	81.0	-0.79	-0.61	-0.03	0.03	-0.28	-0.24
1997	3	3KNG001	U-D	5.0JMA	81.0	-0.79	-0.55	-0.52	-0.31	0.07	-0.30
1997	3	3KNG002	U-D	5.0JMA	68.0	-0.22	-0.19	-0.24	0.00	-0.04	-0.41
1997	3	3KNG003	U-D	5.0JMA	59.0	-1.11	-0.75	-0.30	-0.19	-0.22	-0.72
1997	3	3KNG004	U-D	5.0JMA	50.0	-1.01	-0.18	-0.26	0.00	-0.01	0.07
1997	3	3KNG005	U-D	5.0JMA	53.0	-0.57	-0.50	-0.31	0.13	0.26	-0.43
1997	3	3KNG008	U-D	5.0JMA	65.0	-1.52	-0.80	-0.95	-0.61	-0.34	-0.26
1997	3	3KNG009	U-D	5.0JMA	53.0	-1.02	-0.32	-0.60	-0.30	-0.03	-0.57
1997	3	3KNG010	U-D	5.0JMA	41.0	-0.99	-0.17	-0.08	-0.21	-0.39	-0.66
1997	3	3KNG012	U-D	5.0JMA	42.0	-0.66	-0.65	-0.56	-0.59	-0.52	-0.56
1997	3	3KNG013	U-D	5.0JMA	30.0	-0.55	-0.09	0.31	0.55	0.20	-0.11
1997	3	3SZO001	U-D	5.0JMA	21.0	-0.57	-0.34	-0.40	-0.38	-0.29	-0.01
1997	3	3SZO002	U-D	5.0JMA	12.0	-0.23	0.39	0.94	1.00	1.31	1.18
1997	3	3SZO003	U-D	5.0JMA	26.0	-0.50	-0.64	-0.36	0.18	0.69	0.60
1997	3	3SZO004	U-D	5.0JMA	58.0	-0.93	-0.93	-0.47	-0.46	-0.42	-0.37

1997	3	3SZO006	U-D	5.0JMA	46.0	-1.03	-0.89	-0.69	-0.44	-0.53	-0.52
1997	3	3SZO007	U-D	5.0JMA	28.0	-0.99	-0.43	-0.19	-0.49	0.29	0.08
1997	3	3SZO008	U-D	5.0JMA	38.0	-0.70	-0.35	-0.06	0.04	-0.10	-0.37
1997	3	3SZO009	U-D	5.0JMA	38.0	-0.64	-0.41	-0.16	-0.21	-0.37	-0.43
1997	3	3SZO010	U-D	5.0JMA	45.0	-0.75	-0.53	-0.26	-0.28	-0.52	-0.77
1997	3	3SZO011	U-D	5.0JMA	68.0	-0.80	-0.50	-0.64	-0.64	-0.45	-0.84
1997	3	3SZO012	U-D	5.0JMA	66.0	-0.35	-0.74	-0.67	-0.59	-0.71	-0.59
1997	3	3TKY002	U-D	5.0JMA	81.0	-1.32	-1.33	-1.27	-1.22	-0.98	-0.85
1997	3	3TKY003	U-D	5.0JMA	89.0	-1.40	-1.37	-1.11	-1.08	-0.38	-0.93
1997	3	3TKY005	U-D	5.0JMA	68.0	-1.16	-0.83	-0.76	-0.53	-0.38	-0.28
1997	3	3TKY006	U-D	5.0JMA	85.0	-1.15	-0.57	-0.64	-0.66	-0.46	-0.48
1997	3	3TKY007	U-D	5.0JMA	96.0	-0.96	-0.65	-0.69	-0.56	-0.51	-0.40
1997	3	3TKY008	U-D	5.0JMA	32.0	-0.90	-0.47	-0.26	-0.12	0.29	-0.01
1997	3	3TKY009	U-D	5.0JMA	45.0	-0.71	-0.51	-0.20	-0.68	-0.30	-0.67
1997	3	3TKY010	U-D	5.0JMA	69.0	-0.53	-0.86	-0.51	-0.13	0.01	-0.34
1997	3	3YMN002	U-D	5.0JMA	73.0	-1.03	-1.13	-1.14	-0.82	-0.45	-0.34
1997	2	20HKD100	U-D	5.6JMA	87.0	-0.48	-0.28	-0.17	0.01	0.41	0.51
1997	2	20HKD106	U-D	5.6JMA	97.0	-0.62	-0.12	0.07	0.52	-0.07	-0.47
1997	2	20HKD107	U-D	5.6JMA	95.0	-0.76	-0.25	-0.07	0.06	-0.27	-0.88
1997	2	20HKD108	U-D	5.6JMA	79.0	-0.56	-0.36	0.13	0.16	0.28	-0.30
1997	2	20HKD109	U-D	5.6JMA	66.0	-0.39	-0.11	0.31	0.48	0.43	0.31
1997	2	20HKD110	U-D	5.6JMA	62.0	-0.72	-0.19	0.31	0.33	0.43	0.32
1997	2	20HKD111	U-D	5.6JMA	62.0	-0.48	-0.20	0.20	0.11	0.36	0.10
1997	2	20HKD112	U-D	5.6JMA	65.0	-0.29	0.15	0.38	0.37	0.81	0.56
1997	1	18KGS030	U-D	6.0JMA	64.0	-0.71	-0.08	-0.07	0.57	0.63	0.23
1997	1	18KGS031	U-D	6.0JMA	88.0	-0.66	-0.27	-0.27	0.50	0.53	0.40
1996	12	3KGS009	U-D	6.3JMA	98.0	-0.39	0.92	1.04	0.58	0.15	-0.25
1996	12	3KGS013	U-D	6.3JMA	77.0	-0.32	0.30	0.53	0.50	0.08	-0.01
1996	12	3KGS015	U-D	6.3JMA	83.0	-0.72	0.46	0.92	0.74	0.47	0.14
1996	12	3KGS017	U-D	6.3JMA	98.0	-0.48	0.42	0.42	0.86	0.56	0.08
1996	12	3KGS022	U-D	6.3JMA	88.0	-0.51	0.09	0.18	-0.05	-0.11	-0.29

1996 12	3KMM017	U-D	6.3JMA	94.0	0.15	1.08	0.87	0.55	0.16	-0.26
1996 12	3MYZ004	U-D	6.3JMA	77.0	-0.01	0.28	0.51	0.65	0.05	-0.16
1996 12	3MYZ005	U-D	6.3JMA	75.0	-0.03	0.40	0.56	0.74	0.28	-0.04
1996 12	3MYZ006	U-D	6.3JMA	59.0	0.07	0.15	0.91	0.97	0.66	0.55
1996 12	3MYZ007	U-D	6.3JMA	78.0	0.02	0.33	0.19	0.25	-0.06	-0.12
1996 12	3MYZ008	U-D	6.3JMA	51.0	-0.04	0.46	0.94	0.94	0.76	0.93
1996 12	3MYZ009	U-D	6.3JMA	96.0	0.08	0.70	1.12	0.86	0.04	-0.43
1996 12	3MYZ010	U-D	6.3JMA	78.0	-0.07	0.86	0.66	0.52	0.09	-0.31
1996 12	3MYZ011	U-D	6.3JMA	53.0	-0.36	0.40	0.77	0.71	0.57	0.27
1996 12	3MYZ012	U-D	6.3JMA	67.0	-0.30	0.24	0.47	0.31	0.76	0.17
1996 12	3MYZ013	U-D	6.3JMA	38.0	-0.16	0.39	0.90	1.27	1.33	0.84
1996 12	3MYZ014	U-D	6.3JMA	45.0	-0.12	0.60	0.70	0.73	1.28	0.62
1996 12	3MYZ015	U-D	6.3JMA	67.0	-0.17	0.89	0.94	0.85	0.45	0.69
1996 12	3MYZ016	U-D	6.3JMA	44.0	-0.25	0.29	0.73	1.14	0.32	0.10
1996 12	3MYZ018	U-D	6.3JMA	63.0	-0.35	0.33	0.35	0.82	0.47	-0.13
1996 12	3MYZ019	U-D	6.3JMA	85.0	0.17	0.42	0.63	0.24	0.04	-0.53
1996 12	3MYZ020	U-D	6.3JMA	92.0	0.01	-0.08	0.22	0.32	0.18	0.07

Mexico:

yr	mmdd	station	comp	magtype	R (km)	A0.2	A0.5	A1	A2	A5	A10
						0.20	0.50	1.00	2.00	5.01	10.00
97	8	2ATYC	V	4.2Mc	34.0	-2.25	-2.31	-2.32	-1.68	-1.04	-0.31
97	8	5COYC	V	4.2Mc	72.0	-1.80	-2.57	-2.47	-2.23	-1.38	-0.99
97	8	14COYC	V	4.0Mc	30.0	-1.88	-2.10	-2.08	-1.54	-1.30	-0.76
97	8	14VNTA	V	4.0Mc	47.0	-2.07	-2.55	-2.49	-1.74	-1.51	-0.91
97	8	25VNTA	V	3.9Mc	29.0	-1.86	-2.56	-2.82	-2.02	-1.61	-0.66
97	7	19ATYC	V	4.9Mc	56.0	-1.16	-1.09	-0.53	0.15	0.35	0.50
97	7	19ATYC	V	4.5Mc	44.0	-1.60	-1.81	-1.65	-0.85	-0.39	0.09
97	7	24ATYC	V	4.3Mc	44.0	-2.32	-2.33	-1.93	-1.62	-0.77	-0.59
97	7	24ATYC	V	4.5Mc	73.0	-1.98	-2.25	-1.29	-1.28	-0.56	-0.43
97	7	19CAYR	V	4.9Mc	62.0	-0.60	-1.03	-0.74	-0.26	0.10	-0.35
97	7	11COYC	V	4.3Ma	67.0	-1.94	-2.06	-1.58	-1.48	-0.68	-0.27

97	7	19COYC	V	4.9Mc	74.0	-1.56	-1.52	-0.74	-0.39	-0.42	-0.15
97	7	11CPDR	V	4.3Ma	25.0	-1.58	-1.29	-0.86	-0.34	-0.11	0.52
97	7	15CPDR	V	4.0Mc	33.0	-2.16	-2.51	-2.59	-2.08	-1.41	-0.69
97	7	16CPDR	V	4.0Mc	54.0	-2.43	-2.12	-2.06	-2.01	-1.18	-0.84
97	7	19NUXC	V	4.9Mc	67.0	-1.38	-1.43	-1.01	-0.68	-0.54	-0.52
97	7	21NUXC	V	4.5Mc	96.0	-2.17	-1.99	-1.65	-1.19	-0.87	-0.84
97	7	11OCLL	V	4.3Ma	60.0	-1.30	-1.75	-1.39	-1.41	-1.08	-0.57
97	7	19OCLL	V	4.9Mc	86.0	-1.18	-1.50	-0.86	-0.45	-0.18	-0.42
97	7	19PAPN	V	4.9Mc	89.0	-2.58	-1.41	-0.69	-0.64	-0.52	0.06
97	7	19PAPN	V	4.5Mc	85.0	-2.29	-2.25	-1.50	-1.19	-0.77	-0.61
97	7	11POZU	V	4.3Ma	61.0	-2.59	-1.96	-1.48	-1.46	-0.80	-0.78
97	7	15POZU	V	4.0Mc	46.0	-2.82	-2.81	-2.88	-2.50	-1.65	-0.98
97	7	19SLUI	V	4.9Mc	76.0	-1.53	-1.58	-0.77	-0.52	-0.68	-0.37
97	7	19SLUI	V	4.5Mc	71.0	-2.11	-2.09	-1.57	-1.11	-0.77	-0.90
97	7	11SMR2	V	4.3Ma	38.0	-2.41	-2.13	-1.46	-1.28	-0.39	-0.84
97	7	11VNTA	V	4.3Ma	46.0	-2.06	-1.75	-1.37	-1.39	-0.96	-0.65
97	7	19VNTA	V	4.9Mc	94.0	-2.05	-1.78	-0.97	-0.70	-0.39	-0.86
97	6	15ATYC	V	4.0Mc	34.0	-2.13	-2.41	-2.14	-1.56	-1.04	-0.26
97	6	24CPDR	V	3.5Mc	35.0	-1.94	-1.92	-1.83	-1.79	-1.20	-0.52
97	6	26CPDR	V	3.9Mc	36.0	-1.96	-2.62	-2.57	-1.84	-1.15	-0.67
97	6	28CPDR	V	4.1Mc	14.0	-2.06	-2.58	-2.46	-1.82	-0.87	-0.95
97	6	17PAPN	V	4.2Mc	60.0	-1.95	-2.44	-2.00	-1.72	-1.29	-0.66
97	6	28POZU	V	4.1Mc	26.0	-2.80	-2.90	-2.45	-1.90	-1.18	-1.00
97	6	28VNTA	V	4.1Mc	23.0	-1.74	-2.35	-2.24	-2.12	-1.31	-1.22
97	5	8ATYC	V	5.1Me	16.0	-1.44	-0.74	-0.28	0.17	0.19	0.90
97	5	14ATYC	V	4.2Mc	31.0	-2.20	-2.38	-2.15	-1.33	-0.92	-0.50
97	5	8CAYR	V	5.1Me	30.0	-1.21	-1.37	-0.61	0.11	0.19	-0.07
97	5	8COYC	V	5.1Me	48.0	-1.46	-1.07	-0.43	0.02	-0.13	-0.05
97	5	8NUXC	V	5.1Me	45.0	-1.30	-0.98	-0.57	-0.39	-0.26	-0.16
97	5	19NUXC	V	4.3Mc	60.0	-1.79	-1.87	-1.34	-1.19	-0.79	-0.71
97	5	7PAPN	V	3.6Mc	38.0	-2.08	-2.38	-2.45	-2.50	-1.68	-1.02

97	5	8PAPN	V	5.1Me	75.0	-0.87	-1.24	-0.59	-0.40	-0.01	0.34
97	5	8POZU	V	5.1Me	86.0	-1.47	-1.42	-0.72	-0.17	-0.37	-0.40
97	5	8SLUI	V	5.1Me	58.0	-1.36	-0.93	-0.54	-0.55	0.01	-0.15
97	5	8SUCH	V	5.1Me	33.0	-1.75	-0.83	-0.41	-0.02	-0.05	0.07
97	5	19SUCH	V	4.3Mc	48.0	-1.98	-1.61	-1.23	-0.80	-0.27	-0.43
97	5	29UNIO	V	4.5Mc	64.0	-2.89	-2.48	-1.52	-0.99	-0.62	-0.78
97	5	21VILE	V	4.7Mc	75.0	-2.07	-1.66	-0.96	-0.61	-0.75	-1.03
97	5	22VILE	V	5.9Me	89.0	-0.35	0.08	0.60	0.39	0.59	0.41
97	4	22ATYC	V	3.5Mc	44.0	-1.97	-2.24	-2.28	-2.03	-1.27	-0.32
97	4	22ATYC	V	4.0Mc	34.0	-2.13	-2.20	-1.97	-1.54	-0.99	-0.65
97	4	18SMR2	V	3.7Mc	74.0	-2.16	-2.61	-2.39	-2.14	-1.48	-1.11
97	4	28TNLP	V	4.1Mc	47.0	-2.28	-2.18	-2.32	-2.01	-1.14	-1.00
97	3	22ACAN	V	4.9Mc	33.0	-0.82	-1.75	-0.71	-0.38	-0.35	-0.27
97	3	6ATYC	V	4.2Mc	36.0	-2.18	-2.43	-2.22	-1.63	-0.97	-0.27
97	3	16ATYC	V	4.1Mc	53.0	-2.36	-2.53	-1.86	-1.32	-1.03	-0.51
97	3	22ATYC	V	4.9Mc	76.0	-1.71	-1.41	-0.66	-0.74	-0.31	-0.19
97	3	23ATYC	V	4.7Mc	55.0	-1.15	-0.81	-0.63	-0.64	-0.16	0.12
97	3	6COYC	V	4.2Mc	30.0	-2.50	-2.10	-1.57	-0.80	-0.17	0.32
97	3	22COYC	V	4.9Mc	40.0	-1.04	-0.65	-0.06	-0.12	0.20	0.63
97	3	2CPDR	V	4.3Mc	100.0	-2.21	-2.43	-1.91	-1.54	-0.97	-0.77
97	3	22CPDR	V	4.9Mc	45.0	-1.88	-1.30	-0.65	-0.40	-0.22	0.38
97	3	22CPDR	V	4.6Mc	58.0	-1.45	-1.44	-1.17	-0.89	-0.76	-0.68
97	3	10NUXC	V	4.3Mc	83.0	-2.20	-2.42	-2.11	-1.49	-1.06	-1.06
97	3	23NUXC	V	4.7Mc	31.0	-1.50	-1.02	-0.46	-0.29	-0.39	-0.28
97	3	22OCLL	V	4.9Mc	28.0	-1.05	-1.20	-0.84	-0.39	-0.24	-0.19
97	3	22OCTT	V	4.9Mc	50.0	-0.77	-0.61	-0.62	-0.29	0.19	0.31
97	3	20PAPN	V	3.9Mc	59.0	-2.35	-2.44	-2.14	-1.81	-1.15	-0.09
97	3	23PAPN	V	4.7Mc	28.0	-0.83	-0.60	-0.49	0.09	0.60	0.97
97	3	24PAPN	V	4.3Mc	28.0	-2.32	-2.11	-1.87	-1.49	-1.07	-0.52
97	3	23PETA	V	4.7Mc	50.0	-0.69	-0.80	-0.60	-0.16	0.00	0.21
97	3	22POZU	V	4.9Mc	35.0	-1.33	-0.97	-0.62	-0.44	-0.27	0.13

97	3	10SLUI	V	4.3Mc	99.0	-2.35	-2.30	-1.90	-1.36	-0.65	-0.74
97	3	23SLUI	V	4.7Mc	24.0	-1.23	-1.09	-0.62	-0.38	0.02	-0.04
97	3	24SLUI	V	4.3Mc	29.0	-2.47	-2.37	-2.14	-1.44	-1.05	-0.77
97	3	22SMR2	V	4.9Mc	60.0	-1.94	-1.37	-0.58	-0.49	-0.86	-0.49
97	3	23SUCH	V	4.7Mc	36.0	-1.58	-0.87	-0.72	-0.39	-0.21	-0.30
97	3	16VNTA	V	4.1Mc	34.0	-2.75	-2.48	-2.07	-1.64	-0.88	-1.20
97	3	22VNTA	V	4.9Mc	29.0	-1.77	-1.05	-0.59	-0.25	-0.45	-0.27
97	3	22VNTA	V	4.6Mc	56.0	-2.50	-2.06	-1.09	-1.26	-1.11	-0.83
97	2	15NUXC	V	4.5Mc	33.0	-1.85	-1.81	-1.59	-1.00	-1.15	-1.11
97	2	15PAPN	V	4.5Mc	55.0	-1.99	-2.30	-1.50	-1.12	-0.84	-0.29
97	2	15SLUI	V	4.5Mc	42.0	-2.34	-2.00	-1.52	-1.01	-0.86	-0.95
97	1	11CALE	V	7.3Me	21.0	0.83	1.07	1.43	1.36	1.58	1.28
97	1	12CALE	V	4.7Mc	33.0	-0.47	-0.96	-0.50	-0.18	-0.53	-0.62
97	1	16CALE	V	5.4Me	29.0	-1.50	-0.44	0.76	0.66	0.21	0.16
97	1	11VILE	V	7.3Me	74.0	0.75	0.90	0.76	0.99	1.08	0.80
96	12	28NUXC	V	4.4Mc	68.0	-2.18	-2.35	-1.58	-1.23	-0.94	-0.98
96	12	28PAPN	V	4.4Mc	40.0	-1.95	-1.91	-1.62	-1.01	-0.59	-0.18
96	12	28SLUI	V	4.4Mc	54.0	-2.15	-2.46	-1.42	-1.01	-1.18	-0.55
96	11	3CPDR	V	4.1Mc	32.0	-2.13	-2.22	-2.13	-1.55	-1.07	-0.35
96	11	20CPDR	V	4.1Mc	95.0	-2.15	-2.49	-2.00	-1.93	-1.38	-0.61
96	11	20OCLI	V	4.1Mc	81.0	-1.19	-1.86	-2.05	-1.55	-1.00	-0.76
96	11	20POZU	V	4.1Mc	90.0	-1.87	-1.81	-1.79	-1.63	-1.06	-0.65
96	10	1ATYC	V	4.3Mc	88.0	-2.05	-2.48	-2.18	-1.69	-1.13	-0.09
96	10	17COPL	V	4.9Mc	13.0	-0.83	-0.75	-0.82	-0.10	0.59	-0.17
96	10	17CPDR	V	4.9Mc	80.0	-2.11	-1.76	-0.82	-0.47	-0.39	-0.45
96	10	27NUXC	V	4.4Mc	92.0	-1.94	-2.24	-1.66	-0.96	-1.13	-0.63
96	10	20PAPN	V	4.3Mc	30.0	-2.11	-2.34	-1.88	-1.43	-0.88	-0.04
96	10	27PAPN	V	4.4Mc	94.0	-1.45	-1.46	-1.33	-1.21	-0.47	-0.02
96	10	17POZU	V	4.9Mc	98.0	-1.25	-1.35	-1.05	-0.85	-0.14	-0.36
96	10	20SLUI	V	4.3Mc	37.0	-2.08	-2.50	-1.96	-1.33	-1.12	-0.88
96	10	27SLUI	V	4.4Mc	91.0	-1.86	-2.13	-1.65	-1.09	-0.91	-0.59

96	10	17SMR2	V	4.9Mc	58.0	-1.93	-1.72	-1.19	-0.71	-0.34	-0.37
96	9	22ATYC	V	4.2Mc	27.0	-2.01	-2.30	-2.07	-1.50	-1.01	-0.12
96	9	3COYC	V	4.9Mc	36.0	-1.83	-1.08	-0.87	-0.58	-0.58	-0.29
96	9	3CPDR	V	4.9Mc	21.0	-1.35	-1.16	-0.63	-0.48	-0.35	-0.63
96	9	3VNTA	V	4.9Mc	14.0	-1.57	-1.08	-0.63	-0.50	-0.65	-0.85
96	8	27CPDR	V	4.5Mc	39.0	-2.22	-1.72	-1.21	-0.53	-0.38	-0.46
96	8	8OCLL	V	3.8Mc	23.0	-1.39	-2.11	-2.17	-2.01	-1.20	-0.70
96	8	27POZU	V	4.5Mc	69.0	-2.03	-1.63	-1.52	-1.00	-0.50	-0.52
96	8	27SMR2	V	4.5Mc	32.0	-1.88	-1.55	-1.04	-0.51	-0.08	-0.61
96	8	8VNTA	V	3.8Mc	26.0	-2.35	-2.27	-2.65	-1.92	-1.15	-1.14
96	7	15ATYC	V	6.5Me	87.0	-0.75	0.23	0.20	0.42	0.52	0.59
96	7	19ATYC	V	4.8Mc	24.0	-1.26	-1.20	-0.52	-0.10	0.05	0.45
96	7	15AZIH	V	6.5Me	40.0	0.35	0.20	0.47	0.42	0.68	0.41
96	7	6CPDR	V	4.2Mc	68.0	-1.34	-1.83	-2.16	-1.91	-0.92	-0.31
96	7	15NUXC	V	6.5Me	55.0	-0.61	-0.22	0.26	0.78	0.57	0.09
96	7	18NUXC	V	4.8Mc	69.0	-1.82	-1.05	-0.48	-0.16	-0.21	-0.45
96	7	19NUXC	V	4.8Mc	54.0	-1.84	-1.33	-0.95	-0.60	-0.53	-0.74
96	7	6OCLL	V	4.2Mc	36.0	-1.19	-1.72	-2.15	-1.48	-1.11	-0.81
96	7	19OCLL	V	4.8Mc	61.0	-1.31	-1.13	-0.66	-0.46	-0.54	-0.21
96	7	15PAPN	V	6.5Me	26.0	0.02	0.31	0.84	1.00	0.92	1.22
96	7	15PAPN	V	4.3Mc	28.0	-2.04	-2.01	-2.19	-1.44	-0.54	-0.44
96	7	15PAPN	V	4.8Mc	25.0	-1.89	-2.15	-1.27	-1.06	-0.47	-0.50
96	7	15PAPN	V	4.1Mc	50.0	-2.12	-2.12	-1.37	-0.81	-0.84	-0.40
96	7	16PAPN	V	4.9Mc	45.0	-1.43	-0.74	-0.53	-0.69	-0.62	-0.19
96	7	16PAPN	V	4.8Mc	35.0	-1.81	-1.00	-0.58	-0.35	0.09	0.10
96	7	16PAPN	V	4.1Mc	24.0	-2.17	-2.42	-1.70	-1.54	-1.28	-0.19
96	7	18PAPN	V	4.8Mc	36.0	-0.71	-0.55	-0.42	0.06	0.16	0.63
96	7	19PAPN	V	4.8Mc	83.0	-1.78	-1.35	-0.73	-0.95	-0.66	-0.06
96	7	15PETA	V	6.5Me	23.0	0.43	0.29	0.49	0.67	0.64	0.87
96	7	16PETA	V	4.8Mc	34.0	-0.67	-0.67	-0.51	-0.01	0.24	-0.14
96	7	16PETA	V	4.1Mc	35.0	-0.65	-1.70	-1.12	-1.12	-0.94	-0.59

96	7	18PETA	V	4.8Mc	7.0	-1.05	-0.59	-0.55	0.10	0.31	0.49
96	7	19POZU	V	4.8Mc	80.0	-2.12	-1.48	-1.33	-0.63	-0.67	-0.56
96	7	15UNIO	V	6.5Me	95.0	-0.25	0.20	0.24	0.28	0.51	0.03
96	7	18UNIO	V	4.8Mc	76.0	-1.13	-0.81	-0.73	-0.50	0.15	-0.33
96	7	19VNTA	V	4.8Mc	73.0	-1.82	-1.16	-0.60	-0.63	-0.71	-0.56
96	6	8CPDR	V	4.4Mc	20.0	-2.26	-1.60	-1.00	-0.35	-0.41	-0.37
96	6	11CPDR	V	3.9Mc	35.0	-2.47	-2.53	-2.84	-2.23	-0.95	-0.93
96	6	11OCLL	V	3.9Mc	41.0	-1.59	-2.23	-2.36	-1.46	-1.01	-0.79
96	6	30PAPN	V	4.6Mc	67.0	-2.00	-2.05	-1.63	-1.02	-0.90	-0.05
96	6	30PETA	V	4.6Mc	62.0	-0.50	-1.42	-1.29	-0.80	-0.46	-0.45
96	6	8POZU	V	4.4Mc	56.0	-2.32	-1.94	-1.76	-1.08	-0.78	-0.46
96	6	8SMR2	V	4.4Mc	34.0	-2.12	-1.91	-1.12	-0.63	0.13	0.16
96	6	8VNTA	V	4.4Mc	40.0	-2.23	-1.86	-1.42	-0.90	-0.92	-0.92
96	6	11VNTA	V	3.9Mc	31.0	-2.17	-2.33	-2.60	-1.73	-0.96	-0.66
96	6	24VNTA	V	3.9Mc	31.0	-1.93	-2.44	-2.39	-1.58	-1.37	-1.07
96	5	8COYC	V	4.6Mc	25.0	-2.28	-1.44	-1.06	-0.59	-0.48	-0.42
96	5	8COYC	V	4.6Mc	25.0	-2.04	-1.51	-1.36	-1.04	-0.41	-0.01
96	5	8COYC	V	4.7Mc	28.0	-1.72	-1.37	-1.02	-0.37	0.10	-0.18
96	5	8CPDR	V	4.7Mc	72.0	-2.16	-1.75	-1.27	-0.71	-1.04	-0.68
96	5	8OCLL	V	4.7Mc	50.0	-1.30	-1.50	-1.11	-1.01	-0.67	-0.30
96	5	6PAPN	V	3.8Mc	41.0	-2.01	-2.62	-2.44	-2.29	-1.41	-0.83
96	5	8PAPN	V	4.5Mc	27.0	-2.03	-1.86	-1.25	-0.74	-1.13	-0.45
96	5	8VNTA	V	4.6Mc	48.0	-1.94	-1.90	-1.59	-0.97	-0.96	-1.07
96	5	8VNTA	V	4.7Mc	53.0	-1.81	-1.77	-1.32	-0.81	-0.81	-0.52
96	4	23ATYC	V	5.4Mc	87.0	-1.20	-0.89	-0.62	-0.74	-0.58	-0.14
96	4	29ATYC	V	4.7Mc	45.0	-1.84	-1.66	-1.62	-0.66	-0.55	-0.06
96	4	29NUXC	V	4.7Mc	32.0	-2.13	-1.55	-1.38	-0.62	-0.21	-0.48
96	4	18PAPN	V	4.9Mc	34.0	-1.44	-1.08	-0.73	-0.53	-0.39	-0.15
96	4	23PAPN	V	5.4Mc	31.0	-0.76	-0.30	-0.40	-0.29	-0.32	0.15
96	4	29PAPN	V	4.7Mc	46.0	-2.03	-2.20	-1.36	-0.76	-0.38	0.07
96	4	23PETA	V	5.4Mc	42.0	-1.17	-0.21	-0.12	-0.12	-0.38	-0.39

96	4	29SUCH	V	4.7Mc	32.0	-2.62	-1.78	-1.45	-0.62	-0.46	-0.49
96	3	13COPL	V	5.3Me	44.0	-1.19	-0.61	-0.38	-0.13	-0.05	-0.08
96	3	13CPDR	V	5.3Me	67.0	-1.69	-0.71	-0.22	-0.05	-0.03	0.14
96	3	31PAPN	V	4.7Mc	53.0	-1.67	-1.27	-0.72	-0.19	-0.18	0.15
96	3	13POZU	V	5.3Me	90.0	-1.81	-1.05	-0.51	-0.46	-0.21	0.00
96	3	31SLUI	V	4.7Mc	61.0	-1.89	-1.48	-0.95	-0.32	-0.45	-0.62
96	3	13SMR2	V	5.3Me	53.0	-1.01	-0.39	0.00	0.26	0.23	-0.10
96	3	13VIGA	V	5.3Me	46.0	-0.45	-0.69	-0.28	-0.08	0.36	0.80
96	3	13VNTA	V	5.3Me	92.0	-1.62	-1.13	-0.86	-0.78	-0.51	-0.49
96	1	1CPDR	V	4.4Mc	50.0	-2.46	-2.32	-1.68	-1.41	-0.93	-0.27
96	1	1POZU	V	4.4Mc	47.0	-2.52	-2.26	-1.90	-1.48	-0.88	-0.55
96	1	25UNIO	V	5.1Mc	72.0	-1.42	-0.28	-0.09	0.15	0.20	-0.14
96	1	25VILE	V	5.1Mc	52.0	-0.81	-0.12	-0.14	0.47	0.17	-0.13
96	1	1VNTA	V	4.4Mc	49.0	-2.19	-2.29	-1.78	-1.31	-1.21	-0.99
95	12	25ATYC	V	4.2Mc	50.0	-0.89	-0.96	-1.03	-0.90	-0.52	-0.13
95	12	9CPDR	V	4.3Mc	26.0	-2.86	-2.30	-1.75	-1.14	-0.70	-0.31
95	12	24PAPN	V	3.3Mb	63.0	0.08	-0.39	-0.66	-0.79	-0.88	-0.34
95	12	24PETA	V	3.3Mb	59.0	-0.40	-1.10	-1.30	-0.97	-0.65	-0.56
95	12	16POZU	V	4.1Mc	53.0	-1.21	-1.86	-2.13	-2.12	-1.49	-0.89
95	12	9VNTA	V	4.3Mc	31.0	-2.48	-2.54	-1.77	-1.36	-0.94	-0.72
95	11	2COPL	V	4.2Mc	64.0	-1.00	-1.72	-1.34	-1.49	-0.76	-0.91
95	11	12CPDR	V	3.9Mc	49.0	-2.50	-2.47	-2.74	-2.18	-1.33	-0.43
95	11	22PETA	V	4.4Mc	31.0	-0.38	-1.37	-1.21	-1.51	-0.54	-0.46
95	11	27POZU	V	3.9Mc	48.0	-2.94	-3.35	-2.95	-2.43	-1.46	-1.01
95	11	12VNTA	V	3.9Mc	32.0	-2.47	-2.40	-2.46	-1.97	-1.55	-0.82
95	10	13COPL	V	4.3Mb	76.0	-1.24	-1.32	-1.01	-0.23	-0.04	-0.75
95	10	31COPL	V	4.2Mb	48.0	-1.00	-1.52	-1.23	-1.02	-0.87	-0.77
95	10	27CPDR	V	4.6Mc	61.0	-2.26	-1.80	-1.42	-1.31	-0.82	-0.60
95	9	14COPL	V	6.4Mb	41.0	0.64	1.27	1.17	1.02	0.89	0.56
95	9	14COPL	V	4.4Mb	84.0	-0.58	-0.99	-0.75	-0.36	0.04	-0.43
95	9	14COPL	V	3.9Mc	58.0	-1.43	-1.51	-1.13	-1.20	-0.85	-0.99

95	9	15COPL	V	4.2Mc	92.0	-0.78	-1.87	-1.25	-1.38	-0.82	-0.83
95	9	16COPL	V	5.1Mb	52.0	-1.18	-0.58	-0.23	-0.63	-0.58	-0.69
95	9	16COPL	V	4.9Mb	60.0	-1.44	-1.38	-0.71	-0.36	-0.52	-0.68
95	9	20COPL	V	4.7Mb	44.0	-1.24	-0.89	-0.20	0.07	-0.49	-1.06
95	9	28COPL	V	4.1Mc	65.0	-0.94	-1.40	-1.22	-0.83	-0.91	-0.40
95	9	20SMR2	V	4.7Mb	77.0	-1.73	-1.52	-0.95	-0.80	-1.00	-1.52
95	9	22SMR2	V	4.6Mc	57.0	-1.67	-1.26	-1.22	-0.85	-0.59	-0.54
95	9	22SMR2	V	4.2Mc	71.0	-2.38	-2.82	-2.02	-1.37	-1.34	-1.00
95	9	14VIGA	V	6.4Mb	67.0	-0.04	0.59	0.55	1.00	0.96	0.92
95	8	28PETA	V	4.2Mc	58.0	-0.31	-0.79	-1.14	-0.95	-0.61	-0.56
95	7	12ACAN	V	4.0Mc	34.0	-0.56	-0.88	-1.14	-0.73	-0.64	-0.74
95	7	12OCLL	V	4.0Mc	29.0	-2.15	-2.21	-1.78	-1.05	-0.75	-0.74
95	7	12OCTT	V	4.0Mc	64.0	-1.05	-1.91	-0.99	-0.79	-0.51	-0.55
95	7	30OCTT	V	3.9Mc	54.0	-0.08	-0.37	-0.66	-0.85	-0.89	-0.53
95	7	2POZU	V	3.7Mc	42.0	-2.80	-2.54	-1.98	-1.57	-1.21	-1.12
95	7	12POZU	V	4.0Mc	48.0	-2.87	-2.23	-1.81	-1.16	-0.96	-0.79
95	7	30POZU	V	3.9Mc	48.0	-2.63	-2.87	-2.35	-1.82	-1.14	-0.64
95	7	12SMR2	V	4.0Mc	75.0	-2.86	-2.19	-1.75	-1.44	-1.00	-1.14
95	7	19SMR2	V	4.9Mb	89.0	-2.31	-1.50	-0.97	-0.62	-0.49	-0.87
95	7	12VNTA	V	4.0Mc	34.0	-2.59	-2.37	-1.75	-1.18	-0.84	-0.44
95	6	20CPDR	V	3.8Mc	61.0	-2.20	-2.61	-2.58	-1.85	-0.85	-0.72
95	6	7MSAS	V	4.6Mc	81.0	-2.27	-1.97	-1.30	-0.82	-0.65	-0.35
95	6	12MSAS	V	4.1Mc	22.0	-2.33	-2.57	-2.13	-2.20	-1.74	-0.69
95	6	7OCLL	V	4.6Mc	62.0	-2.68	-2.14	-1.41	-1.30	-1.08	-0.88
95	6	21OCLL	V	3.8Mc	90.0	-2.64	-2.59	-2.72	-2.06	-1.05	-1.12
95	6	7POZU	V	4.6Mc	78.0	-2.49	-2.02	-1.32	-0.92	-1.02	-0.72
95	6	7VNTA	V	4.6Mc	52.0	-2.29	-1.89	-1.48	-1.36	-1.05	-0.88
95	5	15ACAN	V	4.6Mc	45.0	-0.53	-1.11	-0.99	-0.65	-0.76	-0.21
95	5	15CPDR	V	4.6Mc	53.0	-0.47	-0.62	-0.93	-0.43	0.33	0.02
95	5	15MSAS	V	4.6Mc	85.0	-1.81	-2.30	-1.34	-0.92	-0.84	-0.27
95	5	15POZU	V	4.6Mc	80.0	-1.71	-1.75	-1.19	-0.73	-1.00	-0.64

95	5	15VNTA	V	4.6Mc	53.0	-0.49	-0.68	-0.65	-0.56	-0.77	-0.25
95	4	27AZIH	V	4.9Mb	72.0	-0.62	-0.76	-0.16	-0.47	-0.14	-0.33
95	4	15COPL	V	3.8Mb	32.0	-1.18	-1.37	-1.81	-0.02	0.28	-0.27
95	4	24COYC	V	3.9Mc	12.0	-1.02	-1.94	-1.03	-1.23	-0.80	-0.18
95	4	15MSAS	V	3.8Mb	80.0	-1.79	-2.42	-1.80	-1.24	-0.75	-0.39
95	4	27MSAS	V	4.2Mc	85.0	-1.67	-2.21	-1.78	-1.60	-1.10	-0.33
95	4	24OCLL	V	3.9Mc	34.0	-0.65	-1.38	-1.06	-0.98	-0.91	-0.79
95	4	27POZU	V	4.2Mc	99.0	-2.15	-2.45	-2.37	-1.62	-1.19	-0.81
95	4	26TNLP	V	3.6Mb	89.0	-1.87	-1.82	-1.86	-1.24	-0.51	-0.55
95	3	13MSAS	V	3.3Mc	58.0	-1.94	-2.50	-2.53	-2.59	-1.86	-1.20
95	3	19MSAS	V	3.7Mc	49.0	-1.98	-2.21	-2.41	-1.89	-1.30	-0.77
95	3	1OCLL	V	3.7Mc	23.0	-0.61	-0.86	-1.09	-0.84	-0.87	-0.90
95	2	22MSAS	V	3.9Mc	88.0	-2.44	-1.99	-2.51	-2.06	-1.90	-1.09
95	1	2CPDR	V	4.2Mc	28.0	-0.52	-1.02	-1.08	-1.19	-0.66	-0.11
95	1	2MSAS	V	4.2Mc	56.0	-2.18	-2.24	-2.29	-1.59	-0.97	0.02
95	1	18MSAS	V	4.1Mc	56.0	-2.04	-2.16	-2.32	-1.50	-1.26	-0.67
95	1	25MSAS	V	4.5Mc	72.0	-2.05	-2.05	-2.13	-1.89	-1.29	-0.64
95	1	29MSAS	V	3.6Mc	58.0	-2.19	-2.37	-2.92	-2.44	-1.88	-1.31
95	1	2POZU	V	4.2Mc	54.0	-2.12	-2.24	-2.16	-1.68	-0.86	-0.79

Turkey:

yr	mmdd	station	comp	magtype	R(km)	A0.2	A0.5	A1	A2	A5	A10
1976	8	19DNZ\+V	U	5.0MS	26.0	0.20	0.50	1.00	2.00	5.01	10.00
1977	10	5CER\+V	U	5.3MB	75.0	1.38	0.86	0.83	1.04	1.04	1.06
1977	12	9IZM\+V	D	4.8MB	28.0	0.28	9.99	0.34	0.61	0.60	0.29
1977	12	16IZM\+V	D	5.3MB	24.0	0.85	0.78	0.04	0.53	0.80	0.59
1978	9	21MLT\+V	D	4.2MS	55.0	9.99	9.99	9.99	-0.55	-0.23	-0.30
1979	4	11MUR\+V	?	4.4MS	50.0	0.71	0.38	0.01	0.21	0.58	0.19
1979	7	18DUR\+V	?	4.9MS	15.0	0.76	0.95	0.30	0.76	1.14	0.76
1981	6	30HTY\+V	D	3.9MS	68.0	0.80	0.67	0.55	0.64	0.73	0.98
1983	7	5EDC\+V	U	5.8MS	76.0	0.29	0.44	0.84	0.41	0.66	0.52

1983	7	5EDR\+V	U	5.8MS	83.0	0.45	-0.02	-0.11	0.23	0.43	0.10
1983	7	5GNN\+V	?	5.8MS	59.0	0.84	0.28	0.68	0.73	0.33	0.59
1983	7	5TKR\+V	D	5.8MS	78.0	0.81	-0.22	0.21	0.50	0.22	0.08
1983	10	30HRS\+V	U	6.8MS	37.0	0.91	1.57	1.08	1.02	0.90	0.97
1984	3	29BLK\+V	D	3.8MS	13.0	-0.58	9.99	0.10	0.58	0.84	1.10
1985	8	12KIG\+V	U	4.2MS	94.0	0.06	-0.20	-0.33	0.30	0.86	0.41
1985	12	6KOY\?	V	4.5MS	31.0	0.82	9.99	0.38	0.31	0.42	0.59
1986	5	5GOL\+V	U	5.8MS	32.0	0.61	0.84	0.85	0.94	0.57	0.50
1986	6	6GOL\+V	U	5.7MS	40.0	0.45	0.53	0.60	0.59	0.03	-0.01
1986	6	6MLT\?	V	5.7MS	61.0	1.30	0.83	0.59	0.69	0.23	-0.18
1988	4	20MUR\+V	?	4.7MS	73.0	0.59	0.59	0.91	0.87	0.13	-0.21
1988	8	4FOC\+V	U	4.5MB	36.0	-2.04	9.99	-0.33	-0.15	0.38	0.02
1991	2	12IST\+V	U	4.6MS	38.0	0.16	-0.02	-0.68	-0.37	0.07	-0.26
1992	2	12AMS\+V	D	4.3MB	12.0	-0.53	9.99	-0.24	-0.80	0.37	0.50
1992	3	13ERC\+V	U	6.8MS	31.0	1.01	1.43	1.67	1.56	1.60	1.18
1992	3	13TER\+V	U	6.8MS	89.0	0.71	0.70	1.04	0.63	0.36	0.05
1992	3	15ERC\?	V	5.8MS	59.0	-0.37	0.52	0.63	0.70	0.67	0.01
1992	11	6KUS\+V	U	6.0MS	49.0	0.71	-0.04	0.55	0.95	0.73	0.82
1992	11	6ILI\+V	U	6.0MS	79.0	1.07	0.59	0.27	0.24	0.40	0.04
1992	11	6IZM\+V	U	6.0MS	39.0	0.25	-0.03	0.40	0.73	0.57	0.18
1994	1	3ISL\+V	U	4.8MS	89.0	-0.58	9.99	-0.24	0.18	-0.21	-0.30
1994	2	21BRS\+V	D	4.0MB	28.0	9.99	-1.05	-1.71	-0.97	-0.77	-0.12
1994	5	7BLK\+V	D	4.1ML	67.0	-0.65	-1.22	-1.27	-0.79	-0.65	-0.23
1994	5	24FOC\+V	U	5.3MS	31.0	0.84	0.43	-0.56	0.12	0.76	-0.50
1994	5	24IZM\+V	D	4.9MS	79.0	-0.94	-0.72	-0.14	-0.28	-0.29	-0.48
1994	5	24FOC\+V	U	4.9MS	28.0	0.62	0.17	-0.18	0.44	0.54	-0.25
1994	5	24ILI\+V	U	4.9MS	61.0	0.26	0.39	0.22	0.27	0.02	-0.08
1994	6	16SKR\+V	D	3.5ML	14.0	9.99	-1.24	-1.23	-1.34	-1.14	-0.83
1994	6	20KBG\+V	U	3.8MB	21.0	-0.22	-0.02	-0.95	-0.69	-0.44	0.07
1994	7	1MLT\+V	D	4.5MB	75.0	-1.07	-1.17	-0.73	-0.15	-0.18	-0.17
1994	7	16TKR\+V	D	3.6ML	22.0	-1.32	-1.36	-1.42	-1.45	-1.02	-0.95

1994	8	16TKR\+V	D	3.6ML	23.0	-2.10	-2.49	-1.62	-1.56	-1.06	-0.91
1994	9	17MUS\+V	D	5.1MB	94.0	-0.98	-1.39	-0.63	-0.16	-0.89	-1.21
1994	11	5DNZ\+V	D	4.1MB	57.0	-1.33	-1.61	-1.76	-1.14	-0.71	-0.67
1994	11	13KOY\+V	U	5.0MS	42.0	0.19	0.15	0.08	0.62	0.46	0.52
1994	11	13KOY\+V	U	4.1ML	14.0	-0.41	9.99	0.06	0.28	0.29	-0.24
1994	11	13DNZ\+V	D	4.4MS	90.0	-0.89	-0.90	-0.63	-0.36	-0.75	-1.28
1994	11	13KOY\+V	U	4.4MS	27.0	0.38	0.51	0.02	0.64	0.33	0.42
1994	11	13KOY\+V	U	4.1ML	31.0	-1.92	9.99	0.24	0.30	-0.13	0.05
1994	12	15ELZ\+V	D	3.5ML	25.0	-1.01	-1.37	-1.30	-0.47	-0.48	-0.37
1995	1	9IZM\+V	D	4.0ML	18.0	-1.22	-1.00	-1.12	-0.97	-1.10	-0.65
1995	1	12IZM\+V	D	4.3MB	35.0	-0.87	-0.73	-0.43	-0.44	-0.25	-0.29
1995	1	29ERZ\+V	D	4.8MS	74.0	-0.85	-0.84	-0.25	-0.36	-0.01	-0.42
1995	1	29TER\+V	U	4.8MS	43.0	0.67	-0.09	0.28	0.51	0.70	0.38
1995	2	1IZM\+V	D	3.7ML	14.0	9.99	-1.53	-1.04	-0.80	-0.49	-0.47
1995	2	8TKR\+V	D	4.5MB	38.0	-1.11	-1.15	-1.25	-0.75	-0.72	-0.53
1995	3	12DNZ\+V	D	3.3ML	9.0	-1.44	-1.38	-1.57	-0.60	-0.30	-0.06
1995	3	12DNZ\+V	D	3.4ML	6.0	-1.24	-1.51	-1.72	-1.43	-1.48	-1.16
1995	3	12DNZ\+V	D	3.1ML	8.0	9.99	-2.55	-1.91	-1.35	-0.76	-0.54
1995	3	13DNZ\+V	D	3.1ML	18.0	9.99	-1.38	-1.55	-1.23	-0.97	-0.85
1995	3	14DNZ\+V	D	3.5ML	6.0	-1.17	-0.92	-0.64	-0.07	0.62	0.73
1995	3	14DNZ\+V	D	3.3ML	10.0	-1.15	-1.41	-1.23	-0.77	-0.12	-0.17
1995	3	14DNZ\+V	D	3.3ML	16.0	-1.08	-1.62	-1.21	-0.84	0.03	0.05
1995	3	14DNZ\+V	D	3.0ML	8.0	-1.18	-1.68	-1.34	-1.28	-0.82	-0.54
1995	3	15DNZ\+V	D	3.2ML	3.0	9.99	-1.36	-1.78	-1.72	-1.27	-0.78
1995	3	28TKR\+V	D	3.8M1	72.0	-1.40	-1.09	-1.22	-0.92	-0.83	-0.64
1995	4	13TKR\+V	D	4.7ML	31.0	-1.07	-1.27	-0.42	-0.17	0.13	0.01
1995	4	13KMR\+V	D	4.6MB	85.0	-1.19	-1.08	-0.50	-0.58	-0.38	-0.58
1995	4	18TKR\+V	D	4.2ML	41.0	-1.72	-0.97	-0.99	-0.45	-0.36	-0.26
1995	4	23ERZ\+V	D	3.8ML	4.0	-1.10	-0.77	-0.36	0.29	0.12	0.48
1995	6	18ERC\+V	U	4.0ML	43.0	-0.92	-1.04	-0.99	-0.80	-0.41	-0.21
1995	7	5ERZ\+V	D	3.8ML	37.0	-1.45	-1.25	-1.09	-0.34	-0.11	-0.08

1995	8	18DNZ\+V	D	4.8ML	46.0	-0.67	0.31	0.68	0.54	0.30	-0.03
1995	8	18DNZ\+V	D	4.3ML	40.0	-0.81	-0.46	-0.17	0.04	-0.20	-0.96
1995	9	19BRS\+V	D	3.8ML	17.0	-1.02	-1.60	-1.60	-0.97	-0.85	-0.36
1995	9	26DIN\+V	U	4.6ML	21.0	0.53	0.62	1.35	0.90	0.86	0.73
1995	9	26DIN\+V	U	4.2ML	25.0	0.56	-0.10	0.87	0.63	0.32	0.43
1995	9	27DIN\+V	U	4.8ML	21.0	0.53	0.89	1.44	0.99	0.77	0.53
1995	9	28DIN\+V	U	4.0ML	66.0	-0.08	0.24	0.14	0.35	-0.09	-0.42
1995	10	1KRS\+V	D	4.0ML	92.0	-1.37	-0.95	-0.52	-0.77	-0.91	-1.14
1995	10	1DIN\+V	U	6.0MS	13.0	1.08	1.32	1.84	1.27	1.31	1.02
1995	10	1BRD\+V	U	6.0MS	52.0	0.78	0.96	0.82	0.87	0.80	0.11
1995	10	1CRD\+V	U	6.0MS	56.0	0.79	0.55	0.68	0.98	0.84	0.87
1995	10	1DIN\+V	U	3.8ML	17.0	-0.29	9.99	-0.71	-0.35	0.22	0.00
1995	10	1DIN\+V	U	5.0MS	40.0	0.93	1.07	1.19	1.09	0.55	0.51
1995	10	1CRD\+V	U	5.0MS	59.0	-0.29	-0.57	-0.49	-0.14	0.22	0.00
1995	10	1DIN\+V	U	4.1ML	41.0	0.62	0.72	0.82	0.75	0.76	0.34
1995	10	3DIN\+V	U	4.3ML	37.0	0.10	0.30	0.55	0.64	0.84	0.43
1995	10	4DIN\+V	U	3.8ML	20.0	0.28	-0.03	-0.38	-0.38	0.14	0.04
1995	10	5DIN\+V	U	4.4ML	33.0	0.80	-0.24	0.96	1.11	0.63	0.68
1995	10	6DIN\+V	U	4.5ML	34.0	0.12	0.17	0.96	0.71	0.84	0.10
1995	10	7DDH\+V	U	3.1ML	5.0	-1.53	-2.33	-2.05	-1.56	-1.40	-1.11
1995	10	8DDH\+V	U	3.4ML	9.0	-1.79	-1.81	-1.68	-0.94	-0.56	-0.56
1995	10	9DKH\+V	U	2.9ML	13.0	-1.50	-1.97	-1.95	-1.99	-1.70	-1.30
1995	10	10DKH\+V	U	2.8ML	13.0	-1.78	-1.77	-2.17	-1.70	-1.59	-1.04
1995	10	11DCE\+V	U	3.1ML	3.0	-2.23	-1.83	-1.62	-1.09	-0.83	-0.88
1995	10	11DDH\+V	U	3.1ML	4.0	-1.71	-2.76	-2.18	-1.20	-0.82	-0.72
1995	10	11DJK\+V	U	3.1ML	4.0	-1.73	-1.37	-1.45	-1.26	-0.94	-0.93
1995	10	11DKH\+V	U	3.1ML	5.0	-1.87	-2.30	-1.70	-0.82	-0.69	-0.60
1995	10	11DDH\+V	U	2.7ML	15.0	-1.70	-2.00	-2.06	-2.12	-1.15	-1.00
1995	10	11DKH\+V	U	2.7ML	15.0	-1.54	-1.64	-1.96	-1.72	-1.43	-1.09
1995	12	6ERC\+V	U	4.3MS	82.0	-0.97	-1.39	-1.06	-0.76	-0.50	-0.59
1995	12	5ERC\+V	U	5.4MS	82.0	-0.15	0.43	0.67	0.40	0.64	0.12

1996	1	14BLK\+V	D	3.3ML	7.0	9.99	-1.25	-1.30	-1.30	-0.66	-0.75
1996	2	7ELZ\+V	D	4.3ML	58.0	-1.35	-1.01	-0.18	0.08	-0.30	-0.20
1996	2	14ERC\+V	U	4.0ML	35.0	-1.36	-1.43	-1.17	-0.53	0.20	0.39
1996	2	20IZM\+V	D	4.0ML	20.0	-0.53	-1.39	-1.33	-0.83	-0.89	-0.41
1996	2	20KUS\+V	U	4.0ML	47.0	0.08	0.05	-0.56	0.02	-0.20	-0.05
1996	3	17AMS\+V	D	4.2ML	63.0	-1.00	-1.16	-0.87	-0.85	-0.14	-0.04
1996	4	2IZM\+V	D	4.9ML	73.0	-0.59	-0.64	0.17	0.28	-0.06	-0.33
1996	4	2KUS\+V	U	4.9ML	55.0	0.13	-0.50	-0.23	0.12	0.17	0.19
1996	4	2KMR\+V	D	3.9ML	60.0	-1.42	-1.74	-0.91	-0.97	-0.35	-0.47
1996	4	8ELZ\+V	D	4.2ML	40.0	-1.25	-1.25	-0.60	-0.40	-0.54	-0.75
1996	4	14TKR\+V	D	4.3ML	48.0	-1.36	-1.05	-0.58	-0.07	-0.22	-0.33
1996	5	20IZM\+V	D	3.9ML	34.0	-0.93	-2.31	-1.10	-0.69	-0.72	-0.53
1996	6	5HTY\+V	D	4.4ML	78.0	-1.14	-1.16	-1.02	-0.42	-0.66	-0.75
1996	6	22DNZ\+V	D	3.8ML	19.0	-0.86	-1.10	-1.04	-1.23	-0.77	-0.70
1996	6	29DIN\+V	U	4.4ML	36.0	0.42	-0.07	0.84	0.60	0.13	-0.02
1996	7	26IZM\+V	D	3.3ML	16.0	-0.95	-1.17	-1.44	-1.12	-0.72	-0.68
1996	7	19HTY\+V	D	3.6ML	14.0	-1.59	-1.57	-1.33	-1.23	-1.01	-0.84
1996	8	14AMS\+V	D	5.4ML	64.0	-0.44	-0.62	-0.10	-0.10	0.47	0.63
1996	8	14AMS\+V	D	4.1ML	90.0	-0.79	-1.32	-1.37	-1.15	-0.59	-0.62
1996	8	14AMS\+V	D	5.2ML	74.0	-0.98	-0.49	-0.27	0.17	0.28	0.38
1996	8	14AMS\+V	D	4.1ML	67.0	-0.67	-0.96	-1.16	-1.11	-0.97	-0.66
1996	8	14AMS\+V	D	3.7ML	69.0	-0.81	-1.39	-1.14	-1.14	-0.86	-0.76
1996	8	14AMS\+V	D	3.7ML	69.0	-1.04	-1.19	-1.26	-1.37	-1.00	-0.52
1996	8	15AMS\+V	D	3.6ML	66.0	-1.03	-1.13	-1.31	-1.21	-1.04	-1.09
1996	8	15AMS\+V	D	3.6ML	74.0	-0.87	-1.31	-1.15	-1.23	-0.89	-0.54
1996	8	15AMS\+V	D	3.5ML	93.0	-0.99	-1.41	-1.62	-1.32	-1.11	-0.74
1996	8	19AMS\+V	D	3.9ML	61.0	-0.85	-1.76	-1.18	-1.50	-0.74	-0.58
1996	8	14OSM\+V	U	5.4ML	60.0	0.32	0.00	-0.26	0.13	0.21	-0.35
1996	8	14MRZ\+V	U	5.2ML	35.0	0.71	-0.02	0.51	0.62	0.67	0.31
1996	8	20AMS\+V	D	3.6ML	49.0	-0.43	-1.00	-1.48	-1.05	-0.35	-0.06
1996	8	21AMS\+V	D	3.9ML	58.0	-0.81	-1.18	-1.36	-0.96	-0.78	-0.63

1996	8	25CNK\+V	D	4.1ML	78.0	-1.73	-1.24	-1.12	-0.93	-0.57	-0.80
1996	9	6AMS\+V	D	3.3ML	19.0	-0.61	-1.03	-1.38	-1.22	-0.20	-0.15
1996	9	9AMS\+V	D	3.7ML	71.0	-1.07	-1.67	-1.16	-1.19	-0.80	-0.84
1996	11	12ELZ\+V	D	4.1ML	28.0	-0.70	-1.03	-1.00	-0.69	-0.94	-0.83
1996	11	22AMS\+V	D	3.8ML	59.0	-1.26	-1.23	-1.19	-1.07	-0.75	-0.49
1996	12	20MUS\+V	D	4.1ML	76.0	-1.71	-1.52	-1.43	-1.32	-0.91	-1.27
1997	1	22HTY\+V	D	5.5ML	27.0	-0.53	0.87	1.03	1.11	0.90	0.99
1997	1	21BLD\+V	U	4.8ML	16.0	0.35	9.99	0.74	0.56	0.47	-0.91
California:											
yr mdd station comp magtype				R(km)	A0.2	A0.5*	A1*	A2*	A5*	A10*	
1952	7	21KERN\TAF0HtoV		7.4Mw	41.0	0.20	0.56	1.12	2.24	4.47	8.91
1952	7	21KERN\TAF1HtoV		7.4Mw	41.0	0.66	0.96	1.32	1.17	1.03	0.60
1966	6	28PARKF\C02HtoV		6.1Mw	1.0	0.82	1.35	1.27	1.36	1.23	0.78
1966	6	28PARKF\C05HtoV		6.1Mw	5.0	9.99	1.70	1.63	1.55	0.82	9.99
1966	6	28PARKF\C05HtoV		6.1Mw	5.0	9.99	1.15	0.84	1.49	1.10	1.10
1966	6	28PARKF\C05HtoV		6.1Mw	5.0	9.99	0.49	1.05	1.50	0.68	0.83
1966	6	28PARKF\C08HtoV		6.1Mw	9.0	9.99	0.93	1.03	1.18	0.90	0.94
1966	6	28PARKF\C08HtoV		6.1Mw	9.0	9.99	1.15	1.20	1.28	1.20	0.77
1966	6	28PARKF\C12HtoV		6.1Mw	15.0	9.99	0.54	0.67	0.53	0.52	0.45
1966	6	28PARKF\C12HtoV		6.1Mw	15.0	9.99	0.71	0.69	0.70	0.55	0.34
1966	6	28PARKF\SLOHtoV		6.1Mw	60.0	9.99	0.02	0.01	0.13	-0.20	-0.24
1966	6	28PARKF\SLOHtoV		6.1Mw	60.0	9.99	-0.25	0.16	0.06	-0.13	-0.10
1966	6	28PARKF\TMBHtoV		6.1Mw	10.0	9.99	0.75	1.14	1.44	1.15	0.64
1966	6	28PARKF\TMBHtoV		6.1Mw	10.0	9.99	0.99	0.68	1.32	1.25	0.51
1968	4	9BORREGO\AHtoV		6.8Mw	46.0	9.99	1.49	0.55	0.68	0.60	0.02
1968	4	9BORREGO\AHtoV		6.8Mw	46.0	9.99	0.51	0.52	0.44	0.62	0.09
1970	9	12LYTLECR\CHtoV		5.4Mw	20.0	9.99	9.99	0.18	0.20	0.20	0.42
1970	9	12LYTLECR\CHtoV		5.4Mw	23.0	9.99	9.99	-0.06	0.46	0.58	0.47
1970	9	12LYTLECR\CHtoV		5.4Mw	23.0	9.99	0.30	0.41	0.53	0.58	0.44
1970	9	12LYTLECR\CHtoV		5.4Mw	32.0	9.99	-0.20	0.06	0.37	0.60	-0.05
1970	9	12LYTLECR\CHtoV		5.4Mw	32.0	9.99	9.99	0.15	0.19	0.58	9.99

1970	9	12LYTLECR\LHtoV	5.4Mw	93.0	9.99	9.99	-0.37	0.01	-0.20	9.99
1970	9	12LYTLECR\LHtoV	5.4Mw	93.0	9.99	-0.44	-0.25	0.05	-0.12	-0.71
1970	9	12LYTLECR\PHtoV	5.4Mw	76.0	9.99	-0.32	-0.22	-0.16	0.12	-0.02
1970	9	12LYTLECR\PHtoV	5.4Mw	76.0	9.99	-0.49	-0.46	0.05	0.04	-0.13
1970	9	12LYTLECR\PHtoV	5.4Mw	33.0	9.99	9.99	0.24	0.05	-0.05	-0.02
1970	9	12LYTLECR\PHtoV	5.4Mw	33.0	9.99	9.99	0.02	-0.09	0.01	0.02
1970	9	12LYTLECR\SHtoV	5.4Mw	46.0	9.99	-0.74	-0.28	-0.42	-0.09	0.11
1970	9	12LYTLECR\WHtoV	5.4Mw	15.0	9.99	9.99	1.17	1.15	0.83	0.75
1970	9	12LYTLECR\WHtoV	5.4Mw	15.0	9.99	9.99	0.68	1.19	0.82	0.85
1971	2	9SFERN\PVEHtoV	6.6Mw	65.0	9.99	0.33	0.24	0.38	0.46	-0.07
1971	2	9SFERN\PVEHtoV	6.6Mw	65.0	9.99	0.21	0.63	0.50	0.43	-0.14
1971	2	9SFERN\CNDHtoV	6.6Mw	66.0	9.99	9.99	0.60	0.82	0.70	0.63
1971	2	9SFERN\CNDHtoV	6.6Mw	66.0	9.99	9.99	0.38	0.88	0.91	0.64
1971	2	9SFERN\CRRHtoV	6.6Mw	25.0	9.99	9.99	1.10	1.44	1.27	0.96
1971	2	9SFERN\CRRHtoV	6.6Mw	25.0	9.99	9.99	1.58	1.48	1.16	1.05
1971	2	9SFERN\CSMHtoV	6.6Mw	87.0	9.99	0.13	0.38	0.13	0.15	0.01
1971	2	9SFERN\CSMHtoV	6.6Mw	87.0	9.99	0.09	0.21	-0.07	-0.17	-0.05
1971	2	9SFERN\CSPHtoV	6.6Mw	87.0	0.11	-0.35	0.40	0.26	0.25	-0.07
1971	2	9SFERN\CSPHtoV	6.6Mw	87.0	-0.12	0.36	0.14	0.40	0.01	-0.34
1971	2	9SFERN\FTRHtoV	6.6Mw	29.0	9.99	9.99	0.80	0.30	0.74	0.46
1971	2	9SFERN\FTRHtoV	6.6Mw	29.0	9.99	9.99	0.98	0.38	0.89	0.53
1971	2	9SFERN\FTJHtoV	6.6Mw	65.0	-0.24	-0.05	-0.28	-0.01	0.31	0.12
1971	2	9SFERN\FTJHtoV	6.6Mw	65.0	0.12	-0.16	-0.19	-0.03	0.09	0.15
1971	2	9SFERN\OPPHtoV	6.6Mw	48.0	-0.50	1.09	0.59	0.73	0.88	0.46
1971	2	9SFERN\OPPHtoV	6.6Mw	48.0	-0.06	0.60	0.44	0.73	0.52	0.24
1971	2	9SFERN\PELHtoV	6.6Mw	21.0	9.99	0.65	1.24	1.08	1.14	1.07
1971	2	9SFERN\PELHtoV	6.6Mw	21.0	9.99	0.85	1.01	1.03	1.10	1.13
1971	2	9SFERN\L01HtoV	6.6Mw	26.0	9.99	9.99	1.21	0.82	0.58	0.38
1971	2	9SFERN\L01HtoV	6.6Mw	26.0	9.99	9.99	1.20	0.79	0.56	0.53
1971	2	9SFERN\L04HtoV	6.6Mw	24.0	9.99	9.99	0.74	0.99	0.81	1.06
1971	2	9SFERN\L04HtoV	6.6Mw	24.0	9.99	9.99	0.95	1.01	0.98	0.78

1971	2	9SFERN\L09HtoV	6.6Mw	23.0	9.99	9.99	0.66	0.64	0.85	0.72
1971	2	9SFERN\L09HtoV	6.6Mw	23.0	9.99	9.99	0.57	0.66	0.65	0.96
1971	2	9SFERN\L12HtoV	6.6Mw	20.0	9.99	9.99	1.24	0.91	1.52	0.88
1971	2	9SFERN\L12HtoV	6.6Mw	20.0	9.99	9.99	0.91	0.80	1.54	0.98
1971	2	9SFERN\TLIHtoV	6.6Mw	69.0	0.57	0.41	0.56	0.63	0.16	-0.50
1971	2	9SFERN\TLIHtoV	6.6Mw	69.0	1.10	0.19	0.49	0.64	0.09	-0.35
1971	2	9SFERN\PCDHtoV	6.6Mw	3.0	1.97	2.14	1.98	2.00	1.82	1.60
1971	2	9SFERN\PCDHtoV	6.6Mw	3.0	9.99	9.99	1.78	2.09	1.70	1.55
1971	2	9SFERN\PD LHtoV	6.6Mw	25.0	9.99	9.99	1.07	0.92	0.96	1.02
1971	2	9SFERN\PD LHtoV	6.6Mw	25.0	9.99	9.99	1.02	0.82	1.00	0.97
1971	2	9SFERN\PASHToV	6.6Mw	32.0	9.99	9.99	1.11	1.02	0.63	0.75
1971	2	9SFERN\PASHToV	6.6Mw	32.0	9.99	0.63	1.19	1.18	0.91	0.59
1971	2	9SFERN\PSLHtoV	6.6Mw	19.0	9.99	9.99	0.76	0.71	0.98	0.64
1971	2	9SFERN\PSLHtoV	6.6Mw	19.0	9.99	9.99	1.18	1.12	1.21	0.82
1971	2	9SFERN\PPPHtoV	6.6Mw	39.0	9.99	0.83	0.63	0.80	0.69	0.74
1971	2	9SFERN\PPPHtoV	6.6Mw	39.0	9.99	0.58	0.58	0.95	1.00	0.92
1971	2	9SFERN\PHNHtoV	6.6Mw	63.0	9.99	9.99	0.57	0.29	0.25	-0.19
1971	2	9SFERN\PHNHtoV	6.6Mw	63.0	9.99	9.99	0.58	0.28	0.16	-0.18
1971	2	9SFERN\PUDHtoV	6.6Mw	50.0	9.99	9.99	0.70	0.68	0.75	0.42
1971	2	9SFERN\PUDHtoV	6.6Mw	50.0	9.99	9.99	0.60	0.62	0.53	0.49
1971	2	9SFERN\SADHtoV	6.6Mw	27.0	9.99	0.51	0.44	0.45	1.19	1.12
1971	2	9SFERN\SADHtoV	6.6Mw	27.0	9.99	0.53	0.54	0.50	1.09	0.99
1971	2	9SFERN\FSDHtoV	6.6Mw	28.0	0.92	0.48	1.12	0.90	0.73	1.13
1971	2	9SFERN\FSDHtoV	6.6Mw	28.0	0.61	0.58	0.93	0.56	0.63	1.27
1971	2	9SFERN\TEHHtoV	6.6Mw	68.0	9.99	-0.19	-0.31	0.30	0.23	0.44
1971	2	9SFERN\TEHHtoV	6.6Mw	68.0	9.99	-0.12	-0.23	0.06	0.04	0.23
1971	2	9SFERN\SODHtoV	6.6Mw	58.0	9.99	9.99	0.48	0.95	0.54	0.66
1971	2	9SFERN\SODHtoV	6.6Mw	58.0	9.99	9.99	0.42	0.85	0.99	0.73
1971	2	9SFERN\WRPHtoV	6.6Mw	81.0	0.06	0.24	-0.03	-0.25	-0.10	0.01
1971	2	9SFERN\WRPHtoV	6.6Mw	81.0	-0.71	-0.12	0.15	0.06	0.09	0.25
1971	2	9SFERN\WNDHtoV	6.6Mw	45.0	0.92	0.54	0.55	0.63	0.92	0.54

1971	2	9SFERN\WNDHtoV	6.6Mw	45.0	0.08	0.74	0.47	0.82	0.94	0.80
1971	2	9SFERN\WTHtoV	6.6Mw	60.0	9.99	-0.01	0.53	0.76	0.68	0.33
1971	2	9SFERN\WTHtoV	6.6Mw	60.0	9.99	0.42	0.38	0.62	0.45	0.25
1974	11	28HOLLISTR\HtoV	5.2Mw	11.0	9.99	0.52	0.08	0.95	0.39	0.37
1974	11	28HOLLISTR\HtoV	5.2Mw	11.0	9.99	0.73	0.49	1.19	0.97	9.99
1974	11	28HOLLISTR\HtoV	5.2Mw	11.0	9.99	9.99	0.19	0.61	0.40	0.60
1974	11	28HOLLISTR\HtoV	5.2Mw	11.0	9.99	0.47	0.74	0.66	0.78	0.41
1975	6	7NCALIF\D-HtoV	5.2Mw	23.0	9.99	0.51	0.58	0.85	1.04	0.67
1975	6	7NCALIF\D-HtoV	5.2Mw	23.0	9.99	-0.56	0.28	0.45	0.25	0.09
1975	6	7NCALIF\D-HtoV	5.2Mw	30.0	9.99	9.99	0.59	1.34	0.77	0.82
1975	6	7NCALIF\D-HtoV	5.2Mw	30.0	9.99	-0.38	0.52	0.96	0.72	0.90
1975	8	2OROVILLE\HtoV	4.4Mw	11.0	9.99	0.03	0.28	0.20	0.45	0.29
1975	8	2OROVILLE\HtoV	4.4Mw	11.0	9.99	-0.02	-0.18	0.50	0.14	0.39
1975	8	2OROVILLE\HtoV	4.4Mw	15.0	9.99	0.48	-0.01	-0.15	0.01	-0.10
1975	8	2OROVILLE\HtoV	4.4Mw	15.0	9.99	9.99	-0.42	-0.31	-0.06	0.10
1975	8	2OROVILLE\HtoV	4.4Mw	12.0	9.99	0.36	-0.03	0.18	0.50	0.32
1975	8	2OROVILLE\HtoV	4.4Mw	12.0	9.99	0.34	0.47	0.09	0.39	0.38
1975	8	8OROVILLE\HtoV	4.7Mw	10.0	9.99	9.99	0.27	0.67	0.40	0.44
1975	8	8OROVILLE\HtoV	4.7Mw	10.0	9.99	9.99	0.32	0.48	0.72	0.40
1975	8	8OROVILLE\HtoV	4.7Mw	11.0	9.99	9.99	0.22	0.32	0.19	0.35
1975	8	8OROVILLE\HtoV	4.7Mw	11.0	9.99	9.99	0.15	0.10	0.18	0.27
1975	8	8OROVILLE\HtoV	4.7Mw	12.0	9.99	9.99	-0.62	-0.07	-0.04	0.33
1975	8	8OROVILLE\HtoV	4.7Mw	12.0	9.99	-0.14	0.11	0.48	0.40	0.45
1975	8	8OROVILLE\HtoV	4.7Mw	12.0	9.99	9.99	0.39	0.47	0.35	0.24
1975	8	8OROVILLE\HtoV	4.7Mw	13.0	9.99	9.99	0.24	-0.41	0.64	0.76
1975	8	8OROVILLE\HtoV	4.7Mw	13.0	9.99	0.02	0.53	-0.13	0.42	0.40
1979	8	6COYOTELK\HtoV	5.7Mw	3.0	9.99	0.69	0.92	1.12	0.85	0.51
1979	8	6COYOTELK\HtoV	5.7Mw	3.0	9.99	0.90	0.99	1.52	0.92	0.71
1979	8	6COYOTELK\HtoV	5.7Mw	9.0	9.99	0.38	0.70	0.28	0.63	0.53
1979	8	6COYOTELK\HtoV	5.7Mw	9.0	9.99	0.85	0.93	0.32	0.86	0.60
1979	8	6COYOTELK\HtoV	5.7Mw	8.0	9.99	0.98	0.75	0.74	1.16	0.77

1979	8	6COYOTELK\HtoV	5.7Mw	8.0	9.99	1.32	1.41	1.09	0.85	0.89
1979	8	6COYOTELK\HtoV	5.7Mw	6.0	9.99	0.93	1.38	1.06	0.76	0.99
1979	8	6COYOTELK\HtoV	5.7Mw	6.0	0.63	1.20	1.40	1.06	0.64	0.95
1979	8	6COYOTELK\HtoV	5.7Mw	4.0	9.99	1.13	1.47	1.27	1.07	0.62
1979	8	6COYOTELK\HtoV	5.7Mw	4.0	0.70	1.08	1.43	1.18	0.87	0.71
1979	8	6COYOTELK\HtoV	5.7Mw	3.0	1.06	1.47	1.78	1.45	1.21	0.79
1979	8	6COYOTELK\HtoV	5.7Mw	3.0	9.99	1.25	0.96	1.56	1.18	0.64
1979	8	6COYOTELK\HtoV	5.7Mw	31.0	9.99	-0.38	0.51	0.46	0.33	-0.44
1979	8	6COYOTELK\HtoV	5.7Mw	31.0	9.99	0.13	0.56	0.63	0.33	-0.51
1979	8	6COYOTELK\HtoV	5.7Mw	15.0	9.99	0.10	0.49	1.04	0.95	0.45
1979	8	6COYOTELK\HtoV	5.7Mw	15.0	9.99	0.27	0.70	0.71	0.74	0.41
1979	8	6COYOTELK\HtoV	5.7Mw	17.0	9.99	9.99	0.61	0.69	0.84	0.15
1979	8	6COYOTELK\HtoV	5.7Mw	17.0	9.99	0.30	0.81	1.24	0.31	0.36
1979	8	6COYOTELK\HtoV	5.7Mw	17.0	9.99	-0.11	0.55	0.59	0.74	0.30
1979	8	6COYOTELK\HtoV	5.7Mw	17.0	9.99	0.39	0.79	1.15	0.30	0.35
1979	10	15IMPVALL\HHToV	6.5Mw	9.0	0.92	1.76	1.30	1.25	1.06	1.31
1979	10	15IMPVALL\HHToV	6.5Mw	9.0	0.68	1.06	1.31	1.20	1.13	1.28
1979	10	15IMPVALL\HHToV	6.5Mw	13.0	0.97	1.59	1.31	1.24	0.82	1.08
1979	10	15IMPVALL\HHToV	6.5Mw	13.0	1.15	1.68	1.46	0.91	0.70	1.08
1979	10	15IMPVALL\HHToV	6.5Mw	3.0	1.25	1.55	1.77	1.82	1.40	1.43
1979	10	15IMPVALL\HHToV	6.5Mw	3.0	1.27	1.44	1.69	1.73	1.61	1.37
1979	10	15IMPVALL\HHToV	6.5Mw	9.0	1.66	1.19	0.90	0.77	0.96	0.80
1979	10	15IMPVALL\HHToV	6.5Mw	9.0	1.40	1.35	1.18	0.94	0.92	0.65
1979	10	15IMPVALL\HHToV	6.5Mw	11.0	1.10	1.06	1.13	1.47	1.17	0.89
1979	10	15IMPVALL\HHToV	6.5Mw	11.0	9.99	1.28	0.99	1.05	1.02	1.05
1979	10	15IMPVALL\HHToV	6.5Mw	24.0	1.27	0.79	0.79	0.80	0.82	0.36
1979	10	15IMPVALL\HHToV	6.5Mw	24.0	1.17	0.69	0.82	0.66	0.73	0.40
1979	10	15IMPVALL\HHToV	6.5Mw	26.0	1.00	0.92	0.98	1.52	1.07	1.05
1979	10	15IMPVALL\HHToV	6.5Mw	26.0	1.11	1.30	1.48	1.27	1.11	1.11
1979	10	15IMPVALL\HHToV	6.5Mw	29.0	0.98	1.21	1.14	1.31	1.14	0.89
1979	10	15IMPVALL\HHToV	6.5Mw	29.0	1.03	1.40	1.52	1.36	1.10	0.93

1979	10	15IMPVALL\HHTOV	6.5Mw	49.0	9.99	0.98	1.04	0.99	0.65	-0.25
1979	10	15IMPVALL\HHTOV	6.5Mw	49.0	9.99	0.92	0.95	1.04	0.20	-0.21
1979	10	15IMPVALL\HHTOV	6.5Mw	32.0	9.99	0.68	0.94	1.10	0.95	0.95
1979	10	15IMPVALL\HHTOV	6.5Mw	32.0	9.99	0.54	0.52	0.91	0.83	0.72
1979	10	15IMPVALL\HHTOV	6.5Mw	23.0	1.04	1.40	1.34	1.24	1.31	1.16
1979	10	15IMPVALL\HHTOV	6.5Mw	44.0	0.81	0.98	1.27	1.41	1.02	1.29
1979	10	15IMPVALL\HHTOV	6.5Mw	44.0	1.03	1.28	1.48	1.30	1.05	1.38
1979	10	15IMPVALL\HHTOV	6.5Mw	8.0	1.36	1.24	1.41	1.28	0.99	0.80
1979	10	15IMPVALL\HHTOV	6.5Mw	8.0	1.62	1.53	1.22	0.93	0.94	0.75
1979	10	15IMPVALL\HHTOV	6.5Mw	1.0	1.50	1.56	1.54	1.20	0.94	0.49
1979	10	15IMPVALL\HHTOV	6.5Mw	1.0	1.75	1.93	1.45	1.15	0.58	0.48
1979	10	15IMPVALL\HHTOV	6.5Mw	15.0	1.16	1.09	0.83	0.81	0.74	1.05
1979	10	15IMPVALL\HHTOV	6.5Mw	15.0	1.02	0.99	0.19	0.52	0.71	0.89
1979	10	15IMPVALL\HHTOV	6.5Mw	10.0	1.31	1.49	1.20	1.38	1.33	1.23
1979	10	15IMPVALL\HHTOV	6.5Mw	9.0	1.45	1.54	1.25	1.22	1.31	1.08
1979	10	15IMPVALL\HHTOV	6.5Mw	9.0	1.63	0.90	1.05	1.01	1.20	1.08
1979	10	15IMPVALL\HHTOV	6.5Mw	4.0	1.23	1.67	1.75	1.34	1.15	1.03
1979	10	15IMPVALL\HHTOV	6.5Mw	4.0	2.01	1.33	1.27	1.25	1.01	0.80
1979	10	15IMPVALL\HHTOV	6.5Mw	1.0	1.12	1.29	1.45	1.50	1.27	1.07
1979	10	15IMPVALL\HHTOV	6.5Mw	1.0	2.04	1.37	1.53	1.51	1.08	0.91
1979	10	15IMPVALL\HHTOV	6.5Mw	1.0	1.67	1.67	1.68	1.25	1.19	0.90
1979	10	15IMPVALL\HHTOV	6.5Mw	1.0	2.08	1.50	1.42	1.37	1.40	1.00
1979	10	15IMPVALL\HHTOV	6.5Mw	1.0	1.51	1.18	1.64	1.11	1.11	0.59
1979	10	15IMPVALL\HHTOV	6.5Mw	1.0	1.96	1.67	1.80	1.44	0.86	0.63
1979	10	15IMPVALL\HHTOV	6.5Mw	4.0	1.51	1.60	1.28	1.35	1.32	1.42
1979	10	15IMPVALL\HHTOV	6.5Mw	4.0	1.88	1.22	1.38	1.35	1.31	1.32
1979	10	15IMPVALL\HHTOV	6.5Mw	9.0	1.57	1.42	0.98	1.35	0.88	0.89
1979	10	15IMPVALL\HHTOV	6.5Mw	9.0	0.95	1.58	1.09	1.18	1.25	0.74
1979	10	15IMPVALL\HHTOV	6.5Mw	13.0	9.99	1.59	1.18	1.40	1.54	1.04
1979	10	15IMPVALL\HHTOV	6.5Mw	13.0	1.38	1.26	1.17	1.42	1.55	0.88
1979	10	15IMPVALL\HHTOV	6.5Mw	18.0	1.00	1.11	0.68	1.05	0.92	0.72

1979	10	15IMPVALL\HHtoV	6.5Mw	18.0	1.02	1.11	0.94	1.00	0.92	0.88
1979	10	15IMPVALL\HHtoV	6.5Mw	22.0	9.99	1.06	0.85	1.03	1.08	0.85
1979	10	15IMPVALL\HHtoV	6.5Mw	22.0	9.99	0.71	0.47	1.03	1.12	0.83
1979	10	15IMPVALL\HHtoV	6.5Mw	5.0	1.76	1.47	1.20	1.31	1.35	1.18
1979	10	15IMPVALL\HHtoV	6.5Mw	5.0	1.45	1.50	1.39	1.60	1.31	1.18
1979	10	15IMPVALL\HHtoV	6.5Mw	8.0	1.79	0.68	1.24	1.23	1.16	0.96
1979	10	15IMPVALL\HHtoV	6.5Mw	8.0	1.60	1.28	1.03	1.11	1.25	0.90
1979	10	15IMPVALL\HHtoV	6.5Mw	36.0	0.88	0.49	0.82	1.13	0.72	0.43
1979	10	15IMPVALL\HHtoV	6.5Mw	36.0	0.40	0.61	0.68	0.75	0.89	0.42
1979	10	15IMPVALL\HHtoV	6.5Mw	14.0	1.42	1.08	0.90	0.92	0.98	0.59
1979	10	15IMPVALL\HHtoV	6.5Mw	14.0	1.21	0.97	0.89	1.17	0.78	0.52
1979	10	15IMPVALL\HHtoV	6.5Mw	32.0	0.22	0.38	0.01	0.42	0.53	0.25
1979	10	15IMPVALL\HHtoV	6.5Mw	32.0	0.53	0.50	0.74	0.54	0.81	0.48
1979	10	15IMPVALL\HHtoV	6.5Mw	11.0	9.99	1.21	1.36	1.17	1.34	1.08
1979	10	15IMPVALL\HHtoV	6.5Mw	11.0	9.99	1.29	1.36	1.52	1.45	1.19
1979	10	15IMPVALL\HHtoV	6.5Mw	26.0	0.99	0.46	0.42	0.70	0.72	0.66
1979	10	15IMPVALL\HHtoV	6.5Mw	26.0	0.76	0.85	0.62	0.81	0.99	0.74
1979	10	15IMPVALL\HHtoV	6.5Mw	54.0	0.48	0.70	0.70	0.58	1.05	0.78
1979	10	15IMPVALL\HHtoV	6.5Mw	54.0	9.99	0.63	0.54	0.91	0.99	0.74
1979	10	15IMPVALL\HHtoV	6.5Mw	15.0	1.64	0.94	0.76	0.76	0.52	0.44
1979	10	15IMPVALL\HHtoV	6.5Mw	15.0	1.23	1.16	0.84	0.76	0.56	0.48
1979	10	15IMPVALL\AHTtoV	5.2Mw	15.0	9.99	9.99	0.32	0.62	0.41	0.41
1979	10	15IMPVALL\AHTtoV	5.2Mw	15.0	9.99	0.60	0.87	0.21	0.56	0.08
1979	10	15IMPVALL\AHTtoV	5.2Mw	27.0	9.99	9.99	0.11	0.02	0.00	0.02
1979	10	15IMPVALL\AHTtoV	5.2Mw	15.0	9.99	9.99	0.72	0.92	0.13	0.05
1979	10	15IMPVALL\AHTtoV	5.2Mw	15.0	9.99	0.22	0.59	0.45	0.24	0.17
1979	10	15IMPVALL\AHTtoV	5.2Mw	52.0	9.99	9.99	0.23	0.18	0.49	0.63
1979	10	15IMPVALL\AHTtoV	5.2Mw	52.0	9.99	0.17	0.72	0.29	0.56	0.82
1979	10	15IMPVALL\AHTtoV	5.2Mw	26.0	9.99	9.99	0.44	0.70	-0.10	-0.23
1979	10	15IMPVALL\AHTtoV	5.2Mw	26.0	9.99	9.99	-0.13	-0.09	-0.14	0.15
1979	10	15IMPVALL\AHTtoV	5.2Mw	20.0	9.99	9.99	0.77	1.02	0.24	0.49

1979	10	15IMPVALL\AHTov	5.2Mw	18.0	9.99	9.99	0.84	0.95	0.54	0.27
1979	10	15IMPVALL\AHTov	5.2Mw	18.0	9.99	9.99	0.28	0.64	0.40	0.25
1979	10	15IMPVALL\AHTov	5.2Mw	14.0	9.99	9.99	0.51	0.90	0.88	0.55
1979	10	15IMPVALL\AHTov	5.2Mw	14.0	9.99	9.99	0.62	1.02	0.82	0.53
1979	10	15IMPVALL\AHTov	5.2Mw	14.0	9.99	9.99	0.52	1.02	1.00	0.75
1979	10	15IMPVALL\AHTov	5.2Mw	14.0	9.99	9.99	0.82	1.06	0.78	0.84
1979	10	15IMPVALL\AHTov	5.2Mw	13.0	9.99	9.99	0.89	1.12	0.67	0.57
1979	10	15IMPVALL\AHTov	5.2Mw	13.0	9.99	0.71	1.18	1.23	1.18	0.34
1979	10	15IMPVALL\AHTov	5.2Mw	13.0	9.99	9.99	0.54	0.72	0.92	0.63
1979	10	15IMPVALL\AHTov	5.2Mw	13.0	9.99	0.61	0.73	0.94	1.07	0.59
1979	10	15IMPVALL\AHTov	5.2Mw	13.0	9.99	9.99	0.39	0.65	0.57	0.76
1979	10	15IMPVALL\AHTov	5.2Mw	13.0	9.99	9.99	0.67	1.01	0.65	0.54
1979	10	15IMPVALL\AHTov	5.2Mw	15.0	9.99	9.99	0.34	0.22	0.11	0.19
1979	10	15IMPVALL\AHTov	5.2Mw	17.0	9.99	9.99	0.77	0.38	0.61	0.31
1979	10	15IMPVALL\AHTov	5.2Mw	17.0	9.99	9.99	0.64	1.15	0.54	0.31
1979	10	15IMPVALL\AHTov	5.2Mw	13.0	9.99	9.99	0.77	0.95	0.88	0.92
1979	10	15IMPVALL\AHTov	5.2Mw	13.0	9.99	9.99	0.25	0.79	0.76	0.77
1979	10	15IMPVALL\AHTov	5.2Mw	12.0	9.99	9.99	0.51	0.77	0.88	0.52
1979	10	15IMPVALL\AHTov	5.2Mw	12.0	9.99	9.99	1.11	1.11	0.33	0.55
1980	1	24LIVERMOR\HtoV	5.8Mw	20.0	9.99	0.39	0.80	0.69	0.31	-0.39
1980	1	24LIVERMOR\HtoV	5.8Mw	20.0	9.99	0.54	0.37	0.43	0.07	-0.31
1980	1	24LIVERMOR\HtoV	5.8Mw	13.0	0.63	1.15	1.01	0.75	0.91	0.43
1980	1	24LIVERMOR\HtoV	5.8Mw	13.0	0.59	1.43	1.06	1.08	1.20	0.67
1980	1	24LIVERMOR\HtoV	5.8Mw	30.0	9.99	0.51	0.70	0.64	0.35	-0.31
1980	1	24LIVERMOR\HtoV	5.8Mw	30.0	9.99	1.02	0.60	0.62	0.47	-0.45
1980	1	24LIVERMOR\HtoV	5.8Mw	31.0	9.99	0.52	0.28	0.53	0.50	0.18
1980	1	24LIVERMOR\HtoV	5.8Mw	31.0	9.99	0.28	0.34	0.49	0.77	0.17
1980	1	24LIVERMOR\HtoV	5.8Mw	22.0	0.17	0.29	0.39	0.65	0.53	0.33
1980	1	24LIVERMOR\HtoV	5.8Mw	22.0	9.99	0.89	0.48	0.84	0.47	0.07
1980	1	24LIVERMOR\HtoV	5.8Mw	18.0	1.02	1.54	1.54	0.84	0.66	-0.16
1980	1	24LIVERMOR\HtoV	5.8Mw	18.0	9.99	0.95	0.95	0.78	0.61	0.05

1980	1	24LIVERMOR\HtoV	5.8Mw	37.0	0.32	0.75	0.69	0.65	0.37	-0.51
1980	1	24LIVERMOR\HtoV	5.8Mw	37.0	-0.22	0.33	0.89	0.78	0.35	-0.20
1980	1	27LIVERMOR\HtoV	5.4Mw	31.0	9.99	0.15	0.60	0.44	0.64	-0.50
1980	1	27LIVERMOR\HtoV	5.4Mw	31.0	9.99	0.28	0.30	0.31	0.34	-0.25
1980	1	27LIVERMOR\HtoV	5.4Mw	13.0	9.99	-0.13	-0.06	0.26	0.30	0.35
1980	1	27LIVERMOR\HtoV	5.4Mw	13.0	9.99	0.40	0.55	0.27	0.37	0.21
1980	1	27LIVERMOR\HtoV	5.4Mw	30.0	9.99	0.51	0.86	0.49	-0.26	-0.28
1980	1	27LIVERMOR\HtoV	5.4Mw	30.0	9.99	0.61	0.88	0.50	0.16	-0.46
1980	1	27LIVERMOR\HtoV	5.4Mw	31.0	9.99	0.41	0.84	0.50	0.37	-0.06
1980	1	27LIVERMOR\HtoV	5.4Mw	31.0	0.00	-0.58	0.12	0.13	0.27	-0.23
1980	1	27LIVERMOR\HtoV	5.4Mw	4.0	9.99	0.21	0.59	1.11	0.79	0.74
1980	1	27LIVERMOR\HtoV	5.4Mw	4.0	9.99	0.22	0.68	1.37	0.83	0.49
1980	1	27LIVERMOR\HtoV	5.4Mw	8.0	9.99	0.63	0.97	0.81	1.14	0.43
1980	1	27LIVERMOR\HtoV	5.4Mw	8.0	9.99	-0.01	1.16	0.82	1.23	0.74
1980	1	27LIVERMOR\HtoV	5.4Mw	18.0	9.99	1.09	1.52	1.16	0.81	-0.07
1980	1	27LIVERMOR\HtoV	5.4Mw	18.0	9.99	0.03	1.01	0.85	0.51	-0.12
1980	1	27LIVERMOR\HtoV	5.4Mw	22.0	9.99	0.51	0.74	0.80	0.37	-0.02
1980	1	27LIVERMOR\HtoV	5.4Mw	22.0	9.99	0.45	0.85	0.69	0.40	-0.01
1980	2	25ANZA\AZF2HtoV	4.9Mw	12.0	9.99	0.07	0.26	0.29	0.20	0.52
1980	2	25ANZA\AZF3HtoV	4.9Mw	12.0	9.99	9.99	-0.18	0.18	0.50	0.21
1980	2	25ANZA\PFT0HtoV	4.9Mw	13.0	9.99	-0.16	-0.05	0.20	-0.13	0.32
1980	2	25ANZA\PFT1HtoV	4.9Mw	13.0	9.99	0.21	0.47	0.71	0.49	0.55
1980	2	25ANZA\BAR2HtoV	4.9Mw	41.0	9.99	9.99	0.47	0.53	0.23	-0.16
1980	2	25ANZA\BAR3HtoV	4.9Mw	41.0	9.99	9.99	-0.09	0.14	0.37	-0.29
1980	2	25ANZA\RDA0HtoV	4.9Mw	19.0	9.99	9.99	0.34	0.80	0.64	0.38
1980	2	25ANZA\RDA1HtoV	4.9Mw	19.0	9.99	9.99	0.10	1.04	0.55	0.02
1980	5	25MAMMOTH\IHtoV	6.3Mw	9.0	0.85	1.42	1.19	1.28	1.61	1.18
1980	5	25MAMMOTH\IHtoV	6.3Mw	9.0	0.51	1.34	0.74	1.17	1.52	1.52
1980	5	25MAMMOTH\IHtoV	6.3Mw	15.0	0.92	0.80	1.00	1.62	1.31	1.05
1980	5	25MAMMOTH\IHtoV	6.3Mw	15.0	0.63	0.67	1.29	1.25	1.01	0.99
1980	5	25MAMMOTH\IHtoV	6.3Mw	14.0	9.99	9.99	0.59	1.06	1.13	1.19

1980	5	25MAMMOTH\IHtoV	6.3Mw	14.0	9.99	9.99	0.73	1.42	1.11	1.20
1980	5	25MAMMOTH\JHtoV	5.7Mw	16.0	9.99	9.99	0.96	1.01	0.86	0.64
1980	5	25MAMMOTH\JHtoV	5.7Mw	16.0	9.99	9.99	0.96	0.76	0.88	0.80
1980	5	25MAMMOTH\JHtoV	5.7Mw	25.0	9.99	9.99	0.67	0.93	0.57	0.60
1980	5	25MAMMOTH\JHtoV	5.7Mw	25.0	9.99	9.99	0.66	0.94	0.37	0.30
1980	5	25MAMMOTH\JHtoV	5.7Mw	14.0	9.99	9.99	0.78	1.16	1.63	1.29
1980	5	25MAMMOTH\JHtoV	5.7Mw	14.0	0.44	0.84	0.89	0.98	1.26	1.21
1980	5	25MAMMOTH\AHtoV	6.0Mw	17.0	0.45	0.82	1.08	1.16	1.14	0.79
1980	5	25MAMMOTH\AHtoV	6.0Mw	17.0	-0.06	0.83	0.43	1.06	1.08	0.86
1980	5	25MAMMOTH\AHtoV	6.0Mw	19.0	0.17	0.66	0.69	0.68	0.75	0.55
1980	5	25MAMMOTH\AHtoV	6.0Mw	19.0	9.99	0.44	0.14	0.57	0.38	0.18
1980	5	25MAMMOTH\AHtoV	6.0Mw	19.0	9.99	0.42	0.86	0.66	0.74	0.45
1980	5	25MAMMOTH\AHtoV	6.0Mw	19.0	9.99	0.57	0.38	0.60	0.69	0.39
1980	5	25MAMMOTH\AHtoV	6.0Mw	19.0	9.99	0.84	1.11	1.44	1.24	0.96
1980	5	25MAMMOTH\AHtoV	6.0Mw	19.0	0.73	0.60	0.58	1.21	1.00	0.78
1980	5	25MAMMOTH\BHtoV	5.7Mw	3.0	9.99	0.25	0.85	0.80	1.17	1.16
1980	5	25MAMMOTH\BHtoV	5.7Mw	3.0	9.99	0.87	0.68	0.75	1.09	1.32
1980	5	25MAMMOTH\BHtoV	5.7Mw	14.0	9.99	9.99	0.83	0.31	0.68	0.34
1980	5	25MAMMOTH\BHtoV	5.7Mw	14.0	9.99	0.32	0.24	0.31	0.28	0.33
1980	5	25MAMMOTH\BHtoV	5.7Mw	14.0	9.99	9.99	1.14	1.36	0.91	0.78
1980	5	25MAMMOTH\BHtoV	5.7Mw	14.0	9.99	0.41	0.85	1.18	0.57	0.63
1980	5	25MAMMOTH\BHtoV	5.7Mw	14.0	9.99	9.99	1.15	1.36	0.90	0.78
1980	5	25MAMMOTH\BHtoV	5.7Mw	14.0	9.99	0.32	0.79	1.14	0.57	0.62
1980	5	27MAMMOTH\LHtoV	6.0Mw	49.0	9.99	9.99	1.07	0.62	0.93	0.89
1980	5	27MAMMOTH\LHtoV	6.0Mw	49.0	9.99	9.99	0.97	0.82	1.06	0.85
1980	5	27MAMMOTH\LHtoV	6.0Mw	44.0	9.99	0.55	0.82	0.37	0.44	0.55
1980	5	27MAMMOTH\LHtoV	6.0Mw	44.0	9.99	0.54	0.27	0.48	0.60	0.78
1980	5	27MAMMOTH\LHtoV	6.0Mw	19.0	0.52	0.46	1.18	1.11	1.03	0.95
1980	5	27MAMMOTH\LHtoV	6.0Mw	19.0	0.23	0.92	0.87	1.15	1.05	0.98
1980	5	27MAMMOTH\LHtoV	6.0Mw	20.0	9.99	9.99	1.44	1.70	1.40	1.07
1980	5	27MAMMOTH\LHtoV	6.0Mw	20.0	9.99	1.33	1.76	1.49	1.20	1.02

1980	5	27MAMMOTH\CHtoV	4.9Mw	5.0	9.99	-0.19	0.37	0.89	0.52	0.55
1980	5	27MAMMOTH\CHtoV	4.9Mw	5.0	-0.30	0.05	0.85	0.42	0.16	0.23
1980	5	27MAMMOTH\CHtoV	4.9Mw	5.0	9.99	0.05	0.81	1.06	0.76	0.01
1980	5	27MAMMOTH\CHtoV	4.9Mw	5.0	9.99	0.10	0.71	0.99	0.51	0.12
1980	5	27MAMMOTH\CHtoV	4.9Mw	4.0	9.99	9.99	0.38	0.20	0.11	0.05
1980	5	27MAMMOTH\CHtoV	4.9Mw	4.0	9.99	9.99	0.08	0.03	0.04	0.00
1980	5	27MAMMOTH\CHtoV	4.9Mw	9.0	9.99	9.99	0.43	0.58	0.50	-0.06
1980	5	27MAMMOTH\CHtoV	4.9Mw	9.0	9.99	9.99	0.39	0.81	0.73	-0.02
1980	5	27MAMMOTH\CHtoV	4.9Mw	10.0	9.99	9.99	0.75	0.38	0.24	-0.19
1980	5	27MAMMOTH\CHtoV	4.9Mw	10.0	9.99	-0.40	0.69	0.50	0.24	-0.02
1980	5	27MAMMOTH\CHtoV	4.9Mw	2.0	9.99	9.99	0.58	0.73	0.96	0.84
1980	5	31MAMMOTH\DHToV	4.9Mw	12.0	-0.38	-0.50	-0.10	0.36	0.87	0.54
1980	5	31MAMMOTH\DHToV	4.9Mw	12.0	9.99	-0.53	0.21	0.70	0.76	0.54
1980	5	31MAMMOTH\DHToV	4.9Mw	9.0	9.99	9.99	0.54	0.85	0.75	0.69
1980	5	31MAMMOTH\DHToV	4.9Mw	9.0	9.99	9.99	0.83	0.72	0.72	0.69
1980	5	31MAMMOTH\DHToV	4.9Mw	8.0	9.99	9.99	0.56	0.99	1.12	1.07
1980	5	31MAMMOTH\DHToV	4.9Mw	8.0	9.99	0.27	0.97	0.68	0.94	0.61
1980	5	31MAMMOTH\DHToV	4.9Mw	9.0	9.99	9.99	0.10	0.35	0.10	-0.14
1980	5	31MAMMOTH\DHToV	4.9Mw	9.0	9.99	9.99	-0.25	0.33	-0.01	-0.25
1980	5	31MAMMOTH\DHToV	4.9Mw	7.0	9.99	0.41	0.45	0.75	0.74	0.64
1980	5	31MAMMOTH\DHToV	4.9Mw	7.0	9.99	0.34	0.69	0.79	0.90	0.60
1980	5	31MAMMOTH\DHToV	4.9Mw	9.0	9.99	9.99	0.42	0.88	1.03	0.52
1980	5	31MAMMOTH\DHToV	4.9Mw	9.0	9.99	9.99	0.40	0.41	0.80	0.75
1980	5	31MAMMOTH\DHToV	4.9Mw	7.0	9.99	9.99	0.01	0.45	0.91	1.02
1980	6	11MAMMOTH\HHToV	5.0Mw	8.0	9.99	9.99	-0.12	0.16	0.32	0.70
1980	6	11MAMMOTH\HHToV	5.0Mw	11.0	9.99	9.99	-0.23	-0.56	-0.17	0.42
1980	6	11MAMMOTH\HHToV	5.0Mw	12.0	9.99	9.99	0.10	-0.03	-0.01	-0.08
1980	6	11MAMMOTH\HHToV	5.0Mw	12.0	9.99	-0.20	-0.14	0.05	0.11	0.15
1980	6	11MAMMOTH\HHToV	5.0Mw	13.0	9.99	9.99	-0.45	-0.60	0.01	0.58
1980	6	11MAMMOTH\HHToV	5.0Mw	13.0	9.99	9.99	-0.11	-0.40	0.11	0.68
1980	6	11MAMMOTH\HHToV	5.0Mw	14.0	9.99	9.99	-0.44	-0.63	-0.24	-0.19

1980	6	11MAMMOTH\HHTOV	5.0Mw	14.0	9.99	9.99	-0.49	-0.50	-0.55	-0.38
1980	6	11MAMMOTH\HHTOV	5.0Mw	12.0	9.99	9.99	-0.03	-0.32	-0.10	-0.03
1980	6	11MAMMOTH\HHTOV	5.0Mw	12.0	9.99	9.99	-0.15	-0.36	0.31	-0.03
1980	6	11MAMMOTH\HHTOV	5.0Mw	11.0	9.99	9.99	-0.21	-0.35	0.52	0.54
9810	42	60WESTMORL\HtoV	5.8Mw	22.0	0.46	1.00	1.02	0.99	1.02	0.92
9810	42	60WESTMORL\HtoV	5.8Mw	22.0	9.99	9.99	0.36	0.78	0.91	0.95
9810	42	60WESTMORL\HtoV	5.8Mw	19.0	9.99	0.33	0.52	0.71	0.82	0.66
9810	42	60WESTMORL\HtoV	5.8Mw	19.0	9.99	0.43	0.56	0.75	0.89	0.71
9810	42	60WESTMORL\HtoV	5.8Mw	24.0	0.68	0.97	0.88	1.06	1.16	0.61
9810	42	60WESTMORL\HtoV	5.8Mw	24.0	0.39	0.34	0.91	0.98	1.11	0.36
9810	42	60WESTMORL\HtoV	5.8Mw	10.0	0.96	1.20	1.06	0.90	1.18	1.09
9810	42	60WESTMORL\HtoV	5.8Mw	10.0	0.49	0.70	1.04	0.72	1.27	0.95
9810	42	60WESTMORL\HtoV	5.8Mw	26.0	9.99	9.99	0.19	0.65	0.34	0.29
9810	42	60WESTMORL\HtoV	5.8Mw	26.0	9.99	9.99	0.86	1.05	0.92	0.60
9810	42	60WESTMORL\HtoV	5.8Mw	13.0	0.85	1.53	1.65	1.40	1.29	1.18
9810	42	60WESTMORL\HtoV	5.8Mw	13.0	1.24	1.40	1.51	1.30	1.45	1.27
1983	5	2COALINGA\HtoV	6.4Mw	26.0	9.99	1.06	1.41	1.42	1.16	0.25
1983	5	2COALINGA\HtoV	6.4Mw	26.0	9.99	0.79	1.35	1.56	1.22	0.56
1983	5	2COALINGA\HtoV	6.4Mw	42.0	9.99	0.87	0.88	1.02	0.25	-0.09
1983	5	2COALINGA\HtoV	6.4Mw	42.0	9.99	1.22	1.03	1.05	0.38	-0.13
1983	5	2COALINGA\HtoV	6.4Mw	41.0	9.99	9.99	0.45	0.50	0.09	-0.03
1983	5	2COALINGA\HtoV	6.4Mw	41.0	9.99	1.08	0.60	0.57	0.44	-0.11
1983	5	2COALINGA\HtoV	6.4Mw	43.0	9.99	1.13	0.90	1.24	0.81	0.18
1983	5	2COALINGA\HtoV	6.4Mw	43.0	9.99	1.10	1.10	1.03	0.86	0.03
1983	5	2COALINGA\HtoV	6.4Mw	38.0	9.99	0.85	0.70	0.84	0.50	0.07
1983	5	2COALINGA\HtoV	6.4Mw	38.0	9.99	1.30	0.70	0.80	0.45	0.04
1983	5	2COALINGA\HtoV	6.4Mw	44.0	9.99	0.80	0.99	1.15	0.73	-0.03
1983	5	2COALINGA\HtoV	6.4Mw	44.0	9.99	0.78	1.02	1.11	0.58	0.07
1983	5	2COALINGA\HtoV	6.4Mw	46.0	9.99	0.22	0.80	0.71	0.34	0.18
1983	5	2COALINGA\HtoV	6.4Mw	46.0	9.99	0.77	0.94	0.87	0.49	0.08
1983	5	2COALINGA\HtoV	6.4Mw	45.0	9.99	0.73	0.93	1.28	0.63	-0.05

1983	5	2COALINGA\HtoV	6.4Mw	45.0	9.99	0.64	0.95	1.43	0.86	0.10
1983	5	2COALINGA\HtoV	6.4Mw	47.0	9.99	0.78	0.73	1.34	0.88	0.31
1983	5	2COALINGA\HtoV	6.4Mw	47.0	9.99	0.39	1.05	1.20	0.57	0.14
1983	5	2COALINGA\HtoV	6.4Mw	49.0	9.99	9.99	0.96	1.38	0.57	0.18
1983	5	2COALINGA\HtoV	6.4Mw	49.0	9.99	0.71	0.93	1.06	0.66	0.06
1983	5	2COALINGA\HtoV	6.4Mw	51.0	9.99	0.51	0.91	0.96	0.26	0.10
1983	5	2COALINGA\HtoV	6.4Mw	51.0	9.99	9.99	0.77	1.27	0.27	0.08
1983	5	2COALINGA\HtoV	6.4Mw	55.0	9.99	0.54	0.72	0.51	0.42	-0.07
1983	5	2COALINGA\HtoV	6.4Mw	55.0	9.99	0.65	0.89	0.50	0.40	-0.06
1983	5	2COALINGA\HtoV	6.4Mw	41.0	9.99	1.18	1.21	1.04	0.67	0.13
1983	5	2COALINGA\HtoV	6.4Mw	41.0	9.99	1.42	1.11	1.19	0.72	0.08
1983	5	2COALINGA\HtoV	6.4Mw	38.0	9.99	1.27	0.72	0.91	0.75	0.10
1983	5	2COALINGA\HtoV	6.4Mw	38.0	9.99	1.46	0.85	0.82	0.75	0.25
1983	5	2COALINGA\HtoV	6.4Mw	36.0	0.62	1.16	1.17	1.23	0.69	0.40
1983	5	2COALINGA\HtoV	6.4Mw	36.0	0.61	1.04	1.15	1.39	0.69	0.36
1983	5	2COALINGA\HtoV	6.4Mw	35.0	9.99	1.11	1.20	0.98	0.36	-0.16
1983	5	2COALINGA\HtoV	6.4Mw	35.0	9.99	1.33	0.94	0.89	0.29	-0.31
1983	5	2COALINGA\HtoV	6.4Mw	33.0	9.99	0.97	0.89	0.90	0.55	0.00
1983	5	2COALINGA\HtoV	6.4Mw	33.0	9.99	1.14	0.98	0.65	0.61	-0.05
1983	5	2COALINGA\HtoV	6.4Mw	31.0	9.99	1.12	0.89	1.01	0.69	0.17
1983	5	2COALINGA\HtoV	6.4Mw	31.0	9.99	1.20	0.83	0.89	0.61	0.09
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	1.13	1.29	1.15	1.02	0.15
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	0.97	1.19	1.01	0.85	0.31
1983	5	2COALINGA\HtoV	6.4Mw	32.0	9.99	0.91	1.06	0.91	0.18	-0.07
1983	5	2COALINGA\HtoV	6.4Mw	32.0	9.99	0.80	1.28	0.77	0.25	-0.06
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	0.82	1.16	0.64	0.61	0.10
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	1.16	1.15	0.84	0.50	-0.06
1983	5	2COALINGA\HtoV	6.4Mw	28.0	9.99	0.81	1.09	0.95	0.73	0.09
1983	5	2COALINGA\HtoV	6.4Mw	28.0	9.99	0.73	0.82	0.91	0.76	0.22
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	0.72	0.81	1.09	0.44	-0.01
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	1.16	1.08	0.65	0.69	-0.22

1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	1.19	1.69	1.41	0.82	0.21
1983	5	2COALINGA\HtoV	6.4Mw	30.0	0.42	1.12	1.61	1.22	0.82	0.15
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	1.28	1.59	1.40	0.77	0.17
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	1.19	1.33	1.13	0.76	0.23
1983	5	2COALINGA\HtoV	6.4Mw	28.0	9.99	0.71	1.29	1.26	1.18	0.49
1983	5	2COALINGA\HtoV	6.4Mw	28.0	9.99	0.89	0.98	1.14	1.05	0.53
1983	5	2COALINGA\HtoV	6.4Mw	47.0	9.99	1.02	1.11	0.93	0.28	-0.24
1983	5	2COALINGA\HtoV	6.4Mw	47.0	9.99	0.98	0.79	0.76	0.12	-0.34
1983	5	2COALINGA\HtoV	6.4Mw	32.0	9.99	0.48	0.70	1.14	0.45	0.17
1983	5	2COALINGA\HtoV	6.4Mw	32.0	9.99	0.65	0.67	1.12	0.56	0.20
1983	5	2COALINGA\HtoV	6.4Mw	36.0	9.99	1.14	1.10	0.89	0.56	0.02
1983	5	2COALINGA\HtoV	6.4Mw	36.0	9.99	1.47	1.01	0.94	0.48	-0.21
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	0.85	0.76	1.01	0.71	-0.01
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	0.59	0.62	0.83	0.66	0.16
1983	5	2COALINGA\HtoV	6.4Mw	39.0	9.99	0.82	1.06	1.10	0.97	0.31
1983	5	2COALINGA\HtoV	6.4Mw	39.0	9.99	0.70	0.93	0.90	0.84	0.32
1983	5	2COALINGA\HtoV	6.4Mw	41.0	9.99	0.84	0.81	0.84	0.66	0.21
1983	5	2COALINGA\HtoV	6.4Mw	41.0	9.99	0.67	0.64	0.66	0.72	0.26
1983	5	2COALINGA\HtoV	6.4Mw	44.0	9.99	0.85	1.29	0.92	0.63	0.20
1983	5	2COALINGA\HtoV	6.4Mw	44.0	9.99	0.96	1.05	0.91	0.53	0.29
1983	5	2COALINGA\HtoV	6.4Mw	48.0	9.99	0.79	0.68	0.65	0.55	0.19
1983	5	2COALINGA\HtoV	6.4Mw	48.0	9.99	-0.11	0.81	0.58	0.53	0.27
1983	5	2COALINGA\HtoV	6.4Mw	35.0	9.99	0.89	0.83	1.05	0.34	-0.01
1983	5	2COALINGA\HtoV	6.4Mw	35.0	9.99	0.95	0.67	0.94	0.43	0.07
1983	5	2COALINGA\HtoV	6.4Mw	32.0	9.99	0.87	0.95	1.22	0.73	0.66
1983	5	2COALINGA\HtoV	6.4Mw	32.0	9.99	0.93	0.79	0.97	0.95	0.88
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	1.04	0.98	0.94	0.72	0.05
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	1.02	0.72	0.93	0.70	0.03
1983	5	2COALINGA\HtoV	6.4Mw	27.0	9.99	1.28	1.29	1.27	0.75	0.32
1983	5	2COALINGA\HtoV	6.4Mw	27.0	9.99	1.21	1.30	1.18	0.76	0.47
1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	9.99	1.22	0.64	0.62	0.09

1983	5	2COALINGA\HtoV	6.4Mw	30.0	9.99	9.99	1.20	0.99	0.85	0.01
1983	5	2COALINGA\HtoV	6.4Mw	25.0	9.99	1.29	1.18	1.55	1.03	0.52
1983	5	2COALINGA\HtoV	6.4Mw	31.0	9.99	0.95	0.74	0.70	0.74	0.24
1983	5	2COALINGA\HtoV	6.4Mw	31.0	9.99	0.94	0.52	0.94	0.84	0.26
1983	5	2COALINGA\HtoV	6.4Mw	32.0	9.99	1.27	1.48	1.04	0.59	0.06
1983	5	2COALINGA\HtoV	6.4Mw	32.0	9.99	1.12	1.47	0.84	0.69	0.25
1983	5	2COALINGA\HtoV	6.4Mw	35.0	9.99	0.53	0.97	0.59	0.41	0.11
1983	5	2COALINGA\HtoV	6.4Mw	35.0	9.99	0.63	1.05	0.88	0.21	-0.05
1983	5	2COALINGA\HtoV	6.4Mw	37.0	9.99	0.92	1.28	1.00	0.52	0.02
1983	5	2COALINGA\HtoV	6.4Mw	41.0	9.99	1.05	1.10	0.77	0.40	0.54
1983	5	2COALINGA\HtoV	6.4Mw	41.0	9.99	0.78	0.74	0.86	0.61	0.31
1983	5	2COALINGA\HtoV	6.4Mw	9.0	9.99	1.27	1.25	1.57	1.21	0.39
1983	5	2COALINGA\HtoV	6.4Mw	9.0	9.99	0.65	1.20	1.17	1.17	0.47
1983	5	2COALINGA\HtoV	6.4Mw	9.0	9.99	1.34	1.42	1.73	1.59	1.40
1983	5	2COALINGA\HtoV	6.4Mw	9.0	9.99	1.13	1.46	1.36	1.37	1.37
1983	5	2COALINGA\HtoV	6.4Mw	28.0	9.99	1.27	1.60	1.24	0.60	-0.02
1983	5	2COALINGA\HtoV	6.4Mw	28.0	9.99	1.00	1.33	0.91	0.95	-0.15
1983	5	9COALINGA\HtoV	5.0Mw	20.0	9.99	0.02	0.27	0.50	0.32	-0.14
1983	5	9COALINGA\HtoV	5.0Mw	20.0	9.99	-0.55	-0.16	-0.32	0.06	-0.27
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	-0.05	0.66	0.93	1.55	1.10
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	9.99	0.65	1.04	1.51	0.93
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	9.99	0.39	0.94	1.61	0.86
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	9.99	0.76	1.03	1.46	0.54
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	0.43	0.67	1.07	0.90	0.66
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	0.30	0.19	1.24	0.55	0.84
1983	5	9COALINGA\HtoV	5.0Mw	18.0	9.99	9.99	0.18	0.82	0.25	0.36
1983	5	9COALINGA\HtoV	5.0Mw	18.0	9.99	-0.54	0.03	0.70	0.39	0.09
1983	5	9COALINGA\HtoV	5.0Mw	17.0	9.99	0.01	0.11	0.63	0.67	0.68
1983	5	9COALINGA\HtoV	5.0Mw	17.0	9.99	9.99	0.15	0.88	0.60	0.37
1983	5	9COALINGA\HtoV	5.0Mw	18.0	9.99	9.99	-0.32	0.02	0.84	0.07
1983	5	9COALINGA\HtoV	5.0Mw	18.0	9.99	0.23	0.59	0.73	0.69	0.21

1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	0.27	0.69	0.87	0.64	0.47
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	-0.25	0.64	0.39	0.34	0.55
1983	5	9COALINGA\HtoV	5.0Mw	13.0	-0.65	0.00	0.49	0.61	0.46	0.59
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	9.99	0.57	0.38	1.08	0.65
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	9.99	0.65	0.41	1.09	0.83
1983	5	9COALINGA\HtoV	5.0Mw	12.0	9.99	9.99	0.33	0.72	1.02	0.55
1983	5	9COALINGA\HtoV	5.0Mw	12.0	9.99	9.99	0.14	0.56	0.96	0.93
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	9.99	0.25	0.78	1.00	0.77
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	9.99	0.62	0.79	1.14	1.18
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	9.99	0.41	0.78	0.72	1.05
1983	5	9COALINGA\HtoV	5.0Mw	13.0	9.99	0.32	0.70	0.86	1.04	0.92
1983	5	9COALINGA\HtoV	5.0Mw	14.0	9.99	0.49	0.77	0.80	0.46	0.18
1983	5	9COALINGA\HtoV	5.0Mw	14.0	9.99	9.99	0.29	0.84	1.01	0.05
1983	5	9COALINGA\HtoV	5.0Mw	14.0	-0.21	0.39	0.56	0.26	0.94	0.73
1983	5	9COALINGA\HtoV	5.0Mw	14.0	-0.43	0.21	0.40	0.05	1.03	0.68
1983	5	9COALINGA\HtoV	5.0Mw	12.0	9.99	0.15	0.55	0.66	0.90	0.52
1983	5	9COALINGA\HtoV	5.0Mw	12.0	9.99	0.04	0.16	0.67	0.73	0.48
1983	5	9COALINGA\HtoV	5.0Mw	14.0	-0.42	0.35	0.56	0.65	0.81	-0.01
1983	5	9COALINGA\HtoV	5.0Mw	14.0	-0.01	0.37	0.72	0.93	1.02	0.09
1983	5	9COALINGA\HtoV	5.0Mw	20.0	9.99	9.99	-0.23	0.08	-0.44	-0.66
1983	5	9COALINGA\HtoV	5.0Mw	20.0	9.99	9.99	-0.33	-0.35	-0.46	-0.83
1983	5	9COALINGA\HtoV	5.0Mw	15.0	9.99	0.25	0.66	1.01	0.39	0.19
1983	5	9COALINGA\HtoV	5.0Mw	15.0	9.99	0.29	0.39	0.89	0.29	0.12
1983	5	9COALINGA\HtoV	5.0Mw	13.0	-0.13	0.43	0.67	0.86	0.49	0.44
1983	5	9COALINGA\HtoV	5.0Mw	13.0	-0.35	0.20	0.10	1.09	0.42	0.42
1983	5	9COALINGA\HtoV	5.0Mw	20.0	9.99	9.99	0.05	-0.09	0.07	-0.12
1983	5	9COALINGA\HtoV	5.0Mw	20.0	9.99	-0.92	-0.25	-0.15	0.09	0.02
1983	6	11COALINGA\HtoV	5.3Mw	10.0	0.34	0.67	0.89	0.54	1.04	0.16
1983	6	11COALINGA\HtoV	5.3Mw	10.0	0.41	0.74	0.38	0.80	1.00	0.12
1983	6	11COALINGA\HtoV	5.3Mw	10.0	0.78	0.63	0.34	0.54	0.50	0.19
1983	6	11COALINGA\HtoV	5.3Mw	10.0	0.55	0.73	0.79	0.48	0.20	0.38

1983	6	11COALINGA\HtoV	5.3Mw	10.0	9.99	0.45	0.60	0.33	0.19	0.15
1983	6	11COALINGA\HtoV	5.3Mw	10.0	9.99	0.61	0.46	0.32	0.54	0.28
1983	7	9COALINGA\HtoV	5.2Mw	11.0	9.99	0.75	0.82	1.28	1.36	0.62
1983	7	9COALINGA\HtoV	5.2Mw	11.0	9.99	9.99	0.56	1.09	1.16	0.67
1983	7	9COALINGA\HtoV	5.2Mw	11.0	9.99	0.69	0.78	1.21	1.33	0.71
1983	7	9COALINGA\HtoV	5.2Mw	11.0	9.99	0.31	0.56	1.18	1.18	0.73
1983	7	9COALINGA\HtoV	5.2Mw	16.0	9.99	9.99	0.02	0.89	0.75	0.34
1983	7	9COALINGA\HtoV	5.2Mw	16.0	9.99	0.07	0.32	0.76	1.07	0.47
1983	7	9COALINGA\HtoV	5.2Mw	15.0	9.99	0.21	0.31	0.67	0.74	0.84
1983	7	9COALINGA\HtoV	5.2Mw	15.0	9.99	-0.10	0.04	0.21	0.77	1.11
1983	7	9COALINGA\HtoV	5.2Mw	10.0	9.99	0.73	1.02	1.20	1.08	1.16
1983	7	9COALINGA\HtoV	5.2Mw	10.0	9.99	0.49	0.81	0.99	1.16	1.26
1983	7	9COALINGA\HtoV	5.2Mw	12.0	9.99	9.99	0.62	0.82	0.68	0.65
1983	7	9COALINGA\HtoV	5.2Mw	12.0	0.22	0.01	0.49	0.90	0.73	0.80
1983	7	9COALINGA\HtoV	5.2Mw	12.0	-0.72	0.32	0.64	0.83	0.67	0.67
1983	7	9COALINGA\HtoV	5.2Mw	12.0	9.99	-0.05	0.49	0.91	0.73	0.88
1983	7	9COALINGA\HtoV	5.2Mw	14.0	9.99	9.99	0.29	0.41	0.49	0.88
1983	7	9COALINGA\HtoV	5.2Mw	14.0	9.99	9.99	0.27	0.58	1.00	0.95
1983	7	9COALINGA\HtoV	5.2Mw	13.0	9.99	0.16	0.53	0.87	0.95	0.26
1983	7	9COALINGA\HtoV	5.2Mw	13.0	9.99	0.24	0.19	0.40	0.89	0.53
1983	7	9COALINGA\HtoV	5.2Mw	17.0	9.99	-0.08	0.01	0.26	-0.06	0.40
1983	7	9COALINGA\HtoV	5.2Mw	17.0	9.99	-0.08	0.12	0.30	0.37	0.47
1983	7	9COALINGA\HtoV	5.2Mw	10.0	9.99	0.82	1.00	1.34	0.69	0.58
1983	7	9COALINGA\HtoV	5.2Mw	10.0	9.99	0.57	0.85	1.19	0.75	0.76
1983	7	22COALINGA\HtoV	5.8Mw	10.0	9.99	0.62	0.86	1.28	1.01	0.77
1983	7	22COALINGA\HtoV	5.8Mw	10.0	9.99	9.99	0.97	1.20	1.47	0.69
1983	7	22COALINGA\HtoV	5.8Mw	10.0	9.99	0.76	0.79	1.26	1.25	1.19
1983	7	22COALINGA\HtoV	5.8Mw	10.0	9.99	0.93	0.77	1.22	1.26	1.49
1983	7	22COALINGA\HtoV	5.8Mw	8.0	1.15	1.14	1.45	1.76	1.70	1.24
1983	7	22COALINGA\HtoV	5.8Mw	8.0	9.99	9.99	1.38	1.37	1.65	1.30
1983	7	22COALINGA\HtoV	5.8Mw	11.0	9.99	0.66	1.55	0.95	0.89	0.89

1983	7	22COALINGA\HtoV	5.8Mw	11.0	0.57	1.15	1.23	1.00	0.79	0.80
1983	7	22COALINGA\HtoV	5.8Mw	11.0	0.98	0.69	1.54	0.96	0.89	0.88
1983	7	22COALINGA\HtoV	5.8Mw	11.0	0.65	1.13	1.27	1.00	0.83	0.85
1983	7	22COALINGA\HtoV	5.8Mw	12.0	0.48	0.84	1.03	1.23	0.93	1.31
1983	7	22COALINGA\HtoV	5.8Mw	12.0	0.65	1.14	0.90	1.28	0.89	1.22
1983	7	22COALINGA\HtoV	5.8Mw	17.0	1.11	1.02	0.94	1.09	1.07	0.81
1983	7	22COALINGA\HtoV	5.8Mw	17.0	0.85	0.78	0.78	1.12	1.19	0.72
1983	7	22COALINGA\HtoV	5.8Mw	17.0	1.10	0.99	1.12	1.41	1.40	1.16
1983	7	22COALINGA\HtoV	5.8Mw	17.0	0.62	0.70	0.59	0.83	0.94	1.19
1983	7	22COALINGA\HtoV	5.8Mw	12.0	1.24	0.87	1.38	1.09	1.21	0.61
1983	7	22COALINGA\HtoV	5.8Mw	12.0	1.03	0.80	0.99	0.89	1.12	0.81
1983	7	22COALINGA\HtoV	5.8Mw	10.0	9.99	0.38	0.72	0.74	0.65	0.70
1983	7	22COALINGA\HtoV	5.8Mw	10.0	9.99	0.32	0.57	0.76	0.88	0.68
1983	7	22COALINGA\HtoV	5.8Mw	9.0	0.92	1.03	1.85	1.72	1.20	1.04
1983	7	22COALINGA\HtoV	5.8Mw	9.0	0.87	0.86	1.58	1.67	1.49	0.98
1984	4	24MORGAN\AGHtoV	6.2Mw	30.0	9.99	0.21	0.53	0.56	0.39	-0.32
1984	4	24MORGAN\AGHtoV	6.2Mw	30.0	9.99	0.67	0.63	0.36	0.31	-0.29
1984	4	24MORGAN\ANHtoV	6.2Mw	3.0	0.43	0.60	1.16	1.50	0.89	0.91
1984	4	24MORGAN\ANHtoV	6.2Mw	3.0	0.84	1.11	1.44	1.58	1.13	0.93
1984	4	24MORGAN\AlHtoV	6.2Mw	51.0	9.99	-0.03	0.17	0.38	0.37	-0.19
1984	4	24MORGAN\AlHtoV	6.2Mw	51.0	9.99	0.09	0.44	0.30	0.25	-0.15
1984	4	24MORGAN\CAHtoV	6.2Mw	38.0	9.99	0.22	0.55	0.83	1.06	0.68
1984	4	24MORGAN\CAHtoV	6.2Mw	38.0	9.99	0.56	0.84	1.16	0.98	0.77
1984	4	24MORGAN\CLHtoV	6.2Mw	23.0	9.99	0.70	1.04	0.94	0.69	0.17
1984	4	24MORGAN\CLHtoV	6.2Mw	23.0	9.99	0.71	1.26	1.26	0.42	0.08
1984	4	24MORGAN\CYHtoV	6.2Mw	1.0	1.12	1.24	1.75	1.56	1.38	1.01
1984	4	24MORGAN\CYHtoV	6.2Mw	1.0	0.87	1.54	2.12	1.58	1.60	1.11
1984	4	24MORGAN\FMHtoV	6.2Mw	32.0	9.99	9.99	0.46	0.46	0.12	-0.06
1984	4	24MORGAN\FMHtoV	6.2Mw	32.0	9.99	0.56	0.44	0.42	0.04	-0.14
1984	4	24MORGAN\GOHtoV	6.2Mw	16.0	0.48	0.30	0.55	0.40	0.77	0.48
1984	4	24MORGAN\GOHtoV	6.2Mw	16.0	0.02	0.40	-0.01	0.70	0.69	0.52

1984	4	24MORGAN\G0HtoV	6.2Mw	15.0	9.99	0.51	0.46	0.74	0.99	0.66
1984	4	24MORGAN\G0HtoV	6.2Mw	15.0	0.52	0.67	0.60	0.72	0.91	0.67
1984	4	24MORGAN\G0HtoV	6.2Mw	14.0	0.80	0.44	0.80	0.77	0.99	0.57
1984	4	24MORGAN\G0HtoV	6.2Mw	14.0	0.16	0.72	0.94	1.01	0.84	0.87
1984	4	24MORGAN\G0HtoV	6.2Mw	13.0	0.94	0.40	1.06	1.06	1.24	0.71
1984	4	24MORGAN\G0HtoV	6.2Mw	13.0	0.52	0.68	0.92	1.34	1.25	0.90
1984	4	24MORGAN\G0HtoV	6.2Mw	12.0	0.57	0.41	1.22	0.89	1.27	0.97
1984	4	24MORGAN\G0HtoV	6.2Mw	12.0	0.49	1.20	1.82	1.33	1.42	0.61
1984	4	24MORGAN\GMHtoV	6.2Mw	14.0	0.37	0.41	0.51	1.02	0.82	0.73
1984	4	24MORGAN\GMHtoV	6.2Mw	14.0	0.16	0.68	0.46	1.04	0.89	0.78
1984	4	24MORGAN\GIHtoV	6.2Mw	16.0	0.35	0.37	0.49	0.37	0.67	0.67
1984	4	24MORGAN\GIHtoV	6.2Mw	16.0	0.22	0.40	0.03	0.52	0.70	0.57
1984	4	24MORGAN\HVHtoV	6.2Mw	3.0	9.99	0.51	1.14	1.25	0.89	0.54
1984	4	24MORGAN\HVHtoV	6.2Mw	3.0	9.99	1.00	1.58	1.35	1.02	0.74
1984	4	24MORGAN\HCHtoV	6.2Mw	32.0	9.99	0.87	0.73	0.86	0.59	-0.22
1984	4	24MORGAN\HCHtoV	6.2Mw	32.0	9.99	0.90	1.19	0.71	0.64	-0.04
1984	4	24MORGAN\HDHtoV	6.2Mw	28.0	9.99	0.38	0.95	0.84	0.74	0.04
1984	4	24MORGAN\HDHtoV	6.2Mw	28.0	9.99	0.69	0.65	0.86	0.74	0.04
1984	4	24MORGAN\HDHtoV	6.2Mw	28.0	9.99	0.57	1.03	0.82	0.71	0.20
1984	4	24MORGAN\HDHtoV	6.2Mw	28.0	9.99	0.64	0.84	0.82	0.79	-0.01
1984	4	24MORGAN\HDHtoV	6.2Mw	28.0	0.30	0.44	0.94	0.78	0.69	0.08
1984	4	24MORGAN\HDHtoV	6.2Mw	28.0	9.99	0.67	0.94	0.66	0.61	0.17
1984	4	24MORGAN\HDHtoV	6.2Mw	28.0	0.37	0.51	1.08	0.98	0.78	0.18
1984	4	24MORGAN\HDHtoV	6.2Mw	28.0	9.99	0.63	1.00	0.79	0.69	0.18
1984	4	24MORGAN\HDHtoV	6.2Mw	28.0	9.99	0.51	1.04	0.79	0.70	0.06
1984	4	24MORGAN\HDHtoV	6.2Mw	28.0	9.99	0.65	0.81	0.90	0.74	0.19
1984	4	24MORGAN\LBHtoV	6.2Mw	65.0	9.99	9.99	0.67	0.66	0.03	-0.68
1984	4	24MORGAN\LBHtoV	6.2Mw	65.0	9.99	9.99	0.70	0.74	0.14	-0.79
1984	4	24MORGAN\SJHtoV	6.2Mw	30.0	0.31	0.39	0.58	0.50	0.44	-0.21
1984	4	24MORGAN\SJHtoV	6.2Mw	30.0	0.14	0.50	0.73	0.54	0.18	-0.11
1984	4	24MORGAN\SJHtoV	6.2Mw	35.0	9.99	0.43	0.82	1.15	0.85	0.05

1984	4	24MORGAN\SJHtoV	6.2Mw	35.0	9.99	0.00	0.53	0.92	0.77	0.35
1984	4	24MORGAN\SJHtoV	6.2Mw	35.0	9.99	0.56	0.78	0.54	0.80	0.18
1984	4	24MORGAN\SJHtoV	6.2Mw	35.0	9.99	0.57	0.86	0.72	0.72	0.27
1984	4	24MORGAN\WVHtoV	6.2Mw	29.0	9.99	9.99	0.41	0.80	0.64	0.34
1984	4	24MORGAN\WNHtoV	6.2Mw	29.0	9.99	0.38	0.41	0.51	0.56	0.10
1984	4	24MORGAN\WSHtoV	6.2Mw	29.0	9.99	9.99	0.42	0.51	0.64	0.21
1984	4	24MORGAN\SFHtoV	6.2Mw	71.0	9.99	9.99	-0.03	0.53	0.51	-0.12
1984	4	24MORGAN\SFHtoV	6.2Mw	71.0	9.99	9.99	0.44	0.65	0.51	-0.07
1984	4	24MORGAN\LOHtoV	6.2Mw	44.0	9.99	9.99	0.12	0.31	0.68	0.34
1984	4	24MORGAN\LOHtoV	6.2Mw	44.0	9.99	9.99	0.66	0.96	0.91	0.50
1986	1	26HOLLISTR\HtoV	5.4Mw	17.0	-0.03	0.51	0.56	0.81	0.90	0.49
1986	1	26HOLLISTR\HtoV	5.4Mw	17.0	0.54	0.84	0.62	0.95	0.88	0.58
1986	1	26HOLLISTR\HtoV	5.4Mw	17.0	9.99	0.33	0.58	0.97	0.74	0.53
1986	1	26HOLLISTR\HtoV	5.4Mw	17.0	9.99	0.79	0.70	0.88	0.71	0.67
1986	1	26HOLLISTR\HtoV	5.4Mw	17.0	-0.44	0.44	0.61	0.89	0.61	0.58
1986	1	26HOLLISTR\HtoV	5.4Mw	15.0	9.99	0.75	0.84	0.33	0.25	0.26
1986	1	26HOLLISTR\HtoV	5.4Mw	15.0	-0.24	0.79	1.04	0.43	0.69	0.02
1986	7	8PALMSPR\AHTtoV	6.0Mw	46.0	9.99	0.28	0.32	0.84	0.59	0.53
1986	7	8PALMSPR\AHTtoV	6.0Mw	46.0	9.99	9.99	0.41	0.76	0.53	0.61
1986	7	8PALMSPR\AHTtoV	6.0Mw	55.0	9.99	-0.10	0.59	0.83	0.41	0.35
1986	7	8PALMSPR\AHTtoV	6.0Mw	55.0	9.99	0.12	0.84	0.71	0.15	0.57
1986	7	8PALMSPR\AHTtoV	6.0Mw	47.0	9.99	9.99	0.43	0.32	0.78	0.68
1986	7	8PALMSPR\AHTtoV	6.0Mw	47.0	9.99	9.99	0.31	0.55	0.36	0.36
1986	7	8PALMSPR\CHtoV	6.0Mw	16.0	0.12	0.70	0.72	0.57	0.96	1.02
1986	7	8PALMSPR\CHtoV	6.0Mw	16.0	0.17	0.66	0.97	0.77	1.21	0.91
1986	7	8PALMSPR\CHtoV	6.0Mw	58.0	9.99	0.55	0.32	0.60	0.19	-0.07
1986	7	8PALMSPR\CHtoV	6.0Mw	58.0	9.99	0.42	0.44	0.77	0.11	-0.04
1986	7	8PALMSPR\CHtoV	6.0Mw	35.0	9.99	9.99	0.94	0.87	0.73	0.83
1986	7	8PALMSPR\CHtoV	6.0Mw	35.0	9.99	9.99	0.94	1.28	0.75	0.77
1986	7	8PALMSPR\DHtoV	6.0Mw	8.0	9.99	9.99	1.27	1.36	1.41	1.18
1986	7	8PALMSPR\DHtoV	6.0Mw	8.0	9.99	9.99	1.35	1.42	1.47	1.14

1986	7	8PALMSPR\FHtoV	6.0Mw	16.0	9.99	0.40	0.83	0.53	0.47	0.83
1986	7	8PALMSPR\FHtoV	6.0Mw	16.0	9.99	0.61	0.88	0.71	0.41	0.86
1986	7	8PALMSPR\HHtoV	6.0Mw	44.0	9.99	9.99	0.81	0.63	0.75	0.92
1986	7	8PALMSPR\HHtoV	6.0Mw	44.0	9.99	9.99	0.52	0.58	0.66	1.07
1986	7	8PALMSPR\HHtoV	6.0Mw	76.0	9.99	-0.10	0.12	0.46	0.34	0.31
1986	7	8PALMSPR\HHtoV	6.0Mw	76.0	9.99	0.01	-0.02	0.12	0.23	0.45
1986	7	8PALMSPR\HHtoV	6.0Mw	35.0	9.99	9.99	0.71	0.81	1.05	0.72
1986	7	8PALMSPR\HHtoV	6.0Mw	35.0	9.99	9.99	0.89	1.11	0.78	0.67
1986	7	8PALMSPR\IHtoV	6.0Mw	46.0	9.99	9.99	0.95	0.66	0.40	0.35
1986	7	8PALMSPR\IHtoV	6.0Mw	46.0	9.99	9.99	0.71	0.55	0.30	0.47
1986	7	8PALMSPR\IHtoV	6.0Mw	40.0	0.14	0.68	0.66	0.51	0.33	0.63
1986	7	8PALMSPR\IHtoV	6.0Mw	40.0	0.55	0.67	0.95	0.50	0.71	0.63
1986	7	8PALMSPR\JHtoV	6.0Mw	30.0	9.99	9.99	0.71	0.52	0.55	0.26
1986	7	8PALMSPR\JHtoV	6.0Mw	30.0	9.99	9.99	0.52	0.71	0.56	0.29
1986	7	8PALMSPR\LHtoV	6.0Mw	38.0	9.99	9.99	0.40	0.68	0.51	0.64
1986	7	8PALMSPR\LHtoV	6.0Mw	38.0	9.99	9.99	0.08	0.54	0.54	0.70
1986	7	8PALMSPR\MHtoV	6.0Mw	10.0	0.91	1.66	1.28	1.20	0.89	0.64
1986	7	8PALMSPR\MHtoV	6.0Mw	10.0	1.03	1.93	1.25	1.15	0.76	0.61
1986	7	8PALMSPR\HHtoV	6.0Mw	63.0	9.99	9.99	0.14	-0.11	0.22	0.43
1986	7	8PALMSPR\HHtoV	6.0Mw	63.0	9.99	9.99	-0.07	-0.17	0.22	0.67
1986	7	8PALMSPR\NHtoV	6.0Mw	8.0	1.09	1.67	1.62	1.08	1.46	1.29
1986	7	8PALMSPR\NHtoV	6.0Mw	8.0	9.99	1.09	1.29	1.32	1.34	1.36
1986	7	8PALMSPR\PHtoV	6.0Mw	17.0	9.99	1.04	1.18	0.86	1.11	0.72
1986	7	8PALMSPR\PHtoV	6.0Mw	17.0	9.99	0.90	1.06	0.84	0.74	1.06
1986	7	8PALMSPR\PHtoV	6.0Mw	72.0	9.99	-0.28	0.10	0.06	0.91	0.71
1986	7	8PALMSPR\PHtoV	6.0Mw	72.0	9.99	-0.26	0.07	-0.18	0.50	0.61
1986	7	8PALMSPR\RHtoV	6.0Mw	83.0	9.99	-0.07	-0.09	-0.27	0.07	0.10
1986	7	8PALMSPR\RHtoV	6.0Mw	83.0	9.99	-0.35	-0.16	-0.32	-0.18	0.13
1986	7	8PALMSPR\RHtoV	6.0Mw	71.0	9.99	9.99	-0.35	-0.53	0.48	0.29
1986	7	8PALMSPR\RHtoV	6.0Mw	71.0	9.99	9.99	-0.14	-0.24	0.47	0.28
1986	7	8PALMSPR\HHtoV	6.0Mw	32.0	9.99	9.99	0.64	1.08	1.26	0.68

1986	7	8PALMSPR\HHtoV	6.0Mw	32.0	9.99	9.99	0.90	0.62	1.17	0.77
1986	7	8PALMSPR\HHtoV	6.0Mw	40.0	9.99	0.54	0.45	0.64	0.56	0.57
1986	7	8PALMSPR\HHtoV	6.0Mw	40.0	9.99	0.54	0.38	0.58	0.52	0.39
1986	7	8PALMSPR\HHtoV	6.0Mw	26.0	9.99	9.99	0.45	0.52	0.45	1.02
1986	7	8PALMSPR\HHtoV	6.0Mw	26.0	9.99	9.99	0.64	0.53	0.71	0.79
1986	7	8PALMSPR\SHtoV	6.0Mw	45.0	9.99	0.29	0.12	0.67	0.62	0.48
1986	7	8PALMSPR\SHtoV	6.0Mw	45.0	9.99	-0.09	0.18	0.76	0.78	0.67
1986	7	8PALMSPR\THtoV	6.0Mw	72.0	9.99	9.99	0.71	0.77	0.83	0.24
1986	7	8PALMSPR\THtoV	6.0Mw	72.0	9.99	9.99	0.93	0.57	0.88	0.31
1986	7	8PALMSPR\WHtoV	6.0Mw	7.0	0.78	1.23	1.40	1.44	1.58	0.96
1986	7	8PALMSPR\WHtoV	6.0Mw	7.0	0.47	0.81	1.41	1.39	1.50	1.15
1986	7	8PALMSPR\HHtoV	6.0Mw	58.0	9.99	9.99	0.18	0.17	0.37	0.73
1986	7	8PALMSPR\HHtoV	6.0Mw	58.0	9.99	9.99	0.14	0.16	0.25	0.78
1986	7	8PALMSPR\HHtoV	6.0Mw	47.0	9.99	9.99	0.73	0.56	0.82	0.56
1986	7	8PALMSPR\HHtoV	6.0Mw	47.0	9.99	9.99	0.61	0.80	0.75	0.44
1986	7	20CHALFANT\HtoV	5.9Mw	27.0	9.99	0.01	0.34	0.73	0.57	0.51
1986	7	20CHALFANT\HtoV	5.9Mw	27.0	9.99	-0.53	0.25	0.49	0.63	0.42
1986	7	20CHALFANT\HtoV	5.9Mw	24.0	0.18	0.64	0.89	0.72	0.59	0.23
1986	7	20CHALFANT\HtoV	5.9Mw	24.0	0.60	0.66	0.86	0.80	0.72	0.06
1986	7	20CHALFANT\HtoV	5.9Mw	18.0	-0.74	-0.24	0.30	0.20	0.34	0.26
1986	7	20CHALFANT\HtoV	5.9Mw	18.0	0.60	0.77	0.87	0.48	0.18	0.69
1986	7	20CHALFANT\HtoV	5.9Mw	26.0	9.99	-0.14	0.08	0.43	0.62	0.24
1986	7	20CHALFANT\HtoV	5.9Mw	26.0	9.99	0.11	0.09	0.29	0.30	0.23
1986	7	20CHALFANT\HtoV	5.9Mw	11.0	0.51	0.90	0.94	1.26	0.93	1.13
1986	7	20CHALFANT\HtoV	5.9Mw	11.0	0.93	0.90	0.87	1.53	0.94	0.91
1986	7	21CHALFANT\HtoV	6.2Mw	37.0	0.67	1.26	1.09	1.02	1.09	0.83
1986	7	21CHALFANT\HtoV	6.2Mw	37.0	9.99	0.44	1.31	0.96	0.89	0.80
1986	7	21CHALFANT\HtoV	6.2Mw	9.0	1.33	0.68	1.20	0.94	1.18	0.63
1986	7	21CHALFANT\HtoV	6.2Mw	9.0	0.70	0.90	1.15	1.04	0.77	0.48
1986	7	21CHALFANT\HtoV	6.2Mw	23.0	9.99	0.94	0.19	0.38	0.74	0.41
1986	7	21CHALFANT\HtoV	6.2Mw	23.0	0.76	1.26	0.70	0.71	0.63	0.78

1986	7	21CHALFANT\HtoV	6.2Mw	45.0	-0.63	0.43	0.34	0.68	0.33	0.44
1986	7	21CHALFANT\HtoV	6.2Mw	45.0	9.99	0.60	0.62	0.61	0.61	0.35
1986	7	21CHALFANT\HtoV	6.2Mw	36.0	9.99	9.99	0.39	0.85	0.88	0.47
1986	7	21CHALFANT\HtoV	6.2Mw	36.0	9.99	9.99	0.47	1.12	0.88	0.44
1986	7	21CHALFANT\HtoV	6.2Mw	33.0	0.41	0.73	0.22	0.59	0.69	0.38
1986	7	21CHALFANT\HtoV	6.2Mw	33.0	0.96	1.09	0.52	0.67	0.42	0.19
1986	7	21CHALFANT\HtoV	6.2Mw	33.0	0.47	0.67	0.55	0.71	0.66	0.58
1986	7	21CHALFANT\HtoV	6.2Mw	33.0	0.92	1.18	0.61	0.93	0.63	0.33
1986	7	21CHALFANT\HtoV	6.2Mw	51.0	9.99	9.99	0.06	0.81	0.31	-0.23
1986	7	21CHALFANT\HtoV	6.2Mw	51.0	9.99	9.99	0.15	0.71	0.43	-0.47
1986	7	21CHALFANT\HtoV	6.2Mw	36.0	-0.10	-0.07	-0.35	0.34	0.80	0.62
1986	7	21CHALFANT\HtoV	6.2Mw	36.0	-0.34	0.15	-0.25	0.44	0.70	0.63
1986	7	21CHALFANT\HtoV	6.2Mw	41.0	9.99	9.99	0.65	0.63	0.30	0.09
1986	7	21CHALFANT\HtoV	6.2Mw	41.0	9.99	9.99	0.69	0.71	0.26	0.01
1986	7	21CHALFANT\HtoV	6.2Mw	19.0	0.67	1.50	1.30	1.53	1.49	1.16
1986	7	21CHALFANT\HtoV	6.2Mw	19.0	1.30	1.15	1.77	1.47	1.25	0.94
1986	7	21CHALFANT\HtoV	5.6Mw	14.0	9.99	-0.17	0.35	0.46	1.08	0.36
1986	7	21CHALFANT\HtoV	5.6Mw	14.0	9.99	0.30	0.47	0.64	0.75	0.35
1986	7	21CHALFANT\HtoV	5.6Mw	14.0	9.99	0.45	0.23	0.23	0.05	0.12
1986	7	21CHALFANT\HtoV	5.6Mw	14.0	9.99	0.36	-0.22	-0.26	0.02	0.52
1986	7	21CHALFANT\HtoV	5.6Mw	20.0	-0.36	0.34	0.50	0.61	0.80	0.86
1986	7	21CHALFANT\HtoV	5.6Mw	20.0	9.99	0.09	0.28	0.75	0.57	0.72
1986	7	31CHALFANT\HtoV	5.8Mw	13.0	0.52	0.68	0.76	0.74	0.81	0.73
1986	7	31CHALFANT\HtoV	5.8Mw	13.0	0.03	0.67	0.89	1.15	0.95	0.56
1986	7	31CHALFANT\HtoV	5.8Mw	21.0	-0.31	0.18	0.68	0.58	0.19	0.53
1986	7	31CHALFANT\HtoV	5.8Mw	21.0	-0.32	0.41	0.46	0.94	0.49	0.76
1987	10	1WHITTIER\HtoV	6.0Mw	13.0	9.99	9.99	1.46	1.26	1.36	0.98
1987	10	1WHITTIER\HtoV	6.0Mw	13.0	9.99	0.97	1.23	1.12	1.25	1.23
1987	10	1WHITTIER\HtoV	6.0Mw	17.0	9.99	0.65	1.06	1.14	1.06	1.00
1987	10	1WHITTIER\HtoV	6.0Mw	17.0	9.99	0.30	0.44	0.52	0.88	0.88
1987	10	1WHITTIER\HtoV	6.0Mw	39.0	9.99	-0.23	0.40	0.87	0.71	0.50

1987 10	1WHITTIER\HtoV	6.0Mw	39.0	9.99	9.99	0.54	0.89	0.75	0.58
1987 10	1WHITTIER\HtoV	6.0Mw	23.0	9.99	9.99	0.44	0.71	1.13	0.72
1987 10	1WHITTIER\HtoV	6.0Mw	23.0	9.99	9.99	0.28	0.87	1.36	0.78
1987 10	1WHITTIER\HtoV	6.0Mw	23.0	9.99	9.99	0.87	0.58	1.09	0.55
1987 10	1WHITTIER\HtoV	6.0Mw	23.0	9.99	9.99	0.69	0.84	1.15	0.55
1987 10	1WHITTIER\HtoV	6.0Mw	27.0	9.99	9.99	0.38	0.94	1.23	0.88
1987 10	1WHITTIER\HtoV	6.0Mw	27.0	9.99	9.99	0.38	1.11	1.17	0.88
1987 10	1WHITTIER\HtoV	6.0Mw	27.0	9.99	0.57	1.04	1.05	0.65	0.54
1987 10	1WHITTIER\HtoV	6.0Mw	27.0	9.99	0.50	1.24	0.71	0.70	0.65
1987 10	1WHITTIER\HtoV	6.0Mw	71.0	9.99	9.99	0.23	0.36	0.50	-0.05
1987 10	1WHITTIER\HtoV	6.0Mw	71.0	9.99	9.99	0.46	0.79	0.60	0.04
1987 10	1WHITTIER\HtoV	6.0Mw	78.0	9.99	9.99	0.90	0.76	0.79	-0.14
1987 10	1WHITTIER\HtoV	6.0Mw	78.0	9.99	9.99	0.66	0.94	0.66	0.04
1987 10	1WHITTIER\HtoV	6.0Mw	18.0	9.99	0.83	1.45	1.16	0.80	0.88
1987 10	1WHITTIER\HtoV	6.0Mw	18.0	9.99	0.02	1.21	0.85	0.75	0.88
1987 10	1WHITTIER\HtoV	6.0Mw	39.0	9.99	9.99	0.12	0.79	0.68	0.23
1987 10	1WHITTIER\HtoV	6.0Mw	12.0	0.57	0.92	1.33	1.49	1.20	1.10
1987 10	1WHITTIER\HtoV	6.0Mw	12.0	9.99	0.28	1.60	1.21	1.35	1.29
1987 10	1WHITTIER\HtoV	6.0Mw	43.0	9.99	-0.45	-0.13	0.31	0.43	0.42
1987 10	1WHITTIER\HtoV	6.0Mw	43.0	9.99	-0.07	-0.04	0.24	0.42	0.46
1987 10	1WHITTIER\HtoV	6.0Mw	25.0	9.99	9.99	0.47	0.94	0.91	1.19
1987 10	1WHITTIER\HtoV	6.0Mw	25.0	9.99	0.02	1.24	0.81	0.80	0.94
1987 10	1WHITTIER\HtoV	6.0Mw	22.0	9.99	-0.14	1.24	0.57	1.16	1.12
1987 10	1WHITTIER\HtoV	6.0Mw	22.0	9.99	0.12	1.08	1.01	1.13	1.20
1987 10	1WHITTIER\HtoV	6.0Mw	27.0	9.99	0.62	0.55	1.03	0.73	0.76
1987 10	1WHITTIER\HtoV	6.0Mw	27.0	9.99	0.26	0.72	0.85	1.05	0.63
1987 10	1WHITTIER\HtoV	6.0Mw	32.0	9.99	9.99	0.52	0.64	0.54	0.62
1987 10	1WHITTIER\HtoV	6.0Mw	32.0	9.99	0.28	0.80	0.69	1.00	0.71
1987 10	1WHITTIER\HtoV	6.0Mw	32.0	9.99	0.10	0.53	0.74	0.39	0.38
1987 10	1WHITTIER\HtoV	6.0Mw	32.0	9.99	0.37	0.82	0.46	0.70	0.21
1987 10	1WHITTIER\HtoV	6.0Mw	25.0	9.99	0.41	0.60	0.84	1.06	1.14

1987	10	1WHITTIER\HtoV	6.0Mw	25.0	9.99	0.01	0.60	0.83	0.53	0.78
1987	10	1WHITTIER\HtoV	6.0Mw	14.0	9.99	0.89	1.26	1.31	1.32	1.20
1987	10	1WHITTIER\HtoV	6.0Mw	14.0	9.99	0.83	1.28	1.32	1.34	1.16
1987	10	1WHITTIER\HtoV	6.0Mw	74.0	9.99	9.99	0.53	0.21	0.31	0.06
1987	10	1WHITTIER\HtoV	6.0Mw	69.0	9.99	9.99	0.23	0.70	0.65	0.43
1987	10	1WHITTIER\HtoV	6.0Mw	69.0	9.99	9.99	-0.40	0.53	0.61	0.41
1987	10	1WHITTIER\HtoV	6.0Mw	34.0	9.99	9.99	0.63	0.54	0.35	0.36
1987	10	1WHITTIER\HtoV	6.0Mw	34.0	9.99	-0.58	0.28	0.30	0.30	0.31
1987	10	1WHITTIER\HtoV	6.0Mw	26.0	9.99	0.62	1.33	1.14	0.86	0.59
1987	10	1WHITTIER\HtoV	6.0Mw	26.0	9.99	9.99	1.19	0.94	1.03	0.64
1987	10	1WHITTIER\HtoV	6.0Mw	30.0	9.99	-0.20	0.37	0.41	0.56	0.53
1987	10	1WHITTIER\HtoV	6.0Mw	30.0	9.99	0.38	0.38	0.57	0.59	0.46
1987	10	1WHITTIER\HtoV	6.0Mw	62.0	9.99	9.99	0.04	0.25	0.66	0.22
1987	10	1WHITTIER\HtoV	6.0Mw	62.0	9.99	9.99	0.40	0.31	0.46	0.21
1987	10	1WHITTIER\HtoV	6.0Mw	65.0	9.99	9.99	-0.03	0.54	0.28	0.57
1987	10	1WHITTIER\HtoV	6.0Mw	65.0	9.99	0.13	0.42	0.73	0.49	0.25
1987	10	1WHITTIER\HtoV	6.0Mw	65.0	9.99	9.99	0.65	0.49	0.55	0.15
1987	10	1WHITTIER\HtoV	6.0Mw	27.0	9.99	9.99	0.11	0.13	0.13	-0.04
1987	10	1WHITTIER\HtoV	6.0Mw	27.0	9.99	9.99	0.46	0.32	0.21	-0.28
1987	10	1WHITTIER\HtoV	6.0Mw	21.0	9.99	9.99	0.79	0.63	0.74	0.91
1987	10	1WHITTIER\HtoV	6.0Mw	21.0	9.99	9.99	0.32	0.43	0.82	0.76
1987	10	1WHITTIER\HtoV	6.0Mw	55.0	9.99	9.99	0.28	0.39	0.60	0.09
1987	10	1WHITTIER\HtoV	6.0Mw	55.0	9.99	9.99	0.48	0.39	0.50	0.22
1987	10	1WHITTIER\HtoV	6.0Mw	17.0	-0.12	0.41	0.91	0.90	0.60	0.65
1987	10	1WHITTIER\HtoV	6.0Mw	17.0	0.68	0.97	1.24	1.10	0.92	0.89
1987	10	1WHITTIER\HtoV	6.0Mw	23.0	9.99	0.09	0.58	1.14	1.22	0.85
1987	10	1WHITTIER\HtoV	6.0Mw	23.0	9.99	0.46	0.42	0.96	1.06	0.90
1987	10	1WHITTIER\HtoV	6.0Mw	38.0	9.99	0.45	0.84	0.78	0.78	0.57
1987	10	1WHITTIER\HtoV	6.0Mw	38.0	9.99	9.99	1.14	0.76	0.94	0.38
1987	10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	1.07	1.14	1.02	0.95	0.66
1987	10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.75	0.98	1.03	1.06	0.71

1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.76	0.90	1.04	0.86	0.73
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.37	0.88	0.79	0.87	0.56
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.70	0.83	1.16	0.98	0.62
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	1.01	1.06	1.29	0.91	0.67
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.46	0.91	1.01	1.06	0.81
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.82	1.07	1.16	1.26	1.12
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.37	0.98	0.63	1.16	0.91
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.82	1.00	1.20	1.18	1.07
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.33	0.57	0.88	0.70	0.96
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.81	0.93	1.18	1.01	0.44
1987 10	1WHITTIER\HtoV	6.0Mw	17.0	9.99	0.68	0.40	0.96	0.55	0.51
1987 10	1WHITTIER\HtoV	6.0Mw	17.0	9.99	9.99	-0.03	0.84	0.66	0.51
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.74	0.61	1.03	1.24	1.29
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.98	1.04	1.42	1.21	1.28
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.80	0.84	1.08	0.83	0.89
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	1.04	1.02	1.27	0.90	0.82
1987 10	1WHITTIER\HtoV	6.0Mw	29.0	9.99	9.99	0.22	0.36	0.42	0.55
1987 10	1WHITTIER\HtoV	6.0Mw	29.0	9.99	9.99	-0.30	0.65	0.24	0.44
1987 10	1WHITTIER\HtoV	6.0Mw	45.0	9.99	9.99	0.10	0.16	0.46	0.60
1987 10	1WHITTIER\HtoV	6.0Mw	45.0	9.99	9.99	0.14	0.33	0.44	0.53
1987 10	1WHITTIER\HtoV	6.0Mw	85.0	9.99	0.14	0.55	0.88	0.40	0.26
1987 10	1WHITTIER\HtoV	6.0Mw	85.0	9.99	9.99	0.24	0.47	0.68	0.20
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.46	0.51	0.39	0.74	0.73
1987 10	1WHITTIER\HtoV	6.0Mw	15.0	9.99	0.91	1.32	0.88	0.75	1.07
1987 10	1WHITTIER\HtoV	6.0Mw	48.0	9.99	0.48	0.20	0.58	0.63	0.46
1987 10	1WHITTIER\HtoV	6.0Mw	48.0	9.99	0.48	0.64	0.79	0.71	0.46
1987 10	1WHITTIER\HtoV	6.0Mw	43.0	9.99	9.99	0.76	1.46	1.19	1.04
1987 10	1WHITTIER\HtoV	6.0Mw	43.0	9.99	9.99	0.90	1.48	1.34	1.25
1987 10	1WHITTIER\HtoV	6.0Mw	12.0	9.99	0.83	0.76	1.31	1.04	1.10
1987 10	1WHITTIER\HtoV	6.0Mw	12.0	9.99	0.80	0.50	1.09	0.95	1.19
1987 10	4WHITTIER\HtoV	5.3Mw	13.0	9.99	9.99	0.80	0.54	1.13	0.86

1987	10	4WHITTIER\HtoV	5.3Mw	13.0	9.99	9.99	0.71	0.94	0.86	0.65
1987	10	4WHITTIER\HtoV	5.3Mw	16.0	9.99	9.99	0.78	0.68	0.96	0.78
1987	10	4WHITTIER\HtoV	5.3Mw	16.0	9.99	0.33	0.64	0.74	0.34	0.61
1987	10	4WHITTIER\HtoV	5.3Mw	20.0	9.99	0.15	0.67	0.53	0.20	0.38
1987	10	4WHITTIER\HtoV	5.3Mw	20.0	9.99	9.99	0.32	0.38	0.46	0.44
1987	10	4WHITTIER\HtoV	5.3Mw	28.0	9.99	0.43	0.71	0.92	0.60	0.71
1987	10	4WHITTIER\HtoV	5.3Mw	28.0	9.99	0.10	0.82	0.70	0.39	0.59
1987	10	4WHITTIER\HtoV	5.3Mw	25.0	9.99	0.27	0.79	1.01	0.49	0.48
1987	10	4WHITTIER\HtoV	5.3Mw	25.0	-0.61	0.42	0.77	0.66	0.79	0.53
1987	10	4WHITTIER\HtoV	5.3Mw	28.0	9.99	0.53	0.55	0.71	0.42	0.41
1987	10	4WHITTIER\HtoV	5.3Mw	28.0	9.99	0.34	0.78	1.03	0.56	0.15
1987	10	4WHITTIER\HtoV	5.3Mw	25.0	9.99	9.99	0.35	0.53	0.47	0.23
1987	10	4WHITTIER\HtoV	5.3Mw	25.0	9.99	9.99	0.62	0.64	0.36	0.43
1987	10	4WHITTIER\HtoV	5.3Mw	15.0	9.99	9.99	0.76	0.61	1.33	0.89
1987	10	4WHITTIER\HtoV	5.3Mw	15.0	9.99	0.90	1.13	0.83	1.20	1.00
1987	10	4WHITTIER\HtoV	5.3Mw	20.0	9.99	9.99	0.33	0.39	0.63	0.50
1987	10	4WHITTIER\HtoV	5.3Mw	20.0	9.99	9.99	-0.06	0.59	0.20	0.33
1987	10	4WHITTIER\HtoV	5.3Mw	13.0	9.99	9.99	0.82	0.38	0.71	0.49
1987	10	4WHITTIER\HtoV	5.3Mw	13.0	9.99	0.53	0.90	0.26	0.92	0.67
1987	10	4WHITTIER\HtoV	5.3Mw	43.0	9.99	9.99	0.01	0.74	0.39	0.52
1987	11	24SUPERST\BHToV	6.7Mw	14.0	1.15	1.48	1.47	1.16	1.20	0.87
1987	11	24SUPERST\BHToV	6.7Mw	14.0	1.19	1.66	0.85	1.27	1.15	0.92
1987	11	24SUPERST\BHToV	6.7Mw	13.0	1.38	1.36	1.28	1.26	1.16	1.07
1987	11	24SUPERST\BHToV	6.7Mw	13.0	1.34	1.24	1.56	1.32	1.06	1.16
1987	11	24SUPERST\BHToV	6.7Mw	25.0	0.81	1.00	1.08	1.12	0.99	1.16
1987	11	24SUPERST\BHToV	6.7Mw	25.0	0.91	1.36	1.47	1.11	0.99	1.08
1989	10	18LOMAP\AGWHtoV	6.9Mw	28.0	9.99	0.93	1.10	0.99	0.95	0.60
1989	10	18LOMAP\AGWHtoV	6.9Mw	28.0	9.99	1.14	1.16	0.99	1.04	0.80
1989	10	18LOMAP\ANDHtoV	6.9Mw	21.0	9.99	1.41	1.20	1.35	1.34	0.96
1989	10	18LOMAP\ANDHtoV	6.9Mw	21.0	9.99	1.21	0.94	1.22	1.11	0.95
1989	10	18LOMAP\ANAHToV	6.9Mw	21.0	1.30	1.63	1.05	0.55	0.51	0.37

1989	10	18LOMAP\ANAHTOV	6.9Mw	21.0	1.10	1.31	1.08	0.79	0.79	0.37
1989	10	18LOMAP\A02HTOV	6.9Mw	48.0	1.20	1.22	1.46	0.97	0.53	-0.04
1989	10	18LOMAP\A02HTOV	6.9Mw	48.0	0.55	0.85	1.36	0.85	0.59	-0.02
1989	10	18LOMAP\A2EHTOV	6.9Mw	58.0	9.99	0.72	1.26	0.99	0.96	0.67
1989	10	18LOMAP\A2EHTOV	6.9Mw	58.0	9.99	1.25	0.87	0.90	1.02	0.61
1989	10	18LOMAP\A3EHTOV	6.9Mw	58.0	9.99	0.56	0.96	0.65	0.67	0.51
1989	10	18LOMAP\A3EHTOV	6.9Mw	58.0	9.99	0.98	0.81	0.70	0.72	0.43
1989	10	18LOMAP\A07HTOV	6.9Mw	48.0	0.69	1.04	1.41	1.23	0.96	0.37
1989	10	18LOMAP\A07HTOV	6.9Mw	48.0	1.02	1.17	1.28	0.95	0.65	0.49
1989	10	18LOMAP\A09HTOV	6.9Mw	47.0	9.99	1.50	1.09	1.04	0.78	0.18
1989	10	18LOMAP\A09HTOV	6.9Mw	47.0	9.99	1.22	1.27	0.88	0.81	0.54
1989	10	18LOMAP\A10HTOV	6.9Mw	48.0	1.25	1.53	1.10	1.17	0.71	-0.05
1989	10	18LOMAP\A10HTOV	6.9Mw	48.0	0.69	1.64	1.38	1.08	0.43	-0.22
1989	10	18LOMAP\BESHTOV	6.9Mw	50.0	9.99	0.93	1.13	1.21	0.44	0.00
1989	10	18LOMAP\BESHTOV	6.9Mw	50.0	9.99	0.95	1.36	0.92	0.72	0.11
1989	10	18LOMAP\BRKHTOV	6.9Mw	83.0	9.99	0.48	1.35	0.74	0.36	-0.34
1989	10	18LOMAP\BRKHTOV	6.9Mw	83.0	9.99	1.18	1.56	0.97	0.28	-0.06
1989	10	18LOMAP\BRNHTOV	6.9Mw	10.0	1.02	1.30	1.97	2.01	1.44	1.34
1989	10	18LOMAP\BRNHTOV	6.9Mw	10.0	0.88	0.78	1.66	1.93	1.46	1.55
1989	10	18LOMAP\CAPHTOV	6.9Mw	14.0	9.99	1.73	1.54	1.66	1.47	1.30
1989	10	18LOMAP\CAPHTOV	6.9Mw	14.0	9.99	1.05	1.64	1.64	1.33	1.24
1989	10	18LOMAP\CLSHTOV	6.9Mw	5.0	9.99	1.49	1.43	1.63	1.37	1.06
1989	10	18LOMAP\CLSHTOV	6.9Mw	5.0	9.99	1.53	1.91	1.39	1.43	1.02
1989	10	18LOMAP\CLDHTOV	6.9Mw	22.0	0.97	0.83	1.12	0.90	1.17	0.70
1989	10	18LOMAP\CLDHTOV	6.9Mw	22.0	1.09	1.24	1.21	1.29	1.11	0.65
1989	10	18LOMAP\CYCHTOV	6.9Mw	22.0	1.22	1.20	1.46	1.18	1.01	0.79
1989	10	18LOMAP\CYCHTOV	6.9Mw	22.0	1.29	1.49	1.67	1.46	1.22	0.94
1989	10	18LOMAP\FMSHTOV	6.9Mw	44.0	0.86	1.03	1.31	1.20	1.11	0.73
1989	10	18LOMAP\FMSHTOV	6.9Mw	44.0	0.67	1.23	1.20	1.25	1.08	0.75
1989	10	18LOMAP\MSJHTOV	6.9Mw	43.0	9.99	1.14	1.07	0.92	0.88	0.75
1989	10	18LOMAP\MSJHTOV	6.9Mw	43.0	9.99	0.88	0.84	1.05	0.97	0.79

1989	10	18LOMAP\GILHtoV	6.9Mw	11.0	9.99	1.37	1.09	1.64	1.17	1.19
1989	10	18LOMAP\GILHtoV	6.9Mw	11.0	9.99	1.09	1.11	1.48	1.31	1.01
1989	10	18LOMAP\GOFHtoV	6.9Mw	13.0	9.99	1.51	1.07	1.52	0.76	0.74
1989	10	18LOMAP\GOFHtoV	6.9Mw	13.0	9.99	1.07	1.28	1.26	0.93	0.59
1989	10	18LOMAP\G01HtoV	6.9Mw	11.0	9.99	1.01	1.13	1.44	1.47	1.14
1989	10	18LOMAP\G01HtoV	6.9Mw	11.0	9.99	1.37	1.14	1.85	1.27	1.06
1989	10	18LOMAP\G02HtoV	6.9Mw	13.0	9.99	1.31	1.22	1.51	1.17	0.72
1989	10	18LOMAP\G02HtoV	6.9Mw	13.0	9.99	1.65	1.14	1.19	1.18	0.98
1989	10	18LOMAP\G03HtoV	6.9Mw	14.0	0.80	1.08	1.38	1.67	1.65	1.19
1989	10	18LOMAP\G03HtoV	6.9Mw	14.0	1.15	1.67	1.14	1.16	1.44	1.07
1989	10	18LOMAP\G04HtoV	6.9Mw	16.0	9.99	1.33	1.42	1.65	1.06	0.79
1989	10	18LOMAP\G04HtoV	6.9Mw	16.0	9.99	1.17	1.32	1.35	1.04	0.66
1989	10	18LOMAP\G06HtoV	6.9Mw	20.0	9.99	1.27	0.99	1.11	0.95	0.62
1989	10	18LOMAP\G06HtoV	6.9Mw	20.0	9.99	1.19	1.22	1.14	1.23	0.67
1989	10	18LOMAP\GMRHtoV	6.9Mw	24.0	9.99	0.92	0.98	1.58	1.25	0.81
1989	10	18LOMAP\GMRHtoV	6.9Mw	24.0	9.99	0.77	0.99	1.79	1.06	0.89
1989	10	18LOMAP\GGBHtoV	6.9Mw	85.0	9.99	1.62	1.76	1.31	0.79	0.09
1989	10	18LOMAP\GGBHtoV	6.9Mw	85.0	9.99	1.05	1.38	1.24	0.58	-0.02
1989	10	18LOMAP\HVRHtoV	6.9Mw	32.0	9.99	0.95	1.35	0.98	0.54	0.39
1989	10	18LOMAP\HVRHtoV	6.9Mw	32.0	9.99	1.10	1.22	1.09	0.67	0.37
1989	10	18LOMAP\HWBHtoV	6.9Mw	59.0	9.99	0.46	1.50	0.95	1.13	0.93
1989	10	18LOMAP\HWBHtoV	6.9Mw	59.0	9.99	0.67	1.11	1.07	1.20	0.80
1989	10	18LOMAP\HCAHtoV	6.9Mw	28.0	1.14	1.58	1.61	1.18	0.80	0.31
1989	10	18LOMAP\HCAHtoV	6.9Mw	28.0	1.34	1.79	1.63	1.09	0.68	0.29
1989	10	18LOMAP\HDAHtoV	6.9Mw	26.0	1.06	1.64	1.43	1.23	1.06	0.57
1989	10	18LOMAP\HDAHtoV	6.9Mw	26.0	0.82	1.38	1.71	1.34	0.96	0.60
1989	10	18LOMAP\SGIHtoV	6.9Mw	31.0	0.92	0.78	0.99	0.52	0.44	0.32
1989	10	18LOMAP\SGIHtoV	6.9Mw	31.0	0.62	0.71	0.99	0.71	0.43	0.48
1989	10	18LOMAP\HSPHtoV	6.9Mw	29.0	1.37	1.92	1.79	1.33	0.98	0.53
1989	10	18LOMAP\HSPHtoV	6.9Mw	29.0	1.48	1.35	1.38	1.15	1.08	0.46
1989	10	18LOMAP\LGPHToV	6.9Mw	6.0	1.98	2.19	1.97	1.87	1.26	1.21

1989	10	18LOMAP\LGPHTOV	6.9Mw	6.0	1.40	1.65	1.84	1.87	1.35	1.24
1989	10	18LOMAP\MCHHTOV	6.9Mw	45.0	9.99	0.42	0.40	0.73	0.85	0.56
1989	10	18LOMAP\MCHHTOV	6.9Mw	45.0	9.99	0.38	0.77	0.79	0.51	0.36
1989	10	18LOMAP\TIBHTOV	6.9Mw	78.0	9.99	0.94	1.32	0.92	0.95	0.22
1989	10	18LOMAP\TIBHTOV	6.9Mw	78.0	9.99	1.37	1.36	1.21	1.04	0.30
1989	10	18LOMAP\PAEHTOV	6.9Mw	36.0	9.99	1.18	1.28	1.14	1.03	0.31
1989	10	18LOMAP\PAEHTOV	6.9Mw	36.0	9.99	0.91	1.44	1.40	1.07	0.39
1989	10	18LOMAP\SLCHTOV	6.9Mw	36.0	9.99	1.56	1.57	1.16	0.99	0.65
1989	10	18LOMAP\SLCHTOV	6.9Mw	36.0	9.99	1.42	1.43	1.50	0.98	0.64
1989	10	18LOMAP\PJHHTOV	6.9Mw	78.0	9.99	0.71	0.59	0.86	0.45	0.21
1989	10	18LOMAP\PJHHTOV	6.9Mw	78.0	9.99	0.70	0.70	0.92	0.38	0.12
1989	10	18LOMAP\PTBHTOV	6.9Mw	89.0	9.99	1.41	1.08	0.87	0.47	-0.05
1989	10	18LOMAP\PTBHTOV	6.9Mw	89.0	9.99	1.41	1.10	0.88	0.38	-0.18
1989	10	18LOMAP\RCHHTOV	6.9Mw	93.0	9.99	0.71	1.49	0.62	0.50	0.37
1989	10	18LOMAP\RCHHTOV	6.9Mw	93.0	9.99	0.71	1.24	0.57	0.46	0.40
1989	10	18LOMAP\SG3HTOV	6.9Mw	35.0	0.53	0.93	1.34	0.82	0.53	0.09
1989	10	18LOMAP\SG3HTOV	6.9Mw	35.0	0.95	1.06	1.39	0.37	0.67	0.01
1989	10	18LOMAP\SALHTOV	6.9Mw	32.0	1.17	0.75	0.83	0.77	0.79	0.56
1989	10	18LOMAP\SALHTOV	6.9Mw	32.0	1.14	1.08	0.91	0.95	1.04	0.46
1989	10	18LOMAP\STGHTOV	6.9Mw	13.0	1.02	1.78	1.35	1.19	1.31	1.16
1989	10	18LOMAP\STGHTOV	6.9Mw	13.0	1.64	1.43	1.23	1.41	1.36	1.04
1989	10	18LOMAP\WVCHTOV	6.9Mw	14.0	0.81	1.73	1.41	1.21	0.88	0.78
1989	10	18LOMAP\WVCHTOV	6.9Mw	14.0	1.81	1.46	1.48	1.18	1.16	0.81
1989	10	18LOMAP\CFHHHTOV	6.9Mw	85.0	9.99	1.03	1.00	1.05	0.34	-0.32
1989	10	18LOMAP\CFHHHTOV	6.9Mw	85.0	9.99	1.24	1.47	0.95	0.38	-0.11
1989	10	18LOMAP\DMHHHTOV	6.9Mw	78.0	9.99	0.94	0.86	1.02	0.61	0.41
1989	10	18LOMAP\DMHHHTOV	6.9Mw	78.0	9.99	1.19	0.96	1.20	0.62	0.34
1989	10	18LOMAP\PHTHTOV	6.9Mw	81.0	9.99	1.26	1.26	0.66	0.25	-0.13
1989	10	18LOMAP\PHTHTOV	6.9Mw	81.0	9.99	1.12	1.13	0.74	0.43	-0.12
1989	10	18LOMAP\PRSHTOV	6.9Mw	83.0	1.00	1.11	1.29	1.02	0.70	0.07
1989	10	18LOMAP\PRSHTOV	6.9Mw	83.0	1.13	1.45	1.57	1.22	0.70	0.19

1989	10	18LOMAP\RINHtoV	6.9Mw	79.0	9.99	0.84	0.97	0.85	0.45	0.53
1989	10	18LOMAP\RINHtoV	6.9Mw	79.0	9.99	1.28	1.07	0.65	0.45	0.33
1989	10	18LOMAP\TLHHtoV	6.9Mw	81.0	0.80	0.46	0.53	0.45	0.34	-0.07
1989	10	18LOMAP\TLHHtoV	6.9Mw	81.0	0.83	0.88	0.89	0.46	0.53	-0.12
1989	10	18LOMAP\SFOHtoV	6.9Mw	65.0	9.99	1.28	1.44	1.49	1.02	0.52
1989	10	18LOMAP\SFOHtoV	6.9Mw	65.0	9.99	1.15	1.49	1.43	0.90	0.40
1989	10	18LOMAP\SSFHtoV	6.9Mw	68.0	0.65	1.03	0.90	0.80	0.61	0.37
1989	10	18LOMAP\SSFHtoV	6.9Mw	68.0	0.87	0.80	1.18	0.92	0.33	0.27
1989	10	18LOMAP\SVLHtoV	6.9Mw	29.0	1.36	1.18	1.21	1.06	1.01	0.78
1989	10	18LOMAP\SVLHtoV	6.9Mw	29.0	1.24	1.21	1.23	1.10	1.05	0.58
1989	10	18LOMAP\TRIHToV	6.9Mw	83.0	0.69	1.32	1.20	0.60	0.16	0.01
1989	10	18LOMAP\TRIHToV	6.9Mw	83.0	0.98	1.58	1.08	0.76	0.34	0.09
1989	10	18LOMAP\UC2HtoV	6.9Mw	18.0	1.01	0.87	1.02	1.32	1.16	1.10
1989	10	18LOMAP\UC2HtoV	6.9Mw	18.0	0.66	0.85	1.19	1.19	1.31	1.34
1989	10	18LOMAP\LOBHtoV	6.9Mw	18.0	9.99	0.82	1.27	1.53	1.51	1.20
1989	10	18LOMAP\LOBHtoV	6.9Mw	18.0	9.99	0.88	1.02	1.26	1.24	1.26
1989	10	18LOMAP\WAHHtoV	6.9Mw	17.0	0.75	0.81	1.71	1.36	1.52	1.67
1989	10	18LOMAP\WAHHtoV	6.9Mw	17.0	0.97	1.08	1.70	1.56	1.67	1.76
1989	10	18LOMAP\WDSHtoV	6.9Mw	40.0	1.31	1.14	1.25	0.80	0.41	0.10
1989	10	18LOMAP\WDSHtoV	6.9Mw	40.0	1.00	1.18	1.17	0.89	0.49	0.10
1989	10	18LOMAP\YBIHToV	6.9Mw	81.0	9.99	0.54	0.55	0.44	0.33	-0.05
1989	10	18LOMAP\YBIHToV	6.9Mw	81.0	9.99	1.17	0.76	0.86	0.27	0.20
1992	4	25CAPEMEND\HtoV	7.1Mw	9.0	1.98	1.75	1.88	1.72	1.84	1.48
1992	4	25CAPEMEND\HtoV	7.1Mw	9.0	1.66	1.74	1.46	1.63	1.63	1.33
1992	4	25CAPEMEND\HtoV	7.1Mw	45.0	9.99	1.40	0.87	1.00	0.88	0.31
1992	4	25CAPEMEND\HtoV	7.1Mw	45.0	9.99	1.36	0.95	0.95	0.78	0.39
1992	4	25CAPEMEND\HtoV	7.1Mw	23.0	1.28	1.27	1.14	1.01	0.73	0.48
1992	4	25CAPEMEND\HtoV	7.1Mw	23.0	1.43	1.08	1.23	1.04	0.89	0.44
1992	4	25CAPEMEND\HtoV	7.1Mw	10.0	1.04	1.24	1.69	1.56	1.41	1.23
1992	4	25CAPEMEND\HtoV	7.1Mw	10.0	1.55	1.68	1.96	1.62	1.21	1.23
1992	4	25CAPEMEND\HtoV	7.1Mw	19.0	1.09	1.13	1.42	1.26	1.43	1.01

1992	4	25CAPEMEND\HtoV	7.1Mw	19.0	1.05	1.09	1.21	1.94	1.19	0.86
1992	4	25CAPEMEND\HtoV	7.1Mw	34.0	9.99	9.99	0.23	0.55	1.32	0.93
1992	4	25CAPEMEND\HtoV	7.1Mw	34.0	9.99	9.99	0.30	0.62	1.29	0.84
1992	6	28LANDERS\AHtoV	7.3Mw	69.0	1.69	1.40	1.42	1.15	1.22	1.01
1992	6	28LANDERS\AHtoV	7.3Mw	69.0	1.44	1.58	1.44	1.22	1.25	1.05
1992	6	28LANDERS\BHtoV	7.3Mw	89.0	0.62	1.11	0.93	0.97	1.08	0.70
1992	6	28LANDERS\BHtoV	7.3Mw	89.0	0.72	1.16	0.93	1.15	0.96	0.58
1992	6	28LANDERS\BHtoV	7.3Mw	36.0	1.05	1.13	1.14	0.77	0.88	0.61
1992	6	28LANDERS\BHtoV	7.3Mw	36.0	1.25	1.14	1.05	0.91	0.76	0.52
1992	6	28LANDERS\BHtoV	7.3Mw	91.0	0.98	0.93	1.35	0.67	0.82	0.50
1992	6	28LANDERS\BHtoV	7.3Mw	91.0	0.80	0.81	1.19	0.98	0.57	0.33
1992	6	28LANDERS\CHtoV	7.3Mw	21.0	1.43	1.12	1.42	1.32	1.30	0.87
1992	6	28LANDERS\CHtoV	7.3Mw	21.0	1.27	1.48	1.54	1.55	1.30	0.81
1992	6	28LANDERS\DHtoV	7.3Mw	23.0	0.80	1.19	1.40	1.29	0.99	0.96
1992	6	28LANDERS\DHtoV	7.3Mw	23.0	1.22	1.46	1.39	1.02	1.05	0.87
1992	6	28LANDERS\FHtoV	7.3Mw	65.0	0.30	0.37	0.72	1.03	0.85	0.76
1992	6	28LANDERS\FHtoV	7.3Mw	65.0	1.01	1.05	1.07	1.13	0.83	0.63
1992	6	28LANDERS\HHtoV	7.3Mw	69.0	9.99	0.59	0.98	0.76	0.85	1.16
1992	6	28LANDERS\HHtoV	7.3Mw	69.0	9.99	0.51	1.07	0.93	0.85	1.00
1992	6	28LANDERS\IHtoV	7.3Mw	56.0	1.10	1.09	1.18	1.19	0.90	0.62
1992	6	28LANDERS\IHtoV	7.3Mw	56.0	1.01	1.14	1.24	1.13	0.75	0.52
1992	6	28LANDERS\JHtoV	7.3Mw	11.0	1.16	1.46	1.61	1.49	1.13	0.72
1992	6	28LANDERS\JHtoV	7.3Mw	11.0	0.96	1.66	1.57	1.27	1.24	0.96
1992	6	28LANDERS\PHtoV	7.3Mw	37.0	0.73	1.06	1.21	0.77	0.93	0.83
1992	6	28LANDERS\PHtoV	7.3Mw	37.0	1.02	1.18	1.25	0.68	0.95	0.81
1992	6	28LANDERS\PHtoV	7.3Mw	95.0	9.99	0.47	0.33	0.33	0.76	0.81
1992	6	28LANDERS\PHtoV	7.3Mw	95.0	9.99	0.39	0.41	0.44	0.90	0.83
1992	6	28LANDERS\RHTOV	7.3Mw	95.0	9.99	0.61	0.51	0.37	0.91	0.67
1992	6	28LANDERS\RHTOV	7.3Mw	95.0	9.99	0.66	0.64	0.42	0.90	0.55
1992	6	28LANDERS\SHtoV	7.3Mw	51.0	0.75	0.55	0.48	0.56	0.63	0.81
1992	6	28LANDERS\SHtoV	7.3Mw	51.0	0.50	0.46	0.78	0.60	0.60	0.68

1992	6	28LANDERS\2HtoV	7.3Mw	43.0	0.89	0.62	0.60	0.62	0.82	0.71
1992	6	28LANDERS\2HtoV	7.3Mw	43.0	0.76	0.47	0.41	0.44	0.60	0.78
1992	6	28LANDERS\YHtoV	7.3Mw	25.0	1.68	1.51	1.52	1.30	1.02	0.80
1992	6	28LANDERS\YHtoV	7.3Mw	25.0	1.57	1.32	1.27	1.25	1.19	0.99
1994	1	17NORTH\ANHtoV	6.7Mw	38.0	9.99	0.72	0.60	0.73	0.20	0.07
1994	1	17NORTH\ANHtoV	6.7Mw	38.0	9.99	0.58	0.90	0.78	0.62	0.37
1994	1	17NORTH\ARHtoV	6.7Mw	9.0	0.89	1.19	1.61	1.43	1.37	1.17
1994	1	17NORTH\ARHtoV	6.7Mw	9.0	1.00	1.41	1.17	1.28	1.40	1.02
1994	1	17NORTH\CNHtoV	6.7Mw	15.0	1.16	1.35	1.37	1.54	1.31	1.15
1994	1	17NORTH\CNHtoV	6.7Mw	15.0	1.15	1.69	1.66	1.65	1.28	1.17
1994	1	17NORTH\ORHtoV	6.7Mw	22.0	1.04	1.85	1.83	1.70	1.44	0.86
1994	1	17NORTH\ORHtoV	6.7Mw	22.0	1.51	1.75	2.05	1.58	1.35	0.74
1994	1	17NORTH\DWHTtoV	6.7Mw	48.0	9.99	1.09	0.96	1.34	1.23	0.77
1994	1	17NORTH\DWHTtoV	6.7Mw	48.0	9.99	0.61	1.09	1.29	1.13	0.77
1994	1	17NORTH\ELHtoV	6.7Mw	37.0	9.99	0.63	1.03	1.05	0.93	0.45
1994	1	17NORTH\ELHtoV	6.7Mw	37.0	9.99	0.21	1.05	0.91	0.95	0.44
1994	1	17NORTH\JEHTtoV	6.7Mw	6.0	9.99	1.76	1.84	1.48	1.03	0.65
1994	1	17NORTH\JEHTtoV	6.7Mw	6.0	9.99	1.98	2.00	1.63	1.16	0.63
1994	1	17NORTH\11HtoV	6.7Mw	42.0	9.99	1.04	0.83	1.14	1.13	0.89
1994	1	17NORTH\11HtoV	6.7Mw	42.0	9.99	0.58	1.03	1.30	1.10	0.90
1994	1	17NORTH\BLHtoV	6.7Mw	32.0	9.99	1.22	1.07	1.36	1.14	0.99
1994	1	17NORTH\BLHtoV	6.7Mw	32.0	9.99	1.23	1.07	1.27	1.04	1.00
1994	1	17NORTH\CCHtoV	6.7Mw	26.0	0.57	1.55	1.37	1.28	1.42	0.85
1994	1	17NORTH\CCHtoV	6.7Mw	26.0	0.71	1.26	1.41	1.31	1.11	1.06
1994	1	17NORTH\LAHTtoV	6.7Mw	37.0	9.99	1.11	1.08	1.29	1.37	1.06
1994	1	17NORTH\LAHTtoV	6.7Mw	37.0	9.99	1.03	1.38	1.33	1.30	1.23
1994	1	17NORTH\HOHTtoV	6.7Mw	26.0	9.99	1.29	1.12	1.14	1.06	1.13
1994	1	17NORTH\HOHTtoV	6.7Mw	26.0	9.99	1.00	1.59	1.54	1.36	1.36
1994	1	17NORTH\OBHTtoV	6.7Mw	38.0	9.99	9.99	1.09	1.28	1.47	1.20
1994	1	17NORTH\PIHTtoV	6.7Mw	32.0	9.99	1.25	0.83	1.04	0.87	0.76
1994	1	17NORTH\PIHTtoV	6.7Mw	32.0	9.99	0.92	1.04	0.97	0.70	0.76

1994	1	17NORTH\TEHtoV	6.7Mw	32.0	9.99	1.49	1.18	1.08	1.08	0.75
1994	1	17NORTH\TEHtoV	6.7Mw	32.0	9.99	1.15	1.42	1.37	1.19	0.92
1994	1	17NORTH\UNHtoV	6.7Mw	35.0	9.99	0.96	1.25	1.78	1.31	1.05
1994	1	17NORTH\UNHtoV	6.7Mw	35.0	9.99	1.00	0.74	1.28	1.27	1.00
1994	1	17NORTH\LHHtoV	6.7Mw	27.0	1.06	0.75	0.46	0.63	1.13	0.86
1994	1	17NORTH\LHHtoV	6.7Mw	27.0	0.92	0.69	0.34	0.52	1.11	0.65
1994	1	17NORTH\H1HtoV	6.7Mw	23.0	1.01	0.59	0.62	0.92	1.04	0.76
1994	1	17NORTH\H1HtoV	6.7Mw	23.0	0.93	0.78	0.75	0.89	1.24	1.03
1994	1	17NORTH\LBHtoV	6.7Mw	58.0	9.99	0.43	0.38	0.77	0.47	0.05
1994	1	17NORTH\LBHtoV	6.7Mw	58.0	9.99	0.39	0.44	0.73	0.67	0.33
1994	1	17NORTH\LIHtoV	6.7Mw	47.0	9.99	-0.03	1.25	0.67	0.65	0.09
1994	1	17NORTH\LIHtoV	6.7Mw	47.0	9.99	0.45	0.97	0.65	0.60	0.44
1994	1	17NORTH\MAHtoV	6.7Mw	35.0	9.99	1.02	1.00	1.09	0.95	0.54
1994	1	17NORTH\MAHtoV	6.7Mw	35.0	9.99	1.15	1.18	1.02	0.73	0.50
1994	1	17NORTH\MRHtoV	6.7Mw	28.0	9.99	1.18	1.27	1.24	1.23	0.61
1994	1	17NORTH\MRHtoV	6.7Mw	28.0	9.99	1.38	1.17	1.34	1.27	0.76
1994	1	17NORTH\BAHtoV	6.7Mw	71.0	9.99	0.16	0.94	1.05	0.75	0.48
1994	1	17NORTH\BAHtoV	6.7Mw	71.0	9.99	0.28	0.52	0.96	0.66	0.49
1994	1	17NORTH\MTHtoV	6.7Mw	36.0	-0.09	0.60	0.53	0.83	1.28	0.95
1994	1	17NORTH\MTHtoV	6.7Mw	36.0	-0.20	0.35	0.82	0.67	1.21	0.62
1994	1	17NORTH\NEHtoV	6.7Mw	54.0	0.95	1.16	0.77	0.75	0.41	0.00
1994	1	17NORTH\NEHtoV	6.7Mw	54.0	1.21	1.16	0.86	0.48	0.36	0.02
1994	1	17NORTH\NWHtoV	6.7Mw	7.0	1.36	1.70	1.58	1.61	1.57	1.03
1994	1	17NORTH\NWHtoV	6.7Mw	7.0	1.71	1.67	1.85	1.74	1.48	0.96
1994	1	17NORTH\NEHtoV	6.7Mw	85.0	0.60	0.67	0.97	0.95	0.83	0.11
1994	1	17NORTH\NEHtoV	6.7Mw	85.0	0.08	0.49	1.03	1.07	0.53	0.14
1994	1	17NORTH\SAHtoV	6.7Mw	13.0	1.04	1.43	1.33	1.58	1.49	1.17
1994	1	17NORTH\SAHtoV	6.7Mw	13.0	1.52	1.54	1.74	1.83	1.33	1.10
1994	1	17NORTH\PAHtoV	6.7Mw	8.0	9.99	1.26	1.43	1.78	1.03	0.82
1994	1	17NORTH\PAHtoV	6.7Mw	8.0	9.99	1.01	1.36	1.56	1.28	0.92
1994	1	17NORTH\PUHtoV	6.7Mw	8.0	9.99	0.93	1.74	2.03	1.89	1.60

1994	1	17NORTH\PUHtoV	6.7Mw	8.0	9.99	1.74	2.11	1.70	1.60	1.58
1994	1	17NORTH\KAHtoV	6.7Mw	8.0	1.56	1.23	1.90	1.65	1.18	0.53
1994	1	17NORTH\KAHtoV	6.7Mw	8.0	1.33	1.64	1.90	1.71	1.36	0.84
1994	1	17NORTH\PHHtoV	6.7Mw	87.0	9.99	0.14	0.77	0.73	0.44	0.41
1994	1	17NORTH\PHHtoV	6.7Mw	87.0	9.99	0.54	0.86	0.72	0.53	0.44
1994	1	17NORTH\MUHtoV	6.7Mw	45.0	9.99	0.87	1.28	1.47	1.25	0.71
1994	1	17NORTH\MUHtoV	6.7Mw	45.0	9.99	0.63	1.31	1.44	1.28	0.54
1994	1	17NORTH\CUHtoV	6.7Mw	79.0	9.99	0.70	0.53	0.65	0.77	0.35
1994	1	17NORTH\CUHtoV	6.7Mw	79.0	9.99	0.12	0.78	0.76	0.72	0.23
1994	1	17NORTH\SMHtoV	6.7Mw	35.0	9.99	0.77	0.72	1.12	1.13	0.60
1994	1	17NORTH\SMHtoV	6.7Mw	35.0	9.99	9.99	0.91	0.86	1.00	0.86
1994	1	17NORTH\SAHtoV	6.7Mw	44.0	1.08	1.09	1.40	1.35	0.22	-0.23
1994	1	17NORTH\SAHtoV	6.7Mw	44.0	0.83	0.50	0.91	1.31	0.49	-0.04
1994	1	17NORTH\STHtoV	6.7Mw	28.0	1.28	1.67	1.36	1.39	1.83	1.40
1994	1	17NORTH\STHtoV	6.7Mw	28.0	1.07	1.31	1.04	1.36	1.31	1.33
1994	1	17NORTH\SEHtoV	6.7Mw	65.0	9.99	0.52	0.70	0.90	0.82	0.57
1994	1	17NORTH\SEHtoV	6.7Mw	65.0	9.99	0.14	0.91	1.04	0.86	0.62
1994	1	17NORTH\ROHtoV	6.7Mw	11.0	0.74	0.93	1.49	1.31	1.29	0.98
1994	1	17NORTH\ROHtoV	6.7Mw	11.0	0.58	1.15	1.72	1.11	1.26	1.03
1994	1	17NORTH\SCHtoV	6.7Mw	6.0	1.53	1.86	2.02	1.50	1.15	1.12
1994	1	17NORTH\SCHtoV	6.7Mw	6.0	1.39	2.16	2.08	1.49	1.23	1.03
1994	1	17NORTH\SCHtoV	6.7Mw	6.0	1.66	1.86	1.85	1.64	1.46	1.19
1994	1	17NORTH\SCHtoV	6.7Mw	6.0	0.70	1.91	1.82	1.28	1.63	1.09
1994	1	17NORTH\SYHtoV	6.7Mw	6.0	1.14	1.78	1.82	1.66	1.19	1.08
1994	1	17NORTH\SYHtoV	6.7Mw	6.0	1.21	1.95	1.62	1.88	1.45	1.05
1994	1	17NORTH\CHHtoV	6.7Mw	17.0	1.64	2.00	1.92	2.19	1.90	1.73
1994	1	17NORTH\CHHtoV	6.7Mw	17.0	1.81	1.82	1.67	2.27	1.81	1.63
1994	1	17NORTH\VAHtoV	6.7Mw	24.0	0.13	1.22	1.15	1.36	0.93	1.02
1994	1	17NORTH\VAHtoV	6.7Mw	24.0	0.69	0.92	1.14	1.12	1.07	0.94
1994	1	17NORTH\WRHtoV	6.7Mw	72.0	9.99	0.18	0.37	0.61	0.67	0.40
1994	1	17NORTH\WRHtoV	6.7Mw	72.0	9.99	-0.05	0.61	0.72	0.59	0.57

B.C.:

yr	mdd	station	comp	magtype	R(km)	A0.5*	A1	A2	A5	A10
80	6	8PGC	V	3.8Mrg	98.0	0.63	1.00	2.00	5.01	10.00
82	1	30SNB	V	3.2Mrg	42.0	9.99	-0.60	-0.50	-0.29	-0.36
82	1	30HNB	V	3.2Mrg	58.0	9.99	-1.57	-1.34	-0.69	-0.21
82	1	30PGC	V	3.2Mrg	63.0	9.99	-1.80	-1.44	-0.67	-0.96
82	5	13SNB	V	3.0Mrg	35.0	9.99	-1.37	-1.18	-0.32	-0.67
82	5	13VGZ	V	3.0Mrg	43.0	9.99	-1.92	-1.49	-0.51	-0.08
82	5	13NAB	V	3.0Mrg	68.0	9.99	-2.13	-1.51	-0.98	-0.87
82	5	13HNB	V	3.0Mrg	95.0	9.99	-2.22	-1.43	-1.18	-1.12
82	7	22EDB	V	4.7Mrg	68.0	9.99	-0.32	-0.24	-0.60	-0.56
82	10	2EDB	V	4.2Mrg	37.0	9.99	-0.46	-0.06	0.30	0.70
83	2	5OZB	V	3.6Mrg	46.0	9.99	-0.79	-0.10	0.41	0.31
83	2	5ALB	V	3.6Mrg	81.0	9.99	-1.57	-1.03	-0.69	-0.87
83	3	10EDB	V	4.5Mrg	85.0	9.99	-1.22	-1.01	-0.88	-0.92
83	3	10ETB	V	4.5Mrg	91.0	-1.26	-1.26	-1.00	-0.93	-1.13
83	8	28VGZ	V	4.1Mrg	81.0	9.99	-1.26	-0.95	-0.20	-0.28
85	10	27EDB	V	4.7Mrg	87.0	-0.32	-0.24	-0.37	-0.25	-0.29
85	10	27ETB	V	4.7Mrg	100.0	-0.39	-0.50	-0.35	-0.39	-0.43
86	2	10VDB	V	3.7Mrg	71.0	9.99	-1.41	-1.01	-0.68	-0.86
86	2	10SNB	V	3.7Mrg	100.0	-1.63	-1.40	-0.95	-0.88	-1.07
86	2	10VGZ	V	3.7Mrg	100.0	-1.74	-1.82	-1.11	-0.88	-0.95
86	3	2MGB	V	3.0Mrg	50.0	9.99	-1.44	-0.86	-0.39	-0.37
86	3	2PFB	V	3.0Mrg	58.0	9.99	-1.33	-0.88	-0.78	-0.88
86	3	2OZB	V	3.0Mrg	62.0	9.99	-0.96	-0.53	-0.51	-0.50
86	3	2ALB	V	3.0Mrg	71.0	9.99	-1.93	-1.38	-0.86	-0.94
86	3	2NAB	V	3.0Mrg	93.0	9.99	-2.20	-1.24	-0.72	-1.18
86	3	2BTB	V	3.0Mrg	100.0	9.99	-1.39	-0.85	-0.72	-0.66
86	3	26ETB	V	4.3Mrg	85.0	9.99	-1.21	-0.67	-0.47	-0.78
86	3	26EDB	V	4.3Mrg	87.0	9.99	-0.95	-0.79	-0.61	-0.87

86	6	8OZB	V	3.2Mrq	35.0	9.99	-0.99	-0.31	-0.22	-0.29
86	6	8MGB	V	3.2Mrq	56.0	9.99	-1.20	-0.79	-0.04	-0.42
86	6	8ALB	V	3.2Mrq	58.0	9.99	-1.58	-1.04	-1.12	-1.02
86	6	8BTB	V	3.2Mrq	63.0	9.99	-1.20	-0.37	-0.18	-0.48
86	6	8PFB	V	3.2Mrq	58.0	9.99	-1.42	-1.01	-0.87	-1.13
86	6	16EDB	V	5.2Mrq	60.0	9.99	0.41	1.17	0.88	1.02
86	9	6OZB	V	3.5Mrq	44.0	9.99	-0.75	-0.44	0.11	-0.08
86	9	6MGB	V	3.5Mrq	60.0	9.99	-0.87	-0.32	-0.26	0.00
86	9	6PFB	V	3.5Mrq	40.0	9.99	-1.01	-0.52	-0.48	-0.81
86	9	6ALB	V	3.5Mrq	74.0	9.99	-1.39	-0.84	-0.42	-0.62
86	9	6BTB	V	3.5Mrq	89.0	9.99	-0.93	-0.30	-0.34	-0.85
87	6	7EDB	V	3.8Mrq	33.0	9.99	-0.36	0.20	0.77	0.96
87	6	7ETB	V	3.8Mrq	66.0	9.99	-0.38	-0.09	-0.23	-0.43
87	9	16HNB	V	3.2Mrq	22.0	9.99	-1.69	-1.09	-0.38	-0.34
87	9	16VDB	V	3.2Mrq	45.0	9.99	-2.34	-1.41	-0.51	-0.68
87	9	16SNB	V	3.2Mrq	48.0	9.99	-1.77	-1.40	-1.20	-1.14
87	9	16BIB	V	3.2Mrq	56.0	9.99	-2.32	-1.32	-1.01	-0.91
87	9	16PGC	V	3.2Mrq	72.0	9.99	-2.35	-1.86	-1.29	-1.24
87	9	16WPB	V	3.2Mrq	72.0	9.99	-1.98	-1.45	-0.92	-0.88
87	9	16VGZ	V	3.2Mrq	87.0	9.99	-2.24	-1.94	-1.30	-1.31
87	9	16NAB	V	3.2Mrq	95.0	9.99	-2.23	-1.68	-1.03	-1.07
87	12	7EDB	V	4.7Mrq	81.0	-0.58	-0.46	-0.40	-0.62	-0.65
87	12	7ETB	V	4.7Mrq	89.0	9.99	-0.73	-0.50	-0.41	-0.72
88	4	29EDB	V	3.5Mrq	74.0	9.99	-1.34	-0.91	-0.84	-0.63
88	9	26SNB	V	3.0Mrq	55.0	9.99	-1.77	-1.27	-1.26	-1.17
88	9	26VGZ	V	3.0Mrq	59.0	9.99	-2.41	-1.76	-1.02	-0.88
88	9	26VDB	V	3.0Mrq	66.0	9.99	-2.21	-1.43	-1.42	-1.22
88	9	26PGC	V	3.0Mrq	68.0	9.99	-1.98	-1.40	-0.92	-0.89
88	9	26HNB	V	3.0Mrq	83.0	9.99	-2.04	-1.58	-1.52	-1.54
88	10	1EDB	V	3.9Mrq	78.0	9.99	-0.54	-0.69	-0.90	-1.08
89	2	6VDB	V	3.5Mrq	68.0	9.99	-1.39	-1.18	-1.36	-1.42

89	2	6SNB	V	3.5Mrq	81.0	-1.78	-1.73	-0.88	-1.30	-1.50
89	2	6VGZ	V	3.5Mrq	81.0	9.99	-1.92	-1.33	-1.34	-1.36
89	2	6PGC	V	3.5Mrq	95.0	-2.03	-1.78	-1.27	-1.09	-1.21
89	2	6HNB	V	3.5Mrq	98.0	-2.04	-1.91	-1.29	-1.55	-1.62
89	2	14VDB	V	3.6Mrq	68.0	9.99	-0.98	-0.88	-0.88	-0.82
89	2	14SNB	V	3.6Mrq	79.0	9.99	-1.54	-0.75	-0.83	-1.17
89	2	14VGZ	V	3.6Mrq	81.0	9.99	-1.65	-1.26	-0.88	-1.08
89	2	14PGC	V	3.6Mrq	93.0	-1.69	-1.54	-0.90	-0.79	-1.00
89	2	14HNB	V	3.6Mrq	98.0	-1.73	-1.46	-1.07	-1.10	-1.35
89	3	5VGZ	V	4.6Mrq	81.0	9.99	-0.32	0.04	-0.44	-0.13
89	3	6VDB	V	4.0Mrq	68.0	9.99	-0.81	-0.41	-0.52	-0.90
89	3	6SNB	V	4.0Mrq	79.0	9.99	-0.96	-0.21	-0.55	-0.83
89	3	6VGZ	V	4.0Mrq	81.0	9.99	-1.41	-0.85	-0.69	-0.71
89	3	6PGC	V	4.0Mrq	93.0	-1.33	-1.09	-0.48	-0.33	-0.68
89	3	6HNB	V	4.0Mrq	98.0	-1.43	-1.29	-0.69	-0.76	-1.12
89	9	12EDB	V	4.4Mrq	40.0	9.99	0.33	0.57	0.77	1.00
89	9	12ETB	V	4.4Mrq	62.0	9.99	-0.09	0.23	0.12	0.12
89	9	24CBB	V	3.8Mrq	98.0	-1.54	-1.29	-0.93	-0.63	-0.56
89	10	24OZB	V	3.9Mrq	43.0	9.99	-0.67	-0.15	0.33	0.26
89	10	24MGB	V	3.9Mrq	52.0	9.99	-0.82	-0.49	-0.05	0.59
89	10	24ALB	V	3.9Mrq	59.0	9.99	-1.09	-0.63	-0.28	-0.22
89	10	24BTB	V	3.9Mrq	74.0	9.99	-0.51	0.35	0.59	0.24
89	10	24PFB	V	3.9Mrq	58.0	9.99	-0.80	-0.17	-0.25	-0.62
89	10	24NAB	V	3.9Mrq	100.0	9.99	-1.21	-0.75	-0.43	-0.73
90	2	16ETB	V	5.2Mrq	81.0	9.99	0.16	0.19	-0.05	-0.16
90	2	16EDB	V	5.2Mrq	85.0	-0.19	0.09	0.10	-0.17	-0.25
90	4	2VDB	V	4.4Mrq	23.0	9.99	0.06	0.24	0.50	0.04
90	4	2HNB	V	4.4Mrq	56.0	9.99	-0.53	-0.25	-0.42	-0.57
90	4	2SNB	V	4.4Mrq	72.0	9.99	-0.29	-0.16	-0.59	-0.78
90	4	2PGC	V	4.4Mrq	95.0	-0.92	-0.79	-0.41	-0.70	-0.86
90	4	2VGZ	V	4.4Mrq	95.0	-1.04	-0.82	-0.51	-0.51	-0.88

90	4	3VDB	V	3.8Mrq	22.0	9.99	-0.77	-0.32	-0.04	0.07
90	4	3HNB	V	3.8Mrq	56.0	9.99	-1.12	-0.88	-0.84	-1.05
90	4	3SNB	V	3.8Mrq	72.0	9.99	-0.96	-0.94	-1.08	-1.25
90	4	3PGC	V	3.8Mrq	95.0	-1.60	-1.46	-1.03	-1.14	-1.22
90	4	3VGZ	V	3.8Mrq	95.0	-1.74	-1.57	-1.04	-1.11	-1.30
90	4	14VDB	V	4.9Mrq	23.0	9.99	0.38	0.79	0.32	0.48
90	4	14HNB	V	4.9Mrq	56.0	9.99	-0.06	0.04	-0.04	-0.33
90	4	14SNB	V	4.9Mrq	72.0	9.99	0.15	0.26	-0.09	-0.47
90	4	14PGC	V	4.9Mrq	95.0	-0.36	-0.33	0.02	-0.22	-0.59
90	4	14VGZ	V	4.9Mrq	95.0	-0.63	-0.43	0.12	-0.36	-0.62
90	4	14VDB	V	4.0Mrq	25.0	9.99	-0.52	-0.41	0.09	-0.07
90	4	14HNB	V	4.0Mrq	58.0	9.99	-0.91	-0.83	-0.63	-0.76
90	4	14SNB	V	4.0Mrq	72.0	-1.06	-0.79	-0.72	-0.84	-1.01
90	4	14PGC	V	4.0Mrq	93.0	-1.63	-1.48	-0.91	-0.95	-1.00
90	4	14VGZ	V	4.0Mrq	95.0	9.99	-1.56	-0.93	-0.73	-0.91
90	9	13ETB	V	4.2Mrq	98.0	9.99	-1.21	-1.20	-0.41	-0.76
90	12	7SHB	V	3.0Mrq	26.0	9.99	-1.42	-1.06	-0.50	-0.78
90	12	7WPB	V	3.0Mrq	28.0	9.99	-1.49	-0.93	-0.87	-0.40
90	12	7BIB	V	3.0Mrq	40.0	9.99	-1.90	-1.45	-0.93	-0.82
90	12	7NAB	V	3.0Mrq	63.0	9.99	-2.33	-1.58	-1.22	-1.31
90	12	7WHB	V	3.0Mrq	65.0	9.99	-2.27	-1.72	-1.10	-1.21
90	12	7HNB	V	3.0Mrq	87.0	9.99	-2.43	-1.84	-1.13	-1.12
91	2	19WPB	V	3.9Mrq	36.0	9.99	-0.78	-0.24	0.08	0.18
91	2	19HNB	V	3.9Mrq	49.0	9.99	-0.88	-0.33	0.15	0.12
91	2	19WHB	V	3.9Mrq	51.0	9.99	-1.29	-0.64	-0.29	-0.29
91	2	19BIB	V	3.9Mrq	54.0	9.99	-1.07	-0.66	-0.19	0.17
91	2	19VDB	V	3.9Mrq	87.0	-1.57	-1.49	-0.98	-0.62	-0.73
91	2	23ETB	V	4.9Mrq	41.0	9.99	-1.50	-1.02	-0.58	-0.51
91	2	23EDB	V	4.9Mrq	59.0	9.99	-1.60	-1.24	-0.83	-0.72
91	2	23GDR	V	4.9Mrq	72.0	9.99	-1.43	-1.09	-1.13	-1.27
91	2	23BTB	V	4.9Mrq	98.0	-2.09	-1.87	-1.13	-1.07	-1.58

91	7	3VDB	V	3.1Mrg	39.0	9.99	-1.98	-1.65	-0.96	-0.84
91	7	3BIB	V	3.1Mrg	60.0	9.99	-1.98	-1.59	-0.92	-0.82
91	7	3WPB	V	3.1Mrg	68.0	9.99	-1.74	-1.49	-1.04	-0.60
91	7	3SNB	V	3.1Mrg	71.0	9.99	-2.09	-1.67	-1.29	-1.13
91	7	3PGC	V	3.1Mrg	95.0	9.99	-2.42	-1.99	-1.44	-1.12
91	9	15SNB	V	3.1Mrg	30.0	9.99	-0.99	-0.28	-0.28	-0.10
91	9	15PGC	V	3.1Mrg	38.0	9.99	-1.16	-0.51	-0.42	-0.61
91	9	15VGZ	V	3.1Mrg	38.0	9.99	-2.00	-1.39	-0.95	-0.62
91	9	15HNB	V	3.1Mrg	81.0	9.99	-2.21	-1.48	-1.05	-1.10
91	9	15VDB	V	3.1Mrg	83.0	9.99	-2.33	-1.81	-1.41	-1.33
91	9	15BIB	V	3.1Mrg	93.0	9.99	-1.91	-1.41	-1.06	-0.90
91	9	15NAB	V	3.1Mrg	100.0	9.99	-1.91	-1.69	-1.17	-1.22
92	3	13VGZ	V	3.5Mrg	41.0	9.99	-0.96	-0.56	0.06	0.26
92	3	13SNB	V	3.5Mrg	59.0	9.99	-1.29	-0.75	-0.55	-0.62
92	3	13PGC	V	3.5Mrg	59.0	9.99	-1.39	-0.97	-0.08	-0.45
92	3	13VDB	V	3.5Mrg	98.0	-2.07	-1.93	-1.21	-1.09	-0.96
92	5	17SHB	V	3.0Mrg	59.0	9.99	-1.99	-1.45	-1.10	-0.61
92	5	17CBB	V	3.0Mrg	59.0	9.99	-2.23	-1.72	-1.32	-1.17
92	5	17ALB	V	3.0Mrg	59.0	9.99	-1.97	-1.74	-1.42	-0.99
92	5	17BTB	V	3.0Mrg	72.0	9.99	-1.93	-1.21	-0.77	-0.43
92	5	17NAB	V	3.0Mrg	78.0	9.99	-2.01	-1.96	-1.10	-0.97
92	5	17MGB	V	3.0Mrg	87.0	9.99	-2.30	-1.46	-1.18	-0.97
87	4	8SHB	V	3.9Mrg	24.0	9.99	-0.59	-0.59	0.27	0.24
87	4	8WPB	V	3.9Mrg	28.0	9.99	-0.54	-0.28	0.20	0.05
87	4	8BIB	V	3.9Mrg	38.0	9.99	-1.13	-0.75	-0.19	-0.28
87	4	8NAB	V	3.9Mrg	62.0	9.99	-1.28	-0.63	-0.06	-0.43
87	4	8WHB	V	3.9Mrg	66.0	9.99	-1.16	-0.62	0.14	-0.29
87	4	8HNB	V	3.9Mrg	87.0	9.99	-1.63	-0.85	-0.43	-0.76
94	1	3GDR	V	5.5Mrg	79.0	9.99	-1.07	-1.64	-2.11	-2.16

ENA:

yr	mmdd	station	comp	magtype	R(km)	A0.5	A1*	A2	A5*	A10*
----	------	---------	------	---------	-------	------	-----	----	-----	------

86	8	18LPQ	V	3.0Mrg	20.0	0.50	0.87	2.00	4.57	10.47
90	4	23LPQ	V	3.0Mrg	15.0	9.99	9.99	-1.69	-1.09	-0.69
90	4	23A16	V	3.0Mrg	16.0	9.99	-2.51	-1.57	-0.98	-0.59
90	4	23A11	V	3.0Mrg	19.0	9.99	-2.12	-1.68	-1.33	-0.85
90	4	23A54	V	3.0Mrg	20.0	9.99	-2.38	-1.71	-1.18	-0.48
90	4	23A61	V	3.0Mrg	34.0	9.99	-2.87	-2.56	-1.89	-1.12
90	4	23A21	V	3.0Mrg	50.0	9.99	-2.76	-2.35	-1.43	-1.00
90	4	23A64	V	3.0Mrg	52.0	9.99	-2.93	-2.31	-1.74	-0.98
85	3	3LPQ	V	3.1Mrg	38.0	-1.83	-1.84	-1.36	-0.78	-0.64
85	4	10LPQ	V	3.1Mrg	23.0	9.99	9.99	-1.12	-0.86	-0.32
88	1	24LPQ	V	3.1Mrg	36.0	-2.41	-2.42	-1.87	-1.17	-1.01
88	3	13A11	V	3.1Mrg	26.0	9.99	-2.16	-1.47	-1.29	-0.85
88	3	13A16	V	3.1Mrg	28.0	9.99	-1.99	-1.58	-1.08	-0.65
88	3	13LPQ	V	3.1Mrg	30.0	-2.06	-2.06	-1.57	-0.64	-0.58
88	3	13A61	V	3.1Mrg	35.0	9.99	-2.79	-2.32	-1.58	-1.00
88	3	13A64	V	3.1Mrg	56.0	9.99	-2.75	-2.23	-1.61	-0.95
88	3	13A21	V	3.1Mrg	59.0	9.99	-2.54	-2.23	-1.28	-0.93
89	1	31A11	V	3.1Mrg	46.0	9.99	-2.51	-2.00	-1.47	-0.89
89	1	31A16	V	3.1Mrg	54.0	9.99	-2.30	-2.02	-1.51	-0.92
89	1	31LPQ	V	3.1Mrg	54.0	-2.69	-2.49	-1.99	-1.41	-0.95
89	1	31A61	V	3.1Mrg	55.0	9.99	-2.72	-2.14	-1.59	-0.94
89	1	31A64	V	3.1Mrg	76.0	9.99	-2.91	-2.35	-1.73	-1.02
89	1	31A21	V	3.1Mrg	81.0	9.99	-2.73	-2.21	-1.56	-0.93
90	4	21A16	V	3.1Mrg	13.0	9.99	-2.11	-1.46	-0.84	-0.33
90	4	21A61	V	3.1Mrg	18.0	9.99	-2.05	-1.68	-1.07	-0.50
90	4	21LPQ	V	3.1Mrg	25.0	-1.87	-2.13	-1.81	-1.14	-0.72
90	4	21A54	V	3.1Mrg	29.0	9.99	-2.08	-1.51	-0.94	-0.52
90	4	21A21	V	3.1Mrg	34.0	9.99	-2.23	-1.45	-0.84	-0.58
90	4	21A64	V	3.1Mrg	35.0	9.99	-2.19	-1.56	-0.98	-0.71
90	4	21A11	V	3.1Mrg	37.0	9.99	-2.41	-1.80	-1.29	-0.87

87	11	11GAC	V	3.2Mrg	25.0	-1.86	-1.84	-1.40	-0.65	-0.20
87	11	11OTT	V	3.2Mrg	56.0	-2.13	-2.16	-1.46	-0.71	-0.38
87	11	11TRQ	V	3.2Mrg	81.0	-2.35	-2.22	-1.51	-0.94	-0.52
87	11	11WBO	V	3.2Mrg	89.0	-2.53	-2.43	-1.83	-1.16	-0.61
89	10	13LPQ	V	3.2Mrg	25.0	9.99	9.99	-1.27	-0.52	-0.09
89	10	13A16	V	3.2Mrg	25.0	9.99	-2.02	-1.34	-0.86	-0.34
89	10	13A11	V	3.2Mrg	28.0	9.99	-1.94	-1.41	-0.89	-0.40
89	10	13A54	V	3.2Mrg	32.0	9.99	-1.68	-1.29	-0.72	-0.19
89	10	13A61	V	3.2Mrg	40.0	9.99	-2.06	-1.57	-1.17	-0.85
89	10	13A21	V	3.2Mrg	52.0	9.99	-2.42	-1.99	-1.16	-0.72
89	10	13A64	V	3.2Mrg	56.0	9.99	-2.44	-1.72	-1.26	-0.78
90	3	13A61	V	3.2Mrg	23.0	9.99	-2.32	-1.82	-1.12	-0.43
90	3	13A54	V	3.2Mrg	27.0	9.99	-2.24	-1.76	-1.27	-0.55
90	3	13LPQ	V	3.2Mrg	28.0	9.99	9.99	-1.12	-0.54	-0.44
90	3	13A11	V	3.2Mrg	36.0	9.99	-2.21	-1.49	-1.31	-0.96
90	3	13A64	V	3.2Mrg	41.0	9.99	-2.40	-1.82	-1.21	-0.55
90	3	13A21	V	3.2Mrg	41.0	9.99	-2.34	-1.68	-1.04	-0.65
87	3	18LPQ	V	3.3Mrg	44.0	-2.17	-2.19	-1.56	-1.12	-0.62
88	5	15OTT	V	3.3Mrg	30.0	-2.31	-2.25	-1.40	-0.82	-0.63
88	5	15WBO	V	3.3Mrg	31.0	9.99	9.99	-1.44	-0.86	-0.40
88	5	15GAC	V	3.3Mrg	62.0	-2.70	-2.69	-1.98	-1.44	-1.26
90	10	21A54	V	3.3Mrg	17.0	9.99	-1.88	-1.50	-0.75	0.02
90	10	21A16	V	3.3Mrg	32.0	9.99	-2.15	-1.55	-0.85	-0.17
90	10	21A61	V	3.3Mrg	42.0	9.99	-2.60	-2.01	-1.55	-0.78
90	10	21A64	V	3.3Mrg	62.0	9.99	-2.74	-2.22	-1.43	-0.71
90	10	21A21	V	3.3Mrg	63.0	9.99	-2.49	-1.94	-1.31	-0.60
90	12	18A54	V	3.3Mrg	25.0	9.99	-1.92	-1.35	-1.01	-0.70
90	12	18A16	V	3.3Mrg	35.0	9.99	-2.15	-1.68	-1.11	-0.83
90	12	18A61	V	3.3Mrg	52.0	9.99	-2.74	-2.20	-1.73	-1.28
90	12	18A21	V	3.3Mrg	69.0	9.99	-2.36	-1.95	-1.35	-1.08
90	12	18A64	V	3.3Mrg	72.0	9.99	-2.58	-2.10	-1.55	-1.13

87	8	6LPQ	V	3.4Mrg	25.0	-1.92	-1.93	-1.32	-0.69	-0.18
88	8	9WBO	V	3.4Mrg	25.0	9.99	9.99	-1.61	-0.91	-0.30
88	8	9OTT	V	3.4Mrg	72.0	-2.62	-2.77	-2.17	-1.33	-0.78
88	8	9GAC	V	3.4Mrg	87.0	-2.82	-2.78	-2.21	-1.41	-1.22
89	11	4GRQ	V	3.4Mrg	47.0	-2.41	-2.43	-1.84	-1.33	-0.81
89	11	4TRQ	V	3.4Mrg	89.0	-2.69	-3.03	-2.43	-1.79	-1.08
89	11	4OTT	V	3.4Mrg	91.0	-2.69	-2.81	-2.23	-1.42	-1.06
89	11	22A16	V	3.4Mrg	26.0	9.99	-1.75	-1.27	-1.09	-0.51
89	11	22A11	V	3.4Mrg	27.0	9.99	-1.81	-1.14	-0.80	-0.76
89	11	22LPQ	V	3.4Mrg	29.0	-1.95	-1.86	-1.37	-0.88	-0.79
89	11	22A61	V	3.4Mrg	34.0	9.99	-2.42	-1.71	-1.50	-0.72
89	11	22A64	V	3.4Mrg	55.0	9.99	-2.35	-1.80	-1.35	-0.65
89	11	22A21	V	3.4Mrg	56.0	9.99	-2.32	-1.56	-1.09	-0.51
80	3	11GNT	V	3.7Mrg	62.0	-1.64	-1.55	-0.99	-0.66	-0.54
81	6	16LPQ	V	3.7Mrg	17.0	9.99	9.99	-0.43	0.20	0.18
81	7	4WBO	V	3.7Mrg	56.0	-1.17	-1.48	-1.35	-0.75	-0.25
81	7	4MNT	V	3.7Mrg	89.0	-2.13	-1.96	-1.31	-0.97	-0.56
81	7	4OTT	V	3.7Mrg	91.0	-2.24	-2.09	-1.35	-0.60	-0.30
81	7	4GAC	V	3.7Mrg	93.0	-2.41	-2.32	-1.69	-1.03	-0.59
81	9	18TRQ	V	3.5Mrg	39.0	9.99	9.99	-1.13	-0.63	-0.38
81	9	18GAC	V	3.5Mrg	59.0	-2.48	-2.35	-1.68	-1.19	-0.82
81	9	18GRQ	V	3.5Mrg	85.0	-2.46	-2.52	-1.79	-1.31	-0.78
81	9	18OTT	V	3.5Mrg	98.0	-2.11	-2.13	-1.59	-1.10	-0.74
81	9	30GRQ	V	3.5Mrg	36.0	-2.09	-2.15	-1.43	-1.09	-0.50
81	9	30GAC	V	3.5Mrg	76.0	-2.49	-2.27	-2.13	-1.42	-0.98
82	3	16KLN	V	3.5Mrg	25.0	-1.47	-1.52	-0.85	-0.57	-0.40
82	3	31KLN	V	5.0Mrg	25.0	0.45	0.18	0.35	0.59	0.64
82	4	2KLN	V	4.3Mrg	25.0	-0.47	-0.59	-0.17	-0.07	0.09
82	4	11KLN	V	4.0Mrg	25.0	9.99	9.99	-0.44	-0.03	0.19
82	4	18KLN	V	4.1Mrg	25.0	9.99	9.99	-0.45	-0.01	0.24
82	5	6KLN	V	4.0Mrg	25.0	9.99	9.99	-0.65	-0.60	0.25

82	6	16KLN	V	4.7Mrq	49.0	-0.64	-0.46	-0.10	0.25	0.52
82	7	13TRQ	V	3.8Mrq	18.0	-1.44	-1.44	-0.94	-0.41	-0.29
82	7	13GAC	V	3.8Mrq	85.0	-1.88	-1.97	-1.46	-0.86	-0.38
82	7	13MNT	V	3.8Mrq	98.0	-2.35	-1.99	-1.65	-1.15	-0.81
82	8	6GAC	V	3.7Mrq	23.0	-1.84	-2.08	-1.21	-0.71	-0.27
82	8	6OTT	V	3.7Mrq	60.0	-2.55	-2.39	-1.30	-0.85	-0.47
82	8	6TRQ	V	3.7Mrq	79.0	-2.16	-2.17	-1.82	-1.14	-0.72
82	8	6WBO	V	3.7Mrq	100.0	-2.41	-2.43	-1.53	-1.14	-0.72
82	9	3OTT	V	3.7Mrq	78.0	-1.85	-2.03	-1.53	-1.01	-0.47
82	9	3GAC	V	3.7Mrq	89.0	-2.26	-2.12	-1.70	-1.07	-0.73
82	10	26KLN	V	3.5Mrq	25.0	-1.84	-1.80	-1.17	-0.71	-0.40
82	12	4LPQ	V	3.9Mrq	31.0	9.99	9.99	-0.08	0.39	0.39
83	1	17GSQ	V	4.1Mrq	25.0	9.99	9.99	-0.14	0.41	0.79
83	1	17HTQ	V	4.1Mrq	98.0	-1.27	-1.32	-0.66	-0.64	-0.30
83	5	13KLN	V	3.5Mrq	25.0	-1.61	-1.84	-0.99	-0.81	-0.55
83	5	13KLN	V	3.9Mrq	25.0	9.99	9.99	-0.30	0.25	0.32
83	5	16LPQ	V	3.8Mrq	42.0	-1.58	-1.40	-0.82	-0.35	-0.31
83	8	12GGN	V	3.5Mrq	72.0	-2.23	-2.48	-1.85	-0.91	-0.29
83	10	11OTT	V	4.1Mrq	25.0	-0.84	-0.79	-0.18	0.19	0.34
83	10	11WBO	V	4.1Mrq	46.0	-1.32	-1.02	-0.80	-0.28	0.17
83	10	11GAC	V	4.1Mrq	62.0	-1.77	-1.58	-0.97	-0.71	-0.21
83	11	17KLN	V	3.7Mrq	25.0	-1.47	-1.63	-0.77	-0.41	-0.19
83	12	28GRQ	V	3.5Mrq	62.0	9.99	9.99	-1.86	-1.18	-0.91
84	2	24KLN	V	3.7Mrq	25.0	9.99	9.99	-0.68	-0.14	-0.09
84	4	11GSQ	V	3.8Mrq	54.0	-1.76	-1.60	-1.08	-0.31	-0.17
84	4	11HTQ	V	3.8Mrq	65.0	-2.01	-1.77	-1.17	-0.65	-0.28
84	9	23LMN	V	3.6Mrq	19.0	9.99	9.99	-0.66	-0.39	-0.21
84	11	30KLN	V	3.8Mrq	25.0	9.99	9.99	-0.62	-0.19	0.00
85	4	12SBQ	V	3.5Mrq	98.0	-2.27	-2.23	-1.91	-1.15	-0.60
85	10	5KLN	V	4.0Mrq	25.0	9.99	9.99	-0.55	-0.15	0.01
86	1	11LPQ	V	4.0Mrq	43.0	9.99	9.99	-0.77	-0.13	0.12

86	8	6TRQ	V	3.5Mrg	54.0	-2.29	-2.17	-1.34	-0.91	-0.60
86	8	6GRQ	V	3.5Mrg	56.0	-1.68	-1.89	-1.25	-0.78	-0.47
86	8	6GAC	V	3.5Mrg	78.0	-2.46	-2.12	-1.66	-1.31	-0.93
86	9	19LPQ	V	4.2Mrg	32.0	9.99	9.99	-0.18	0.47	0.38
86	11	9GSQ	V	4.2Mrg	43.0	-1.16	-0.91	-0.24	-0.11	0.02
86	11	9HTQ	V	4.2Mrg	72.0	-1.13	-1.23	-0.71	-0.32	-0.22
87	9	26WBO	V	3.8Mrg	83.0	-1.74	-1.78	-1.32	-0.72	-0.56
87	10	23MNT	V	3.7Mrg	76.0	-2.07	-2.16	-1.89	-1.18	-0.74
87	10	23GAC	V	3.7Mrg	78.0	-2.09	-2.00	-1.53	-0.98	-0.59
87	11	11GAC	V	3.5Mrg	22.0	-2.01	-1.82	-1.37	-0.63	-0.18
87	11	11OTT	V	3.5Mrg	54.0	-2.13	-2.16	-1.46	-0.72	-0.38
87	11	11TRQ	V	3.5Mrg	79.0	-1.99	-2.08	-1.46	-0.90	-0.51
87	11	11WBO	V	3.5Mrg	87.0	-2.22	-2.22	-1.71	-1.13	-0.60
88	1	2LPQ	V	3.6Mrg	35.0	-1.82	-1.83	-1.23	-0.62	-0.43
88	1	28KLN	V	3.8Mrg	58.0	-1.37	-1.27	-1.14	-1.00	-0.85
88	3	10GRQ	V	3.7Mrg	35.0	-1.91	-1.70	-1.05	-0.51	-0.02
88	3	10GAC	V	3.7Mrg	74.0	-2.20	-2.21	-1.68	-1.05	-0.54
88	3	10TRQ	V	3.7Mrg	87.0	-1.99	-2.09	-1.53	-0.87	-0.31
88	4	24LMN	V	3.7Mrg	21.0	-1.31	-1.42	-0.89	-0.33	0.03
88	5	9KLN	V	3.5Mrg	25.0	-1.57	-1.78	-1.19	-0.74	0.00
88	8	26KLN	V	3.8Mrg	25.0	9.99	9.99	-0.75	-0.59	-0.09
88	11	23A54	V	4.6Mrg	100.0	9.99	-0.67	-0.25	0.12	0.38
88	11	23A61	V	4.6Mrg	100.0	9.99	9.99	-0.49	-0.13	9.99
89	1	19A61	V	3.6Mrg	83.0	9.99	-2.05	-1.52	-1.03	-0.50
89	1	19A54	V	3.6Mrg	83.0	9.99	-2.05	-1.62	-0.94	-0.46
89	1	19A64	V	3.6Mrg	91.0	9.99	-2.06	-1.72	-1.02	-0.54
89	3	9LPQ	V	4.3Mrg	45.0	-1.31	-1.25	-0.51	-0.14	-0.22
89	8	10KLN	V	3.5Mrg	49.0	-1.65	-1.81	-1.32	-0.79	-0.45
89	11	16GRQ	V	4.0Mrg	58.0	9.99	9.99	-0.92	-0.55	-0.29
89	11	16CKO	V	4.0Mrg	93.0	-2.23	-2.06	-1.36	-0.75	-0.28
90	3	3A64	V	3.6Mrg	21.0	9.99	-1.55	-1.08	-0.47	-0.18

90	3	3A61	V	3.6Mrg	29.0	9.99	-1.76	-1.06	-0.64	-0.36
90	3	3A16	V	3.6Mrg	48.0	9.99	-1.52	-1.13	-0.71	-0.47
90	3	3A54	V	3.6Mrg	59.0	9.99	-1.97	-1.44	-0.80	-0.38
90	3	3LPQ	V	3.6Mrg	62.0	-1.79	-1.72	-1.14	-0.56	-0.49
90	3	3A11	V	3.6Mrg	74.0	9.99	-2.13	-1.60	-1.00	-0.72
90	10	7TRQ	V	3.9Mrg	45.0	-1.71	-1.75	-1.15	-0.70	-0.45
90	10	7GRQ	V	3.9Mrg	69.0	-2.11	-1.97	-1.41	-0.80	-0.30
90	10	19GRQ	V	5.1Mrg	27.0	9.99	9.99	0.45	0.78	1.03
90	10	19TRQ	V	5.1Mrg	87.0	-0.42	-0.53	0.07	0.69	0.79
91	3	6CKO	V	3.9Mrg	56.0	9.99	9.99	-1.00	-0.71	0.00
91	3	6GRQ	V	3.9Mrg	87.0	9.99	9.99	-1.40	-1.00	-0.44
91	7	5MNT	V	3.8Mrg	38.0	9.99	9.99	-1.24	-0.82	-0.06
92	11	17TRQ	V	3.8Mrg	58.0	9.99	9.99	-0.67	-0.14	0.27
92	11	17OTT	V	3.8Mrg	76.0	9.99	9.99	-0.71	-0.11	0.15
92	11	17WBO	V	3.8Mrg	91.0	9.99	9.99	-1.07	-0.49	0.00
93	5	6GRQ	V	3.5Mrg	44.0	9.99	9.99	-1.42	-1.03	-0.55
93	5	6TRQ	V	3.5Mrg	76.0	9.99	9.99	-2.05	-1.38	-0.85
93	9	23TRQ	V	3.8Mrg	21.0	9.99	9.99	-0.47	0.23	0.29
93	12	25GRQ	V	4.2Mrg	25.0	9.99	9.99	-0.18	0.07	0.28
93	12	25TRQ	V	4.2Mrg	87.0	9.99	9.99	-0.70	-0.30	0.00

Note:

*FA amplitude is not exactly at the node point of frequency.
For more detailed information see Appendix 5A.

Chen, S.Z.

"Global Comparisons of
Earthquake Source Spectra."

APPENDIX 4 Disk #1 of 1
(Fourier acceleration spectrum
databases for Japan, Mexico,
and Turkey: H & V comp.)

THS
PH.D.
2001
C454

c.2