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APPENDICES

APPENDIX A

MATLAB PROGRAMS

A.1 To categorize earthquake events as mainshock, after shock and foreshock

```

clc
clear all
format long g

%%% Data Input %%%
[No    yy    mm    dd    hr    mi    se    lat    lon    dep
Mw]=textread('EqData(raw).txt','%d %d %d %d %d %d %f %f %f %f
%f');
n = length(No);
data=zeros(n,1);

%%% Time unit %%%
day(1)=datenum(yy(1),mm(1),dd(1),hr(1),mi(1),se(1));
for i=2:n
    day(i)=datenum(yy(i),mm(i),dd(i),hr(i),mi(i),se(i));
    day(i)=day(i)-day(1);
end
day(1)=0;

%%% Boundary Conditions %%%
for i=1:n
    if data(i)==0
        Ldist=10^(0.1238*Mw(i)+0.983);
        if Mw(i)<6.4
            Tday=10^(0.556*Mw(i)-0.6027);
        else
            Tday=10^(0.0617*Mw(i)+2.5117);
        end

        Numm=No(i);
        for j=1:n
            Numm2=No(j);
            if j~=i & data(j)~=1

                cosdist=sin(lat(i)*pi/180)*sin(lat(j)*pi/180)+cos(lat(i)*pi/18
0)*cos(lat(j)*pi/180)*cos(abs(lon(j)*pi/180-lon(i)*pi/180));
                cdist=111.23*(180/pi)*acos(cosdist);
                cday=abs(day(j)-day(i));
                if Mw(j)<=Mw(i) & cday<=Tday & cdist<=Ldist
                    data(j)=1;
                    if data(j)==1 & day(j)-day(i)<0
                        data(j)=2;
                    end
                end
            end
        end
    end
end
step=i;
end

```

```

[m_shocks] = find(data==0); %%% Mainshock events %%%
[a_shocks] = find(data==1); %%% Aftershock events %%%
[f_shocks] = find(data==2); %%% Foreshock events %%%

%%% Data Output %%%
main_shock = fopen('Mainshock.txt','w');

for k=1:length(m_shocks)

fprintf(main_shock,'%d\t%d\t%d\t%d\t%d\t%d\t%6.2f\t%6.2f\t%6.2f\t%6.2f\t%6.2f\n',No(m_shocks(k)), ...
yy(m_shocks(k)),mm(m_shocks(k)),dd(m_shocks(k)),hr(m_shocks(k)) ...
),mi(m_shocks(k)),se(m_shocks(k)), ...
lat(m_shocks(k)),lon(m_shocks(k)),dep(m_shocks(k)),Mw(m_shocks(k)));
end
fclose(main_shock);

after_shock = fopen('Aftershock.txt','w');
for j=1:length(a_shocks)
fprintf(after_shock,'%d\t%d\t%d\t%d\t%d\t%d\t%6.2f\t%6.2f\t%6.2f\t%6.2f\t%6.2f\n',No(a_shocks(j)), ...
yy(a_shocks(j)),mm(a_shocks(j)),dd(a_shocks(j)),hr(a_shocks(j)) ...
),mi(a_shocks(j)),se(a_shocks(j)), ...
lat(a_shocks(j)),lon(a_shocks(j)),dep(a_shocks(j)),Mw(a_shocks(j)));
end
fclose(after_shock);

```

A.2 To plot time-history records and process the database

```

%%% Main program %%%
clear all;
cofile=fopen('Combinedout.txt');
datacb=fscanf(cofile,'%f');
cbn1=length(datacb);
fclose(cofile);

imno=cbn1/2;
inob=1;
for idatacb=1:cbn1
    if mod(idatacb,2)==1
        cbno(inob)=datacb(idatacb);
    end
    if mod(idatacb,2)==0
        cbdate(inob)=datacb(idatacb);
        inob=inob+1;
    end
end

end

fnamed=dir;
le=length(fnamed);
tofileco=fopen('totalfileco.txt','w');
fprintf(tofileco,'%s\t%s\t%s\t%s\n','No.Catalog','file_TMD','start time','end time');

```

```

tofile=fopen('totalfile.txt','w');
fprintf(tofile,'%s\t%s\t%s\t%s\t%s\t%s\t%s\t%s\t%s\t%s\t%s\t%s\t%
s\n'...
    'year','day','yyyymmdd','file','Fs'...
    'VE_PGD(cm.)','VE_PGV(cm/s.)','VE_PGA(g.)'...
    'NS_PGD(cm.)','NS_PGV(cm/s.)','NS_PGA(g.)'...
    'EW_PGD(cm.)','EW_PGV(cm/s.)','EW_PGA(g.)');

for p=3:le
    if fnamed(p).isdir==1

        eval(['cd ',fnamed(p).name]);
        eval(['!copy C:\123\SUD2ASC.EXE']);
        %*****
        fnamed2=dir;
        le2=length(fnamed2);
        for q=3:le2
            if fnamed2(q).isdir==1
                eval(['cd ',fnamed2(q).name]);
                eval(['!copy C:\123\SUD2ASC.EXE']);
                eval(['!timemurielv2']);
                eval(['!del SUD2ASC.EXE']);
                eval(['cd ..']);
            end
        end
        eval(['!del SUD2ASC.EXE']);
        eval(['cd ..']);
    end
end
fclose(tofileco);
fclose(tofile);

%%% Sub-program %%%
%High pass filter (Hz)
hp=40;
%Low pass filter (Hz)
lp=0.1;

%*****
fnameinp = dir;
na1=length(dir);

for ina=3:na1

    fnamen=fnameinp(ina).name;
    [a na2]=size(fnamen);
    G=0; Gain=0;

    if strcmp(fnamen((na2-2):na2),'CH2',length(fnamen((na2-2):na2)))
        G=171; Gain=32;
    elseif strcmp(fnamen((na2-2):na2),'MA2',length(fnamen((na2-2):na2)))
        G=171; Gain=32;
    elseif strcmp(fnamen((na2-2):na2),'TA2',length(fnamen((na2-2):na2)))
        G=171; Gain=32;
    elseif strcmp(fnamen((na2-2):na2),'LO2',length(fnamen((na2-2):na2)))
        G=171; Gain=32;
    elseif strcmp(fnamen((na2-2):na2),'PA2',length(fnamen((na2-2):na2)))
        G=171; Gain=32;

```

```

elseif strcmp(fnamen((na2-2):na2), 'NO2', length(fnamen((na2-2):na2)))
    G=171; Gain=32;
elseif strcmp(fnamen((na2-2):na2), 'SU2', length(fnamen((na2-2):na2)))
    G=171; Gain=32;
elseif strcmp(fnamen((na2-2):na2), 'CM2', length(fnamen((na2-2):na2)))
    G=171; Gain=32;
elseif strcmp(fnamen((na2-2):na2), 'NA2', length(fnamen((na2-2):na2)))
    G=171; Gain=32;
elseif strcmp(fnamen((na2-2):na2), 'PH2', length(fnamen((na2-2):na2)))
    G=400; Gain=1;
elseif strcmp(fnamen((na2-2):na2), 'KH2', length(fnamen((na2-2):na2)))
    G=400; Gain=1;
elseif strcmp(fnamen((na2-2):na2), 'KA2', length(fnamen((na2-2):na2)))
    G=400; Gain=1;
elseif strcmp(fnamen((na2-2):na2), 'SO2', length(fnamen((na2-2):na2)))
    G=400; Gain=1;
else
    continue;
end

```

```

fnameop=strcat(fnamen(1:(na2-4)), '.txt');
fnameout=strcat(fnamen(1:(na2-4)), fnamen((na2-2):na2), '.txt');
eval(['!SUD2ASC ', fnamen, ' ', fnameop]);
eval(['!rename ', fnameop, ' ', fnameout]);
%*****
fname=strcat(fnamen(1:(na2-4)), fnamen((na2-2):na2));
fnamein=strcat(fname, '.txt');

```

```
fin=fopen(fnamein);
```

```

%Sampling frequency
for i=1:77
ln=fgetl(fin);
end
Fs=str2num(ln(1:10));

```

```

%*****
while (~strcmp(ln, '+0.000000' ; rate
correction', length(ln)) & (~feof(fin)));
    ln=fgetl(fin);
end
data1=fscanf(fin, '%f');
n1=length(data1);
dt=1/Fs;
t1=[0:n1-1]*dt;
t1=t1';

```

```

ln=fgetl(fin);
while (~strcmp(ln, '+0.000000' ; rate
correction', length(ln)) & (~feof(fin)));
    ln=fgetl(fin);
end
data2=fscanf(fin, '%f');
n2=length(data2);
t2=[0:n2-1]*dt;
t2=t2';

```

```
ln=fgetl(fin);
```

```

while (~strcmp(ln, '+0.000000                                ; rate
correction', length(ln)) & (~feof(fin)));
    ln=fgetl(fin);
end
data3=fscanf(fin, '%f');
n3=length(data3);
t3=[0:n3-1]*dt;
t3=t3';

fclose(fin);

%*****Date of recording
fin2=fopen(fnamein);
for da=1:34
ln2=fgetl(fin2);
if da==34
    daten=ln2(1:8);
    datestart=ln2(1:17);
end

end

datena=strcat('20', daten(7:8), daten(1:2), daten(4:5));
fclose(fin2);

%*****time of recording
datestartn=datenum(datestart, 'mm/dd/yy HH:MM:SS');
dateendn=datestartn+(n1-1)*dt/(24*3600);
datestarts=datestr(datestartn, 'yyyy/mm/dd HH:MM:SS');
dateends=datestr(dateendn, 'yyyy/mm/dd HH:MM:SS');
%eval(['!del ', fnameout]);
%*****
for inum=1:imno
if (cbdate(inum)-datestartn)>=0 && (dateendn-cbdate(inum))>=0
    nfo=num2str(cbno(inum));
    ptoal=cbdate(inum)-datestartn;
    ptocal=ptocal*24*3600;
    nfol=' C:\!Chosenones';
    nafo=strcat(nfol, '\', nfo);
    eval(['!md', nafo]);
    eval(['!copy ', fnameinp(ina).name, nafo]);

fprintf(tofileco, '%5.0f\t%s\t%s\t%s\n'...
    , cbno(inum), fnameinp(ina).name, datestarts, dateends);

fname24=strcat(datena, fname, 'VE', '.txt');
fname25=strcat(datena, fname, 'NS', '.txt');
fname26=strcat(datena, fname, 'EW', '.txt');
%%fnameto=strcat(datena, fname, 'to', '.txt');

%*****velocity
vel24=zeros(n1,1);
vel25=zeros(n2,1);
vel26=zeros(n3,1);

vel24=(data1*(1.907*10^-6)*100)/(G*Gain);
vel25=(data2*(1.907*10^-6)*100)/(G*Gain);
vel26=(data3*(1.907*10^-6)*100)/(G*Gain);

%*****Z direction

```

```

vel24m=mean(vel24(1:n1));
vel24=vel24-vel24m;

%***fft vel24
fftvel24=zeros(n1,1);
fftvel24=fft(vel24);
%***high pass
ihp24=round(hp*n1*dt+1);
if ihp24>1
ehp24=n1-ihp24+2;
nhp24=n1-ehp24+1;
fftvel24(1:ihp24)=zeros(ihp24,1);
fftvel24(ehp24:n1)=zeros(nhp24,1);
else fftvel24(1)=0;
end
%***low pass
if Fs/2>lp
ilp24=round(lp*n1*dt+1);
elp24=n1-ilp24+2;
nlp24=elp24-ilp24+1;
fftvel24(ilp24:elp24)=zeros(nlp24,1);
end
%***ifft vel24*****
vel24=ifft(fftvel24);

%*****f vel24
NumUniquePts_vel24 = ceil((n1+1)/2);
fftvel24 = fftvel24(1:NumUniquePts_vel24);
mxvel24 = abs(fftvel24)/n1;
mxvel24 = mxvel24.^2;
if rem(n1, 2) % odd nfft excludes Nyquist point
    mxvel24(2:end) = mxvel24(2:end)*2;
else
    mxvel24(2:end -1) = mxvel24(2:end -1)*2;
end
fvel24 = (0:NumUniquePts_vel24-1)/dt/n1;

%*****acceleration
acc24=zeros(n1,1);
for i=3:n1-2
    acc24(i)=(-vel24(i+2)+8*vel24(i+1)-8*vel24(i-1)+vel24(i-
2))/12/dt/981;% g
end

%***fft acc24
fftacc24=zeros(n1,1);
fftacc24=fft(acc24);
%***high pass***
if ihp24>1
fftacc24(1:ihp24)=zeros(ihp24,1);
fftacc24(ehp24:n1)=zeros(nhp24,1);
else fftacc24(1)=0;
end
%***low pass
if Fs/2>lp
fftacc24(ilp24:elp24)=zeros(nlp24,1);
end
%***ifft acc24
acc24=ifft(fftacc24);

```



```

%***f acc24
NumUniquePts_acc24 = ceil((n1+1)/2);
fftacc24 = fftacc24(1:NumUniquePts_acc24);
mxacc24 = abs(fftacc24)/n1;
mxacc24 = mxacc24.^2;
if rem(n1, 2) % odd nfft excludes Nyquist point
    mxacc24(2:end) = mxacc24(2:end)*2;
else
    mxacc24(2:end -1) = mxacc24(2:end -1)*2;
end
facc24 = (0:NumUniquePts_acc24-1)/dt/n1;

%*****displacement
dis24=zeros(n1,1);
dis24(1)=0;
for i=2:n1
    dis24(i)=dis24(i-1)+dt/2*(vel24(i)+vel24(i-1));
end

%***fft dis24
fftdis24=zeros(n1,1);
fftdis24=fft(dis24);
%***high pass
if ihp24>1
fftdis24(1:ihp24)=zeros(ihp24,1);
fftdis24(ehp24:n1)=zeros(nhp24,1);
else fftdis24(1)=0;
end
%***low pass
if Fs/2>lp
fftdis24(ilp24:elp24)=zeros(nlp24,1);
end
%***ifft dis24
dis24=ifft(fftdis24);

%*****f dis24
NumUniquePts_dis24 = ceil((n1+1)/2);
fftdis24 = fftdis24(1:NumUniquePts_dis24);
mxdis24 = abs(fftdis24)/n1;
mxdis24 = mxdis24.^2;
if rem(n1, 2) % odd nfft excludes Nyquist point
    mxdis24(2:end) = mxdis24(2:end)*2;
else
    mxdis24(2:end -1) = mxdis24(2:end -1)*2;
end
fdis24 = (0:NumUniquePts_dis24-1)/dt/n1;

%*****N-S plane
%*****velocity
vel25m=mean(vel25(1:n2));
vel25=vel25-vel25m;

%***fft vel25
fftvel25=zeros(n2,1);
fftvel25=fft(vel25);
%***high pass
ihp25=round(hp*n2*dt+1);
if ihp25>1
ehp25=n2-ihp25+2;
nhp25=n2-ehp25+1;

```

```

fftvel25(1:ihp25)=zeros(ihp25,1);
fftvel25(ehp25:n2)=zeros(nhp25,1);
else fftvel25(1)=0;
end
%***low pass
if Fs/2>lp
ilp25=round(lp*n2*dt+1);
elp25=n2-ilp25+2;
nlp25=elp25-ilp25+1;
fftvel25(ilp25:elp25)=zeros(nlp25,1);
end
%***ifft vel25
vel25=ifft(fftvel25);
%***f vel25
NumUniquePts_vel25 = ceil((n2+1)/2);
fftvel25 = fftvel25(1:NumUniquePts_vel25);
mxvel25 = abs(fftvel25)/n2;
mxvel25 = mxvel25.^2;
if rem(n2, 2) % odd nfft excludes Nyquist point
    mxvel25(2:end) = mxvel25(2:end)*2;
else
    mxvel25(2:end -1) = mxvel25(2:end -1)*2;
end
fvel25 = (0:NumUniquePts_vel25-1)/dt/n2;

%*****acceleration
acc25=zeros(n2,1);
for i=3:n2-2
    acc25(i)=(-vel25(i+2)+8*vel25(i+1)-8*vel25(i-1)+vel25(i-
2))/12/dt/981; % g
end

%***fft acc25
fftacc25=zeros(n2,1);
fftacc25=fft(acc25);
%***high pass
if ihp25>1
fftacc25(1:ihp25)=zeros(ihp25,1);
fftacc25(ehp25:n2)=zeros(nhp25,1);
else fftacc25(1)=0;
end
%***low pass
if Fs/2>lp
fftacc25(ilp25:elp25)=zeros(nlp25,1);
end
%***ifft acc25
acc25=ifft(fftacc25);

%***f acc25
NumUniquePts_acc25 = ceil((n2+1)/2);
fftacc25 = fftacc25(1:NumUniquePts_acc25);
mxacc25 = abs(fftacc25)/n2;
mxacc25 = mxacc25.^2;
if rem(n2, 2) % odd nfft excludes Nyquist point
    mxacc25(2:end) = mxacc25(2:end)*2;
else
    mxacc25(2:end -1) = mxacc25(2:end -1)*2;
end
facc25 = (0:NumUniquePts_acc25-1)/dt/n2;

```

```

%*****displacement
dis25=zeros(n2,1);
dis25(1)=0;
for i=2:n2
    dis25(i)=dis25(i-1)+dt/2*(vel25(i)+vel25(i-1));
end

%***fft dis25
fftdis25=zeros(n2,1);
fftdis25=fft(dis25);
%***high pass
if ihp25>1
fftdis25(1:ihp25)=zeros(ihp25,1);
fftdis25(ehp25:n2)=zeros(nhp25,1);
else fftdis25(1)=0;
end
%***low pass
if Fs/2>lp
fftdis25(ilp25:elp25)=zeros(nlp25,1);
end
%***ifft dis25
dis25=ifft(fftdis25);

%***f dis25
NumUniquePts_dis25 = ceil((n2+1)/2);
fftdis25 = fftdis25(1:NumUniquePts_dis25);
mxdis25 = abs(fftdis25)/n2;
mxdis25 = mxdis25.^2;
if rem(n2, 2) % odd nfft excludes Nyquist point
    mxdis25(2:end) = mxdis25(2:end)*2;
else
    mxdis25(2:end -1) = mxdis25(2:end -1)*2;
end
fdis25 = (0:NumUniquePts_dis25-1)/dt/n2;

%*****E-W plane
%*****velocity
vel26m=mean(vel26(1:n3));
vel26=vel26-vel26m;

%***fft vel26
fftvel26=zeros(n3,1);
fftvel26=fft(vel26);
%***high pass
ihp26=round(lp*n3*dt+1);
if ihp26>1
ehp26=n3-ihp26+2;
nhp26=n3-ehp26+1;
fftvel26(1:ihp26)=zeros(ihp26,1);
fftvel26(ehp26:n3)=zeros(nhp26,1);
else fftvel26(1)=0;
end
%***low pass
if Fs/2>lp
ilp26=round(lp*n3*dt+1);
elp26=n3-ilp26+2;
nlp26=elp26-ilp26+1;
fftvel26(ilp26:elp26)=zeros(nlp26,1);
end
%***ifft vel26

```

```

vel26=ifft(fftvel26);
%***f vel26
NumUniquePts_vel26 = ceil((n3+1)/2);
fftvel26 = fftvel26(1:NumUniquePts_vel26);
mxvel26 = abs(fftvel26)/n3;
mxvel26 = mxvel26.^2;
if rem(n3, 2) % odd nfft excludes Nyquist point
    mxvel26(2:end) = mxvel26(2:end)*2;
else
    mxvel26(2:end -1) = mxvel26(2:end -1)*2;
end
fvel26 = (0:NumUniquePts_vel26-1)/dt/n3;

%*****acceleration
acc26=zeros(n3,1);
for i=3:n3-2
    acc26(i)=(-vel26(i+2)+8*vel26(i+1)-8*vel26(i-1)+vel26(i-
2))/12/dt/981; % g
end

%***fft acc26
fftacc26=zeros(n3,1);
fftacc26=fft(acc26);
%***high pass
if ihp26>1
fftacc26(1:ihp26)=zeros(ihp26,1);
fftacc26(ehp26:n3)=zeros(nhp26,1);
else fftacc26(1)=0;
end
%***low pass
if Fs/2>lp
fftacc26(ilp26:elp26)=zeros(nlp26,1);
end
%***ifft acc26
acc26=ifft(fftacc26);

%***f acc26
NumUniquePts_acc26 = ceil((n3+1)/2);
fftacc26 = fftacc26(1:NumUniquePts_acc26);
mxacc26 = abs(fftacc26)/n3;
mxacc26 = mxacc26.^2;
if rem(n3, 2) % odd nfft excludes Nyquist point
    mxacc26(2:end) = mxacc26(2:end)*2;
else
    mxacc26(2:end -1) = mxacc26(2:end -1)*2;
end
facc26 = (0:NumUniquePts_acc26-1)/dt/n3;

%*****displacement
dis26=zeros(n3,1);
dis26(1)=0;
for i=2:n3
    dis26(i)=dis26(i-1)+dt/2*(vel26(i)+vel26(i-1));
end

%***fft dis26
fftdis26=zeros(n3,1);
fftdis26=fft(dis26);
%***high pass
if ihp26>1

```

```

fftdis26(1:ihp26)=zeros(ihp26,1);
fftdis26(ehp26:n3)=zeros(nhp26,1);
else fftdis26(1)=0;
end
%***low pass
if Fs/2>lp
fftdis26(ilp26:elp26)=zeros(nlp26,1);
end
dis26=ifft(fftdis26);

%***f dis26
NumUniquePts_dis26 = ceil((n3+1)/2);
fftdis26 = fftdis26(1:NumUniquePts_dis26);
mxdis26 = abs(fftdis26)/n3;
mxdis26 = mxdis26.^2;
if rem(n3, 2)
    mxdis26(2:end) = mxdis26(2:end)*2;
else
    mxdis26(2:end -1) = mxdis26(2:end -1)*2;
end
fdis26 = (0:NumUniquePts_dis26-1)/dt/n3;

%*****Output file
fout24=fopen(fname24,'w');
fout25=fopen(fname25,'w');
fout26=fopen(fname26,'w');
fprintf(fout24,'%8.4f\t%8.5e\t%8.5e\t%8.5e\n',[t1 dis24 vel24
acc24]');
fprintf(fout25,'%8.4f\t%8.5e\t%8.5e\t%8.5e\n',[t2 dis25 vel25
acc25]');
fprintf(fout26,'%8.4f\t%8.5e\t%8.5e\t%8.5e\n',[t3 dis26 vel26
acc26]');
fclose(fout24);
fclose(fout25);
fclose(fout26);

%*****peak points
[mvel24 ptvel24]=max(abs(vel24));
mvel24=vel24(ptvel24);
[mvel25 ptvel25]=max(abs(vel25));
mvel25=vel25(ptvel25);
[mvel26 ptvel26]=max(abs(vel26));
mvel26=vel26(ptvel26);
[macc24 ptacc24]=max(abs(acc24));
macc24=acc24(ptacc24);
[macc25 ptacc25]=max(abs(acc25));
macc25=acc25(ptacc25);
[macc26 ptacc26]=max(abs(acc26));
macc26=acc26(ptacc26);
[mdis24 ptdis24]=max(abs(dis24));
mdis24=dis24(ptdis24);
[mdis25 ptdis25]=max(abs(dis25));
mdis25=dis25(ptdis25);
[mdis26 ptdis26]=max(abs(dis26));
mdis26=dis26(ptdis26);

tvel24=(ptvel24-1)*dt;
tvel25=(ptvel25-1)*dt;
tvel26=(ptvel26-1)*dt;
tacc24=(ptacc24-1)*dt;

```

```

tacc25=(ptacc25-1)*dt;
tacc26=(ptacc26-1)*dt;
tdis24=(ptdis24-1)*dt;
tdis25=(ptdis25-1)*dt;
tdis26=(ptdis26-1)*dt;

datepeaksvel24=datestr(datestartn+tvel24/(24*3600),'dd/mm/yyyy
HH:MM:SS');
datepeaksvel25=datestr(datestartn+tvel25/(24*3600),'dd/mm/yyyy
HH:MM:SS');
datepeaksvel26=datestr(datestartn+tvel26/(24*3600),'dd/mm/yyyy
HH:MM:SS');
datepeaksacc24=datestr(datestartn+tacc24/(24*3600),'dd/mm/yyyy
HH:MM:SS');
datepeaksacc25=datestr(datestartn+tacc25/(24*3600),'dd/mm/yyyy
HH:MM:SS');
datepeaksacc26=datestr(datestartn+tacc26/(24*3600),'dd/mm/yyyy
HH:MM:SS');
datepeaksdis24=datestr(datestartn+tdis24/(24*3600),'dd/mm/yyyy
HH:MM:SS');
datepeaksdis25=datestr(datestartn+tdis25/(24*3600),'dd/mm/yyyy
HH:MM:SS');
datepeaksdis26=datestr(datestartn+tdis26/(24*3600),'dd/mm/yyyy
HH:MM:SS');

%*****plots of time histories
%*****Acceleration
figure;

subplot(3,3,1);plot(t3,acc26,tacc26,macc26,'ro',ptocals,0,'g*');
xlabel('t (s)');
ylabel('A (g):EW');
title([' (PGA = ' num2str(max(abs(acc26))),'%f') ' g.]);
subplot(3,3,2);plot(t2,acc25,tacc25,macc25,'ro',ptocals,0,'g*');
xlabel('t (s)');
ylabel('A (g):NS');
title([' (PGA = ' num2str(max(abs(acc25))),'%f') ' g.]);
subplot(3,3,3);plot(t1,acc24,tacc24,macc24,'ro',ptocals,0,'g*');
xlabel('t (s)');
ylabel('A (g):Z');
title([' (PGA = ' num2str(max(abs(acc24))),'%f') ' g.]);

%*****velocity
subplot(3,3,4);plot(t3,vel26,tvel26,mvel26,'ro',ptocals,0,'g*');
xlabel('t (s)');
ylabel('V (cm/s):EW');
title([' (PGV = ' num2str(max(abs(vel26))),'%f') ' cm/s.]);
subplot(3,3,5);plot(t2,vel25,tvel25,mvel25,'ro',ptocals,0,'g*');
xlabel('t (s)');
ylabel('V (cm/s):NS');
title([' (PGV = ' num2str(max(abs(vel25))),'%f') ' cm/s.]);
subplot(3,3,6);plot(t1,vel24,tvel24,mvel24,'ro',ptocals,0,'g*');
xlabel('t (s)');
ylabel('V (cm/s):Z');
title([' (PGV = ' num2str(max(abs(vel24))),'%f') ' cm/s.]);

%*****displacement
subplot(3,3,7);plot(t3,dis26,tdis26,mdis26,'ro',ptocals,0,'g*');
xlabel('t (s)');
ylabel('D (cm.):EW');

```

```

title([' (PGD = ' num2str(max(abs(dis26))), '%f') 'cm.']);
subplot(3,3,8),plot(t2,dis25,tdis25,mdis25,'ro',ptocals,0,'g*');
xlabel('t (s)');
ylabel('D (cm.):NS');
title([' (PGD = ' num2str(max(abs(dis25))), '%f') 'cm.']);
subplot(3,3,9),plot(t1,dis24,tdis24,mdis24,'ro',ptocals,0,'g*');
xlabel('t (s)');
ylabel('D (cm.):Z');
title([' (PGD = ' num2str(max(abs(dis24))), '%f') 'cm.']);

fig=strcat(datena,fname);
eval(['print -djpeg ',fig]);

fprintf(tofile,'%s\t%s\t%s\t%s\t%4.0f\t%8.5e\t%8.5e\t%8.5e\t%8.5e\t%8.5e\t%8.5e\t%8.5e\t%8.5e\t%8.5e\t%8.5e\t%8.5e\n'...
,fnamed(p).name,fnamed2(q).name,datena,fnameinp(ina).name,Fs...
,[max(abs(dis24)) max(abs(vel24)) max(abs(acc24))]...
,[max(abs(dis25)) max(abs(vel25)) max(abs(acc25))]...
,[max(abs(dis26)) max(abs(vel26)) max(abs(acc26))]);
end
end
end

```

APPENDIX B

GROUND MOTION RECORDS USED IN THIS RESEARCH

Data No.	Event No.	Date	Time (UTC)	Filename	Epicenter		M _w	Distance (km)	Geometric Mean of PGA (g)	Focal Depth (km)
					(°N)	(°E)				
1	1	2/7/2001	16:55:15	3B40A1F6.LO2	18.32	97.91	4.5	417	0.000029	33
2		2/7/2001	16:55:15	3B40A748.PH2	18.32	97.91	4.5	246	0.0001421	33
3	2	9/7/2001	23:51:35	3B4A3686.PH2	24.89	101.25	5.1	719	0.0000116	33
4	3	28/11/2001	4:42:20	3C046516.PH2	19.72	104.01	4.4	420	0.0000147	33
5	4	1/12/2001	5:09:03	3C0864C6.LO2	-5.3	101.68	5.6	2526	0.0000202	15
6	5	4/12/2002	11:30:57	3DEDD4C.TA2	19.57	94.86	5.5	508	0.0000526	48.6
7		4/12/2002	11:30:57	3DEDE25B.LO2	19.57	94.86	5.5	763	0.0001966	48.6
8		4/12/2002	11:30:57	3DEDE752.PH2	19.57	94.86	5.5	577	0.0000807	48.6
9	6	13/2/2002	7:14:56	3C6A107A.PH2	18.91	97.94	3.8	245	0.0000342	33
10	7	18/12/2002	13:47:16	3E006E7B.PH2	19.06	98.95	4.3	148	0.0007427	33
11		18/12/2002	13:47:16	3E0073EE.LO2	19.06	98.95	4.3	346	0.0000461	33
12	8	22/1/2003	3:00:00	3E2DFD72.KA2	5.9	95.6	7	1020	0.0001334	33
13		22/1/2003	3:00:00	3E2DFD72.KA2	5.9	95.6	7	1315	0.0000114	33
14		22/1/2003	3:00:00	3E2E06EB.PH2	5.9	95.6	7	1489	0.0000525	33
15	9	18/9/2003	11:04:00	3F6987D7.LO2	20.5	100.9	5.5	355	0.0000252	33
16		18/9/2003	11:04:00	3F698DAB.TA2	20.5	100.9	5.5	414	0.0000470	33
17		18/9/2003	11:04:00	3F699076.CH2	20.5	100.9	5.5	136	0.00060631	33
18		18/9/2003	11:04:00	3F69910B.CM2	20.5	100.9	5.5	332	0.0001876	33
19	10	30/10/2003	15:22:22	3FA125B5.LO2	19.82	95.73	5.3	687	0.0000406	15
20		30/10/2003	15:22:22	3FA127D5.PH2	19.82	95.73	5.3	495	0.0002279	15
21		30/10/2003	15:22:22	3FA1299E.TA2	19.82	95.73	5.3	449	0.0000694	15
22		30/10/2003	15:22:22	3FA12A29.CM2	19.82	95.73	5.3	333	0.0000863	15
23	11	14/11/2003	18:49:46	3FB52287.CM2	27.68	103.21	5.6	1127	0.0000005	15
24	12	29/2/2004	20:41:30	40424BBA.PH2	-6.84	102.06	5.1	2826	0.0000055	26
25	13	6/3/2004	10:21:34	4049A071.TA2	13.05	93.19	5.4	779	0.0000043	24.7
26	14	25/3/2004	22:15:46	40635343.PH2	-7.02	105.44	5.3	2895	0.0000133	34
27	15	2/4/2004	20:17:47	406DC3FA.CM2	-6.05	103.96	5.4	2793	0.0000011	30.6
28	16	5/4/2004	19:07:05	4071AA8B.CM2	-5.63	101.2	4.8	2698	0.0000038	24.2
29	17	15/4/2004	21:20:42	407EF872.CM2	8.8	94.1	5.3	1181	0.0000011	18.6
30	18	16/4/2004	2:06:15	407F3EC5.CM2	8.88	94.14	5.6	1171	0.0000094	21.1
31	19	3/5/2004	17:41:33	40967C0D.TA2	13.18	93.19	5.2	770	0.0000022	27.8
32	20	11/5/2004	8:28:51	40A089E0.TA2	0.18	97.58	6.1	1904	0.0000032	24
33	21	25/7/2004	14:35:25	4103C290.TA2	-2.68	104.38	7.3	2293	0.0000057	600.5
34	22	25/7/2004	19:49:01	410408E2.TA2	12.46	95.15	5.5	674	0.0000030	12
35	23	29/7/2004	13:23:05	4108ECA2.TA2	12.35	95.07	5.4	689	0.0000046	12
36	24	2/8/2004	2:36:56	410DA631.TA2	-5.7	102.5	5.5	2581	0.0000054	29
37	25	6/8/2004	14:35:28	4113952B.TA2	12.3	95.09	5.6	692	0.0000040	12
38	26	6/8/2004	19:12:15	4113CD6D.TA2	-4.63	102.99	4.9	2472	0.0000009	70
39	27	7/8/2004	14:18:37	4114D8A7.TA2	-6.23	95.61	5.6	2637	0.0000026	22
40	28	10/8/2004	10:26:18	41189E59.LO2	27.16	103.78	5.3	1105	0.0000347	15.1
41	29	16/9/2004	19:56:40	4149EB11.TA2	-3.39	101.83	4.9	2316	0.0000003	91.6
42	30	17/9/2004	11:25:21	414ABE09.TA2	15.76	95.83	5.7	376	0.0000119	12
43	31	27/9/2004	17:05:41	415841EE.TA2	29.78	95.7	4.9	1434	0.0000010	31.1
44	32	8/10/2004	21:48:08	4167094F.TA2	24.34	94.35	4.8	926	0.0000051	77.5
45	33	24/10/2004	14:56:59	417BBFAB.TA2	-5.13	101.57	5.3	2505	0.0000016	30
46	34	10/11/2004	7:51:04	4191C793.TA2	-7.43	102.81	5.1	2776	0.0000047	12
47	35	26/12/2004	1:01:09	41CE0C74.TA2	3.09	94.26	9	1657	0.0005646	28.6
48	36	26/12/2004	4:21:37	41CE36A5.TA2	6.61	92.79	7.2	1362	0.0000187	13.6
49	37	26/12/2004	9:20:11	41CE7CF8.TA2	8.58	92.45	6.6	1197	0.0000065	12
50	38	26/12/2004	10:18:15	41CE8B09.TA2	8.91	94.11	6.3	1068	0.0000099	33.3
51	39	26/12/2004	11:05:06	41CE9919.TA2	13.49	92.84	6.2	782	0.0000094	14
52	40	26/12/2004	14:48:44	41CEC34B.TA2	13.52	92.86	5.7	778	0.0000079	13
53	41	26/12/2004	15:06:37	41CED15B.TA2	3.47	94.17	6	1620	0.0000024	12
54	42	26/12/2004	18:42:46	41CEFB8D.TA2	13.77	92.94	5.4	756	0.0000033	20.3
55	43	26/12/2004	19:03:48	41CF099E.TA2	3.83	94.11	5.5	1585	0.0000010	19.6
56	44	27/12/2004	2:04:26	41CF6C11.TA2	8.07	94.29	5.1	1141	0.0000054	12
57	45	27/12/2004	6:01:51	41CFA453.TA2	7.6	93.45	5	1230	0.0000045	59.8
58	46	27/12/2004	15:20:35	41D022E8.TA2	10.61	93.7	5.2	934	0.0000059	16.2
59	47	27/12/2004	20:10:52	41D0693B.TA2	2.92	95.49	5.7	1639	0.0000011	12
60	48	28/12/2004	17:11:14	41D19096.TA2	9.9	93.99	5.3	980	0.0000031	13.9
61	49	28/12/2004	20:41:58	41D1BAC8.TA2	10.12	93.22	4.9	1009	0.0000005	19.7
62	50	28/12/2004	22:16:54	41D1D6E9.TA2	13.6	93.06	5.1	755	0.0000056	15.4
63	51	29/12/2004	6:30:45	41D2476D.TA2	13.28	92.75	5.3	803	0.0000078	12.3
64	52	29/12/2004	14:03:24	41D2B7F2.TA2	3.19	93.8	5.1	1663	0.0000021	12.8
65	53	30/12/2004	4:27:39	41D37CD9.TA2	5.34	94.29	5.1	1420	0.0000061	36.3
66	54	30/12/2004	6:38:21	41D398FA.TA2	9.18	92.6	4.7	1133	0.0000055	41
67	55	30/12/2004	19:18:02	41D44FD1.TA2	2.51	94.24	4.9	1719	0.0000008	12
68	56	30/12/2004	21:36:05	41D46BF2.TA2	5.12	94.28	5.4	1443	0.0000015	42
69	57	31/12/2004	7:26:38	41D4F89B.TA2	4.2	95.31	5.1	1506	0.0000093	15.3
70	58	31/12/2004	13:41:46	41D54CFB.TA2	3.12	95.17	5.3	1626	0.0000050	12

GROUND MOTION RECORDS USED IN THIS RESEARCH (CONTINUED)

Data No.	Event No.	Date	Time (UTC)	Filename	Epicenter		M _w	Distance (km)	Geometric Mean of PGA (g)	Focal Depth (km)
					(°N)	(°E)				
71	59	31/12/2004	16:15:48	41D5772D.TA2	7.56	93.99	4.9	1207	0.000050	12
72	60	31/12/2004	18:02:02	41D5934E.TA2	6.92	92.79	4.9	1332	0.000011	15.7
73	61	1/1/2005	4:03:14	41D61FF3.TA2	5.36	94.29	5.7	1418	0.000042	35
74	62	1/1/2005	6:25:48	41D63C14.TA2	4.97	92.22	6.7	1552	0.000069	12
75	63	1/1/2005	10:15:31	41D67456.TA2	4.75	94.51	5.2	1473	0.000026	49.4
76	64	1/1/2005	19:08:06	41D6F2EB.TA2	7.15	94.49	6.1	1225	0.000017	19.8
77	65	1/1/2005	22:23:17	41D71D1D.TA2	7.12	92.56	5.1	1326	0.000011	12
78	66	1/1/2005	23:40:33	41D72B2D.TA2	2.74	96.33	4.9	1639	0.000078	57.7
79	67	2/1/2005	8:27:44	41D7A9C2.TA2	3.18	95.32	5.8	1615	0.000071	12
80	68	2/1/2005	19:35:26	41D84478.TA2	5.22	94.15	5	1438	0.000066	71.8
81	69	4/1/2005	2:04:47	41D9F879.TA2	4.45	93.16	4.9	1559	0.000051	19.8
82	70	4/1/2005	15:18:28	41DAAF50.TA2	4.4	93.79	5	1537	0.000017	15.1
83	71	4/1/2005	18:26:46	41DAD982.TA2	4.61	94.69	5.2	1482	0.000029	48.9
84	72	4/1/2005	19:08:07	41DAE792.TA2	5.17	94.29	5.2	1438	0.000009	34.4
85	73	4/1/2005	19:14:53	41DAE792.TA2	10.48	91.56	5.6	1100	0.000009	12
86	74	5/1/2005	5:32:37	41DB7438.TA2	3.47	93.58	5.1	1642	0.000078	12
87	75	5/1/2005	8:33:02	41DB9E69.TA2	13.02	92.62	4.9	831	0.000047	19.4
88	76	5/1/2005	14:34:35	41DBF2CC.TA2	5.2	94.63	5.2	1422	0.000019	52.9
89	77	5/1/2005	14:54:06	41DBF2CC.TA2	5.32	94.24	5.9	1424	0.000019	33
90	78	5/1/2005	0:11:19	41DC7F72.TA2	5.53	93.09	5.4	1453	0.000068	12
91	79	6/1/2005	0:29:12	41DC85E7.PH2	6.87	91.8	5.4	1583	0.000052	17.1
92	80	6/1/2005	0:56:31	41DC85E7.PH2	5.02	94.6	5.6	1619	0.000052	54
93	81	6/1/2005	10:38:42	41DD128C.PH2	13.71	93.07	5	932	0.0000325	15.1
94	82	6/1/2005	11:55:48	41DD209D.PH2	11.01	91.99	5.4	1216	0.0000312	13
95	83	8/1/2005	5:30:44	41DF6F53.PH2	10.41	92.03	4.8	1260	0.0000380	12
96	84	8/1/2005	5:58:24	41DF6F53.PH2	4.69	94.76	5.1	1647	0.0000380	21.8
97	85	9/1/2005	17:16:45	41E16332.TA2	3.2	94.14	5.2	1650	0.0000059	12
98		9/1/2005	17:16:45	41E16368.PH2	3.2	94.14	5.2	1826	0.0000600	12
99	86	9/1/2005	22:13:03	41E1A985.TA2	4.63	94.94	6	1471	0.0000052	46
100		9/1/2005	22:13:03	41E1A9BB.PH2	4.63	94.94	6	1646	0.0000377	46
101	87	10/1/2005	1:04:16	41E1D3B6.TA2	9.56	93.91	4.9	1017	0.0000065	12
102		10/1/2005	1:04:16	41E1D3EC.PH2	9.56	93.91	4.9	1205	0.0000372	12
103	88	10/1/2005	2:19:19	41E1E1C7.TA2	2.42	95.43	4.8	1694	0.0000044	37
104		10/1/2005	2:19:19	41E1E1FD.PH2	2.42	95.43	4.8	1863	0.0000497	37
105	89	11/1/2005	21:46:36	41E43E8E.TA2	4.74	94.63	5	1470	0.0000039	48
106	90	11/1/2005	22:55:50	41E44C9F.TA2	11.95	92.22	4.9	938	0.0000055	19.6
107	91	12/1/2005	13:58:23	41E52657.KA2	5.33	94.51	5.4	1128	0.0000093	43
108	92	12/1/2005	18:44:47	41E56CAA.KA2	5.16	94.41	5.1	1149	0.0000249	47.2
109	93	13/1/2005	5:30:22	41E6009F.TA2	11.9	92.28	4.7	936	0.0000029	23.2
110	94	13/1/2005	8:52:47	41E62AB2.SO2	5.43	94.03	4.7	753	0.0000042	47.6
111	95	13/1/2005	19:56:21	41E6CC48.KA2	14.53	92.31	4.7	734	0.0000055	14.5
112	96	14/1/2005	16:22:08	41E7E592.KA2	8.53	93.29	5.1	911	0.0000043	25.2
113	97	14/1/2005	17:08:39	41E7F3A3.KA2	4.45	95.07	5	1192	0.0000013	53
114		14/1/2005	17:08:39	41E7FAD4.SO2	4.45	95.07	5	684	0.0000107	53
115		14/1/2005	17:08:39	41E7FAF3.TA2	4.45	95.07	5	1486	0.0000008	53
116	98	14/1/2005	21:38:20	41E83316.SO2	3.01	93.81	5.6	885	0.0000033	12
117		14/1/2005	21:38:20	41E83335.TA2	3.01	93.81	5.6	1682	0.0000044	12
118		14/1/2005	21:38:20	41E839F6.KA2	3.01	93.81	5.6	1394	0.0000275	12
119	99	15/1/2005	7:46:54	41E8C69B.KA2	14.66	92.32	5.5	733	0.0000115	12
120	100	17/1/2005	2:45:17	41EB1C83.SO2	14.57	92.21	5	1232	0.0000088	16.5
121	101	17/1/2005	2:53:43	41EB1C83.SO2	3.58	95.92	5	656	0.0000088	46.3
122		17/1/2005	2:53:43	41EB28A0.PH2	3.58	95.92	5	1724	0.0000471	46.3
123	102	17/1/2005	3:55:47	41EB36B0.PH2	14.48	93.13	4.8	879	0.0000549	30.6
124	103	18/1/2005	3:02:57	41EC7A2D.PH2	22.73	94.52	4.8	758	0.0001571	88.7
125	104	18/1/2005	22:04:47	41ED8567.PH2	8.34	93.97	4.8	1317	0.0000263	26.1
126		18/1/2005	22:04:47	41ED8779.TA2	8.34	93.97	4.8	1130	0.0000048	26.1
127	105	19/1/2005	16:09:20	41EE8484.SO2	3.68	92.55	5	974	0.0000024	12
128		19/1/2005	16:09:20	41EE84A3.TA2	3.68	92.55	5	1665	0.0000007	12
129	106	20/1/2005	19:26:43	41EFFE42.PH2	6.42	93.2	5.1	1544	0.0000288	21.8
130		20/1/2005	19:26:43	41F00043.SO2	6.42	93.2	5.1	823	0.0000035	21.8
131		20/1/2005	19:26:43	41F00062.TA2	6.42	93.2	5.1	1359	0.0000002	21.8
132	107	21/1/2005	8:37:05	41F0B71A.SO2	1.37	97.42	4.8	737	0.0000030	31.3
133	108	22/1/2005	9:18:03	41F214B7.PH2	3.4	94.06	4.9	1809	0.0000879	12
134	109	22/1/2005	9:24:33	41F214B7.PH2	3.58	93.96	4.9	1794	0.0000879	12
135	110	22/1/2005	11:07:27	41F232D9.SO2	3.25	94.15	4.7	839	0.0000046	15.2
136		22/1/2005	11:07:27	41F232F7.TA2	3.25	94.15	4.7	1644	0.0000047	15.2
137	111	22/1/2005	12:58:37	41F240E9.SO2	4.94	94.74	4.9	696	0.0000077	40
138	112	22/1/2005	18:38:15	41F2956B.TA2	14.59	92.22	5.5	783	0.0000024	12
139	113	23/1/2005	8:22:18	41F35C78.TA2	13.64	92.84	4.8	773	0.0000018	26.6

GROUND MOTION RECORDS USED IN THIS RESEARCH (CONTINUED)

Data No.	Event No.	Date	Time (UTC)	Filename	Epicenter		M_w	Distance (km)	Geometric Mean of PGA (g)	Focal Depth (km)
					(°N)	(°E)				
140	114	23/1/2005	16:55:49	41F3CAB8.SO2	13.64	92.91	5	1108	0.000028	14.4
141		23/1/2005	16:55:49	41F3CAD7.TA2	13.64	92.91	5	766	0.000019	14.4
142		23/1/2005	16:55:49	41F3D6C8.PH2	13.64	92.91	5	951	0.0000331	14.4
143	115	24/1/2005	0:39:24	41F43B3D.SO2	4.8	96.21	5.3	554	0.0000535	20
144	116	24/1/2005	4:16:50	41F4737F.SO2	7.22	92.4	6.2	907	0.0000262	15.5
145	117	24/1/2005	17:59:24	41F52A56.SO2	4.54	94.72	5	715	0.0000080	37
146	118	25/1/2005	9:54:27	41F60B5E.SO2	5.15	94.6	5	702	0.0000179	58.6
147	119	26/1/2005	16:50:07	41F7B5F5.SO2	2.69	96.21	4.8	698	0.0000055	60.1
148	120	26/1/2005	17:30:30	41F7CB6F.PH2	8.2	94.14	5.5	1321	0.0000242	12
149		26/1/2005	17:30:30	41F7CD70.SO2	8.2	94.14	5.5	723	0.0000112	12
150		26/1/2005	17:30:30	41F7CD8E.TA2	8.2	94.14	5.5	1136	0.0000025	12
151	121	26/1/2005	22:00:43	41F805B2.SO2	2.47	94.47	5.9	859	0.0000059	12
152	122	26/1/2005	22:47:01	41F813E1.TA2	7.92	94.14	5.4	1163	0.0000037	21.4
153	123	26/1/2005	23:03:09	41F813E1.TA2	7.94	94.23	5.1	1157	0.0000037	14.6
154	124	26/1/2005	23:43:30	41F821D3.SO2	5.07	94.36	5	730	0.0000049	51.9
155	125	27/1/2005	3:58:46	41F863D4.SO2	7.94	94.2	5.4	712	0.0000106	19.5
156	126	27/1/2005	4:02:50	41F863D4.SO2	7.89	94.21	5.1	711	0.0000106	12.7
157	127	27/1/2005	6:14:31	41F88447.SO2	7.94	94.18	5	715	0.0000349	12
158	128	27/1/2005	6:56:59	41F88447.SO2	7.92	94.17	5.5	716	0.0000349	18.5
159		27/1/2005	6:56:59	41F8905A.KA2	7.92	94.17	5.5	900	0.0000429	18.5
160		27/1/2005	7:20:26	41F8905A.KA2	7.95	94.19	5.2	896	0.0000429	14
161	129	27/1/2005	7:20:26	41F89257.SO2	7.95	94.19	5.2	714	0.0000182	14
162		27/1/2005	7:20:26	41F89276.TA2	7.95	94.19	5.2	1158	0.0000042	14
163		27/1/2005	7:26:02	41F89257.SO2	7.99	94.21	5.3	712	0.0000182	21.6
164	131	27/1/2005	7:28:32	41F8905A.KA2	7.98	94.22	5.1	891	0.0000429	22.9
165		27/1/2005	7:28:32	41F89257.SO2	7.98	94.22	5.1	711	0.0000182	22.9
166		27/1/2005	7:35:47	41F8905A.KA2	7.96	94.2	5.2	895	0.0000429	17
167	132	27/1/2005	7:35:47	41F89257.SO2	7.96	94.2	5.2	713	0.0000182	17
168	133	27/1/2005	7:41:26	41F8905A.KA2	7.9	94.25	4.9	897	0.0000429	22.2
169		27/1/2005	7:41:26	41F89257.SO2	7.9	94.25	4.9	707	0.0000182	22.2
170		27/1/2005	8:31:12	41F8A086.TA2	7.96	94.22	5.2	1155	0.0000059	14.6
171	135	27/1/2005	10:08:14	41F8BC89.SO2	7.92	94.16	5.3	717	0.0000104	19.5
172	136	27/1/2005	10:25:54	41F8BC89.SO2	7.99	94.26	5.1	707	0.0000104	12
173	137	27/1/2005	10:58:08	41F8BC89.SO2	7.91	94.11	5.3	722	0.0000104	13.9
174	138	27/1/2005	11:44:06	41F8CA99.SO2	8.02	94.15	5.2	719	0.0000228	12
175	139	27/1/2005	11:47:37	41F8CA99.SO2	7.92	94.2	5.5	712	0.0000228	12
176	140	27/1/2005	11:56:44	41F8CA99.SO2	7.88	94.16	5	716	0.0000228	15.5
177	141	27/1/2005	12:11:55	41F8D8AA.SO2	7.98	94.28	5.4	704	0.0000411	12
178	142	27/1/2005	13:15:20	41F8E6BA.SO2	7.86	94.14	5.3	718	0.0000251	17.1
179	143	27/1/2005	13:18:06	41F8E6BA.SO2	7.92	94.25	5.3	707	0.0000251	23.3
180	144	27/1/2005	13:25:22	41F8E6BA.SO2	7.77	94.2	5.2	711	0.0000251	18.1
181	145	27/1/2005	13:26:34	41F8E6BA.SO2	7.84	94.24	5.3	707	0.0000251	22.2
182	146	27/1/2005	13:54:15	41F8E6BA.SO2	7.92	94.17	5.4	716	0.0000251	19.5
183	147	27/1/2005	13:57:07	41F8E6BA.SO2	7.97	94.16	5.5	717	0.0000251	16.3
184	148	27/1/2005	14:13:18	41F8F4CB.SO2	7.95	94.14	5.1	719	0.0000161	17.3
185	149	27/1/2005	14:35:09	41F8F4CB.SO2	7.95	94.2	5.1	713	0.0000161	22.3
186	150	27/1/2005	16:48:29	41F910EC.SO2	7.94	94.14	4.9	719	0.0000096	12
187	151	27/1/2005	18:52:39	41F92B10.KA2	7.85	94.24	5.6	902	0.0000292	15.9
188		27/1/2005	18:52:39	41F92D0D.SO2	7.85	94.24	5.6	707	0.0000115	15.9
189		27/1/2005	21:05:05	41F9575D.TA2	7.99	94.26	5.1	1151	0.0000013	15.4
190	153	27/1/2005	21:32:20	41F9575D.TA2	7.98	94.17	5.2	1156	0.0000013	17
191	154	27/1/2005	21:47:56	41F9575D.TA2	7.95	94.17	5.1	1159	0.0000013	12
192	155	27/1/2005	0:15:47	41F97F73.KA2	7.84	94.21	5.2	905	0.0000290	17.6
193	156	28/1/2005	2:23:16	41F99D91.SO2	7.87	94.2	5.3	712	0.0000212	15.5
194	157	28/1/2005	2:28:58	41F99D91.SO2	7.99	94.15	5.2	719	0.0000212	12
195		28/1/2005	2:28:58	41F99DB0.TA2	7.99	94.15	5.2	1156	0.0000044	12
196		28/1/2005	3:31:27	41F9ABA2.SO2	8.06	94.2	5.3	714	0.0000148	12
197	159	28/1/2005	5:04:35	41F9C5C6.KA2	7.88	94.18	5.3	903	0.0000099	12
198	160	28/1/2005	6:06:56	41F9D5F2.TA2	7.73	94.21	5.3	1179	0.0000054	16.8
199	161	28/1/2005	6:10:30	41F9D3D6.KA2	7.85	94.17	5.5	906	0.0000143	12
200	162	28/1/2005	7:49:18	41F9E3E4.SO2	7.82	94.23	5.6	708	0.0000081	16
201		28/1/2005	7:49:18	41F9E403.TA2	7.82	94.23	5.6	1169	0.0000035	16
202		28/1/2005	9:14:46	41FA0024.TA2	8	94.21	5.1	1152	0.0000046	22
203	164	28/1/2005	11:53:04	41FA1C26.SO2	7.84	94.23	5.3	708	0.0000067	17.2
204	165	28/1/2005	12:37:13	41FA2A55.TA2	8.07	94.22	5.1	1144	0.0000036	12
205	166	28/1/2005	19:18:55	41FA8CC9.TA2	7.86	94.2	5.4	1166	0.0000011	12
206		28/1/2005	19:18:55	41FA8CCD.SO2	7.86	94.2	5.4	712	0.0000087	12
207		28/1/2005	22:29:04	41FAB4DF.KA2	7.75	94.23	5.3	912	0.0000258	20.6
208	167	28/1/2005	22:29:04	41FAB6FB.TA2	7.75	94.23	5.3	1176	0.0000047	20.6
209		28/1/2005	22:29:04	41FAB6FF.SO2	7.75	94.23	5.3	707	0.0000039	20.6

GROUND MOTION RECORDS USED IN THIS RESEARCH (CONTINUED)

Data No.	Event No.	Date	Time (UTC)	Filename	Epicenter		M _w	Distance (km)	Geometric Mean of PGA (g)	Focal Depth (km)
					(°N)	(°E)				
210	168	28/1/2005	22:35:30	41FAB4DF.KA2	7.71	94.01	5.1	929	0.000258	15.3
211		28/1/2005	22:35:30	41FAB6FB.TA2	7.71	94.01	5.1	1191	0.0000047	15.3
212		28/1/2005	22:35:30	41FAB6FF.SO2	7.71	94.01	5.1	731	0.0000039	15.3
213	169	28/1/2005	23:32:12	41FAC50B.TA2	8.05	94.24	5	1146	0.0000060	12
214		28/1/2005	23:32:12	41FAC50F.SO2	8.05	94.24	5	710	0.0000078	12
215	170	29/1/2005	2:55:23	41FAEF3D.TA2	4.84	94.52	5.1	1464	0.0000062	52
216	171	29/1/2005	3:38:04	41FAFD4E.TA2	8.09	94.25	5.1	1141	0.0000053	12
217	172	29/1/2005	5:26:49	41FB196F.TA2	7.82	94.2	5.2	1170	0.0000045	12
218	173	29/1/2005	6:10:44	41FB277F.TA2	3.21	93.59	5.5	1669	0.0000040	12
219	174	29/1/2005	9:27:40	41FB51B1.TA2	7.76	94.29	5	1172	0.0000049	15.4
220	175	29/1/2005	18:21:02	41FBCE2A.KA2	5.25	94.15	5.1	1154	0.0000251	46
221	176	29/1/2005	18:37:58	41FBCE2A.KA2	8.11	94.33	4.8	873	0.0000251	15.6
222	177	29/1/2005	19:06:17	41FBDC3A.KA2	7.72	94.29	5.3	910	0.0000283	15.1
223	178	30/1/2005	2:25:44	41FC40CE.SO2	8.03	94.18	5	716	0.0000067	12
224	179	30/1/2005	2:35:18	41FC40CE.SO2	8.06	94.23	5.2	711	0.0000067	12
225	180	30/1/2005	8:49:40	41FC9531.SO2	7.94	94.18	5.1	715	0.0000065	12
226	181	30/1/2005	10:32:55	41FCB152.SO2	8.04	94.22	5	712	0.0000067	12
227	182	30/1/2005	15:33:16	41FCF7A5.SO2	8.14	94.22	5.4	713	0.0000114	12
228	183	30/1/2005	21:39:05	41FD4C08.SO2	8.13	94.24	5.3	711	0.0000087	15.8
229	184	31/1/2005	6:45:48	41FDCA9D.SO2	4.14	96.72	5	548	0.0000264	16.2
230	185	31/1/2005	8:15:07	41FDE6BE.SO2	8.09	94.22	5.1	712	0.0000076	12
231	186	31/1/2005	13:14:35	41FE2D11.SO2	8.03	94.22	5.1	711	0.0000082	12
232	187	31/1/2005	16:30:20	41FE5742.SO2	8.09	94.26	5.1	708	0.0000047	12
233	188	1/2/2005	1:08:03	41FED3B7.KA2	7.81	94.21	5.2	907	0.0000280	12
234	189	1/2/2005	14:15:53	41FF8CAE.SO2	4.94	94.36	5.3	735	0.0000123	42.9
235	190	1/2/2005	17:14:03	41FFB6E0.SO2	2.67	94.21	4.7	869	0.0000039	12
236	191	1/2/2005	0:52:45	42001734.KA2	8.09	94.32	4.8	875	0.0000085	12
237	192	2/2/2005	13:22:39	4200D02B.SO2	8.09	94.27	5.1	707	0.0000058	12
238	193	3/2/2005	4:51:20	4201A323.SO2	5.57	93.25	5.5	834	0.0000130	35
239	194	5/2/2005	8:00:31	4204706E.SO2	8.06	94.26	5.3	708	0.0000101	12
240	195	5/2/2005	17:35:47	4204FAF4.KA2	8.08	94.27	5.9	879	0.0000131	15
241		5/2/2005	17:35:47	4204FD14.SO2	8.08	94.27	5.9	707	0.0000302	15
242	196	6/2/2005	4:24:22	420595AA.KA2	13.93	93.55	5.4	603	0.0000849	42
243	197	6/2/2005	6:07:59	4205B3EB.SO2	8.07	94.23	5.4	711	0.0000135	12
244	198	9/2/2005	13:27:29	420A0B05.SO2	4.51	95.03	6	685	0.0000797	47
245	199	13/2/2005	1:22:11	420EA653.KA2	4.82	94.61	5.3	1174	0.0000036	51
246		13/2/2005	1:22:11	420EA873.SO2	4.82	94.61	5.3	714	0.0000135	51
247	200	13/2/2005	2:02:09	420EA873.SO2	4.85	94.7	5.2	704	0.0000135	42
248	201	14/2/2005	17:06:55	4210D8E9.KA2	-0.22	98.65	5.8	1626	0.0000051	44
249	202	16/2/2005	8:19:46	4212FF8D.SO2	8.17	94.23	5.9	713	0.0000248	13
250	203	16/2/2005	8:19:00	4212FF8D.SO2	8.73	93.23	5.8	832	0.0000248	33
251	204	17/2/2005	5:31:30	421426E9.SO2	4.37	95.05	5.6	690	0.0000433	50
252	205	18/2/2005	19:33:48	42163D5D.SO2	5.31	94.35	5.6	723	0.0000265	36
253	206	19/2/2005	23:45:16	4217C72C.SO2	4.97	94.37	4.7	733	0.0000064	33.9
254	207	20/2/2005	23:08:06	4219169A.KA2	10.3	93.84	5.4	733	0.0000038	12
255	208	25/2/2005	13:31:16	421F21B5.KA2	7.71	94.23	5.6	915	0.0000167	15
256		25/2/2005	13:31:16	421F23D5.SO2	7.71	94.23	5.6	707	0.0000162	15
257	209	26/2/2005	12:56:58	42206751.SO2	2.8	95.4	6.7	755	0.0000692	12
258	210	7/3/2005	21:32:36	422CC1BB.KA2	9.05	91.31	4.7	1038	0.0000009	29.2
259	211	11/3/2005	12:59:55	42318B79.SO2	7.47	94.38	5.1	689	0.0000107	12.8
260	212	16/3/2005	6:39:53	4237CEE9.SO2	5.37	94.32	5.3	724	0.0000190	35
261	213	25/3/2005	13:34:44	4244133C.PH2	25.54	94.92	5.2	955	0.0000508	83
262	214	28/3/2005	16:10:32	42482BF8.KA2	1.67	97.07	8.6	1433	0.0005311	25.8
263		28/3/2005	16:10:32	42482019.SO2	1.67	97.07	8.6	728	0.0023187	25.8
264	215	29/3/2005	14:16:09	42495585.SO2	2.62	95.99	5.1	721	0.0000033	23
265	216	29/3/2005	16:21:20	42497FB7.SO2	1.72	97.37	4.9	705	0.0000037	47.4
266	217	29/3/2005	18:29:48	424999A6.KA2	1.01	97.73	5	1497	0.0000267	18
267	218	29/3/2005	20:41:39	4249B7F9.SO2	1.86	97.02	5.1	713	0.0000094	58.5
268	219	30/3/2005	0:25:53	4249EE0A.KA2	0.78	97.16	4.9	1530	0.0000253	33
269		30/3/2005	0:25:53	4249F03B.SO2	0.78	97.16	4.9	808	0.0000124	33
270	220	30/3/2005	1:13:17	4249F03B.SO2	1.38	96.85	5.5	768	0.0000124	26
271		30/3/2005	1:13:17	4249FC1A.KA2	1.38	96.85	5.5	1469	0.0000081	26
272	221	30/3/2005	10:20:22	424A7CE1.SO2	1.45	96.84	5.1	762	0.0000056	27
273	222	30/3/2005	12:57:44	424A9902.SO2	0.23	98.09	5.3	822	0.0000053	18.4
274	223	30/3/2005	15:44:39	424AC333.SO2	2.29	97.18	4.8	664	0.0000056	54
275	224	30/3/2005	15:44:39	424AC71D.PH2	2.29	97.18	4.8	1833	0.0000780	54
276	225	30/3/2005	16:19:45	424AD144.SO2	2.67	95.21	6.2	781	0.0001006	24
277	226	30/3/2005	17:29:22	424ADF54.SO2	2.54	95.25	5.6	787	0.0000182	25
278	227	30/3/2005	23:19:16	424B33B8.SO2	1.14	96.91	4.9	787	0.0000093	36.8
279	228	30/3/2005	23:25:20	424B33B8.SO2	1.68	96.49	4.8	763	0.0000093	39.1
280	229	30/3/2005	23:40:49	424B33B8.SO2	1.5	96.84	5.2	757	0.0000093	24

GROUND MOTION RECORDS USED IN THIS RESEARCH (CONTINUED)

Data No.	Event No.	Date	Time (UTC)	Filename	Epicenter		M _w	Distance (km)	Geometric Mean of PGA (g)	Focal Depth (km)
					(°N)	(°E)				
281	230	31/3/2005	4:48:14	424B7A0A.SO2	1.24	96.84	5.2	782	0.000071	26
282	231	31/3/2005	7:23:57	424BA43C.SO2	1.45	96.81	5.8	764	0.0000252	25
283	232	31/3/2005	14:27:33	424C06B0.SO2	5.09	94.54	4.7	711	0.0000036	36.2
284	233	31/3/2005	16:30:02	424C22D1.SO2	1.21	96.94	4.9	779	0.0000028	30
285	234	31/3/2005	18:02:35	424C30E1.SO2	0.29	97.57	4.8	837	0.0000026	17.5
286	235	2/4/2005	16:24:15	424EC5EB.SO2	2.68	96.35	4.9	688	0.0000085	19
287	236	3/4/2005	0:59:25	424F343D.KA2	0.24	98.12	6	1578	0.0000050	32
288		3/4/2005	0:59:25	424F366F.SO2	0.24	98.12	6	820	0.0000271	32
289	237	3/4/2005	3:11:01	424F5290.SO2	1.81	97.74	6.2	677	0.0000745	46
290	238	3/4/2005	10:20:53	424FC0E3.KA2	1.16	96.81	5	1494	0.0000036	20
291	239	3/4/2005	12:21:21	424FDF35.SO2	2.89	96.32	5.1	674	0.0000044	17.8
292	240	3/4/2005	14:42:53	424FFB57.SO2	9.75	93.71	5.2	812	0.0000061	12
293		3/4/2005	14:42:53	424FFF41.PH2	9.75	93.71	5.2	1200	0.0000202	12
294	241	3/4/2005	20:23:36	42504D88.KA2	1.98	96.72	4.8	1406	0.0000005	35.3
295		3/4/2005	20:23:36	42504FBA.SO2	1.98	96.72	4.8	721	0.0000039	35.3
296	242	3/4/2005	22:31:57	425069A9.KA2	1	97.17	4.7	1505	0.0000049	33.2
297		3/4/2005	22:31:57	42506BDB.SO2	1	97.17	4.7	786	0.0000026	33.2
298	243	4/4/2005	4:33:51	4250C03E.SO2	1.49	97.76	5.6	707	0.0000212	36
299	244	4/4/2005	11:05:45	4251188B.PH2	1.18	97.17	4.9	1955	0.0000637	30.5
300	245	4/4/2005	19:37:10	42519105.KA2	4.75	94.73	4.7	1176	0.0000008	42.8
301		4/4/2005	19:37:10	42519336.SO2	4.75	94.73	4.7	705	0.0000046	42.8
302		4/4/2005	19:37:10	42519720.PH2	4.75	94.73	4.7	1642	0.0000546	42.8
303	246	4/4/2005	21:00:55	4251A147.SO2	2.04	97.59	4.7	662	0.0000121	65.7
304	247	5/4/2005	2:19:33	4251F378.KA2	4.91	94.22	4.8	1184	0.0000117	38.4
305		5/4/2005	2:19:33	4251F5AA.SO2	4.91	94.22	4.8	751	0.0000053	38.4
306	248	5/4/2005	7:12:34	425239CB.KA2	0.19	96.75	4.7	1601	0.0000076	16.2
307	249	5/4/2005	9:37:30	4252581E.SO2	1.58	97	5.1	740	0.0000085	43.4
308		5/4/2005	9:37:30	42525C08.PH2	1.58	97	5.1	1915	0.0000443	43.4
309	250	6/4/2005	11:20:12	4253BEFD.PH2	-4.17	102.13	5.6	2530	0.0002447	50
310		6/4/2005	11:20:12	4253C12C.SO2	-4.17	102.13	5.6	1273	0.0000071	50
311		6/4/2005	11:20:12	4253C39A.KA2	-4.17	102.13	5.6	2091	0.0000137	50
312	251	6/4/2005	23:19:42	42546C61.KA2	1.7	96.58	4.9	1439	0.0000048	40.2
313		7/4/2005	2:21:30	42549692.KA2	1.09	96.98	5	1498	0.0000127	23
314	252	7/4/2005	11:50:26	42551D6C.KA2	0.88	97.4	5.2	1515	0.0000143	34.8
315		7/4/2005	11:50:26	42551D8D.SO2	0.88	97.4	5.2	786	0.0000250	34.8
316	253	7/4/2005	16:40:59	42556196.PH2	1.15	96.83	4.9	1965	0.0000358	36.5
317		7/4/2005	16:40:59	42556266.SO2	1.15	96.83	4.9	791	0.0000030	36.5
318	254	7/4/2005	22:48:40	4255B3DF.SO2	-1.58	99.3	5.3	985	0.0000031	17.7
319		7/4/2005	22:48:40	4255B5F9.PH2	-1.58	99.3	5.3	2236	0.0000241	17.7
320	255	8/4/2005	1:51:38	4255DE10.SO2	0.5	97.34	5.7	827	0.0000110	12
321		8/4/2005	1:51:38	4255E02A.PH2	0.5	97.34	5.7	2027	0.0001081	12
322	256	8/4/2005	5:48:40	42561653.SO2	-0.46	97.71	6.1	908	0.0000199	12
323	257	9/4/2005	19:03:37	42581AB5.KA2	1.14	96.94	4.8	1494	0.0000286	29
324		9/4/2005	19:03:37	42581EB7.SO2	1.14	96.94	4.8	785	0.0000019	29
325	258	7/4/2005	11:50:26	42551D8D.SO2	0.88	97.4	5.2	786	0.0000250	34.8
326	259	7/4/2005	16:40:59	42556266.SO2	1.15	96.83	4.9	791	0.0000030	36.5
327	260	8/4/2005	1:51:38	4255DE10.SO2	0.5	97.34	5.7	827	0.0000110	12
328	261	8/4/2005	5:48:40	42561653.SO2	-0.46	97.71	6.1	908	0.0000199	12
329	262	9/4/2005	19:03:37	42581AB5.KA2	1.14	96.94	4.8	1494	0.0000286	29
330		9/4/2005	19:03:37	42581EB7.SO2	1.14	96.94	4.8	785	0.0000019	29
331	263	11/4/2005	2:19:20	4259D2B7.SO2	-1.7	99.48	4.9	995	0.0000039	21.8
332	264	11/4/2005	6:11:14	425A0AF9.SO2	1.92	96.48	6	743	0.0000753	24
333	265	11/4/2005	9:04:33	425A3129.KA2	1.87	96.5	5.4	1423	0.0000114	24
334		11/4/2005	9:04:33	425A352B.SO2	1.87	96.5	5.4	746	0.0000083	24
335	266	11/4/2005	9:53:42	425A481C.SO2	1.93	96.39	5	748	0.0000049	50.5
336	267	12/4/2005	1:00:27	425B1555.KA2	-1.59	99.6	4.9	1779	0.0000112	17.8
337	268	12/4/2005	4:17:31	425B4A74.KA2	-1.62	99.46	5.2	1782	0.0000122	12.6
338	269	13/4/2005	2:59:35	425C7FE0.KA2	-1.81	99.96	5.2	1805	0.0000113	29
339	270	13/4/2005	3:12:33	425C8DF1.KA2	3.34	93.62	4.8	1370	0.0000095	14
340	271	13/4/2005	17:29:35	425D4AE3.PH2	-1.82	99.63	5	2261	0.0001391	21
341		13/4/2005	17:29:35	425D52D8.KA2	-1.82	99.63	5	1804	0.0000007	21
342		13/4/2005	17:29:35	425D56DA.SO2	-1.82	99.63	5	1007	0.0000031	21
343	272	14/4/2005	11:29:55	425E4DF2.KA2	-2.06	99.74	5.7	1832	0.0000149	23
344		14/4/2005	11:29:55	425E5404.SO2	-2.06	99.74	5.7	1032	0.0000109	23
345	273	15/4/2005	13:08:56	425FB3A1.SO2	2.88	96.34	5.3	673	0.0000203	12
346	274	16/4/2005	8:43:07	4260CCEC.SO2	-1.79	99.72	5	1002	0.0000061	12.6
347	275	16/4/2005	16:38:08	4261375E.KA2	1.67	97.46	6.4	1427	0.0000298	34
348	276	16/4/2005	16:38:08	42613D70.SO2	1.67	97.46	6.4	705	0.0000713	34
349	277	17/4/2005	13:43:55	426264CC.SO2	0.31	97.75	5.4	827	0.0000066	12
350	278	19/4/2005	15:10:14	426515F6.SO2	1.78	96	5	789	0.0000040	42
351	279	23/4/2005	10:31:45	426A23E8.SO2	2.4	95.74	5.2	758	0.0000053	25

GROUND MOTION RECORDS USED IN THIS RESEARCH (CONTINUED)

Data No.	Event No.	Date	Time (UTC)	Filename	Epicenter		M _w	Distance (km)	Geometric Mean of PGA (g)	Focal Depth (km)
					(°N)	(°E)				
352	280	25/4/2005	20:18:31	426D4596.SO2	0.48	97.11	5.2	840	0.000069	12
353		25/4/2005	20:18:31	426D4D95.KA2	0.48	97.11	5.2	1563	0.0000255	12
354	281	25/4/2005	20:22:18	426D4596.SO2	0.47	97.45	4.8	824	0.000069	31.3
355		25/4/2005	20:22:18	426D4D95.KA2	0.47	97.45	4.8	1560	0.0000255	31.3
356	282	26/4/2005	17:18:26	426E6CF2.SO2	1.14	97.01	5.2	781	0.000055	19
357		26/4/2005	17:18:26	426E74F0.KA2	1.75	96.76	5.2	1430	0.0000302	19
358	283	27/4/2005	14:04:47	426F944D.SO2	8.66	93.72	4.9	777	0.000033	17.9
359	284	30/4/2005	13:17:21	42737AE3.SO2	1.75	96.76	5.3	739	0.0000130	29
360	285	1/5/2005	12:00:08	4274BE60.SO2	0.95	97.85	4.7	757	0.000061	16.2
361	286	4/5/2005	0:42:03	42781861.SO2	0.23	96.89	5.1	876	0.0001760	15.2
362	287	4/5/2005	5:58:54	42785EB4.SO2	4.6	94.87	5.3	697	0.0000309	42
363	288	9/5/2005	1:30:56	427EB022.SO2	4.85	94.76	5.1	697	0.000077	40
364	289	10/5/2005	1:09:09	428001AF.SO2	-6.47	103.04	6.3	1541	0.0000108	12
365	290	12/5/2005	16:04:29	428377C1.SO2	5.01	94.47	5.2	721	0.000062	19
366	291	12/5/2005	23:47:29	4283E845.SO2	1.84	96.1	4.9	776	0.000080	41
367	292	14/5/2005	5:05:25	42858025.SO2	0.42	98.24	6.7	796	0.0001035	39
368	293	18/5/2005	11:37:36	428B22A5.KA2	5.58	93.21	6.1	1175	0.0000151	36.7
369		18/5/2005	11:37:36	428B2867.CH2	5.58	93.21	6.1	1742	0.0000130	36.7
370	294	18/5/2005	11:37:36	428B28CC.SO2	5.58	93.21	6.1	838	0.0000312	36.7
371		19/5/2005	1:55:03	428BE78C.KA2	1.88	96.74	6.8	1416	0.0000598	12
372	295	19/5/2005	1:55:03	428BEDB4.SO2	1.88	96.74	6.8	729	0.0001930	12
373		19/5/2005	20:44:08	428CF8EE.SO2	0.49	97.26	4.9	832	0.000049	19.4
374	296	21/5/2005	4:29:09	428EACEF.SO2	1.77	97.86	4.8	674	0.000075	49.5
375	297	21/5/2005	9:43:52	428EFCBA.PH2	1.77	97.86	4.8	1879	0.0000682	49.5
376		21/5/2005	9:43:52	428F0152.SO2	1.09	97.18	5	777	0.000048	36
377	298	21/5/2005	23:01:17	428FB829.SO2	5.03	94.71	5.6	695	0.0000503	44
378	299	23/5/2005	5:48:24	42916602.KA2	0.7	97.26	4.9	1537	0.0000134	33
379	300	24/5/2005	9:37:55	4292F161.PH2	2.48	94.41	5.1	1891	0.0000444	12
380	301	24/5/2005	11:38:44	42930D82.PH2	1.21	97.23	4.8	1951	0.0000655	31.6
381	302	25/5/2005	14:42:15	429485FC.TA2	2.49	95.37	5.1	1688	0.0000018	26
382		25/5/2005	14:42:15	42948DD9.SO2	2.49	95.37	5.1	781	0.0000027	26
383	303	25/5/2005	18:47:46	4294BFF3.KA2	1.32	97.24	4.9	1469	0.0000009	33.4
384	304	26/5/2005	10:08:28	42959913.SO2	5.6	93.19	5.7	839	0.000067	14.7
385	305	28/5/2005	6:23:35	429803EB.SO2	1.77	96.66	4.9	744	0.0000045	24
386		28/5/2005	6:23:35	42980D63.PH2	1.77	96.66	4.9	1901	0.0000730	24
387	306	31/5/2005	0:01:38	429BA42E.SO2	0.77	96.26	5	861	0.0000057	13.7
388	307	31/5/2005	2:29:36	429BC04F.SO2	5.23	94.57	5.5	703	0.0000172	20.5
389	308	31/5/2005	7:28:59	429C06A2.SO2	5.21	94.6	4.9	700	0.0000066	52.4
390	309	1/6/2005	20:06:45	429E0F06.SO2	28.81	94.72	5.8	2485	0.0000029	19
391		1/6/2005	20:06:45	429E153A.TA2	28.81	94.72	5.8	1359	0.0000003	19
392	310	3/6/2005	0:42:05	429F9F09.TA2	1.21	96.96	5.8	1797	0.0000031	12
393		3/6/2005	0:42:05	429FA16A.KA2	1.21	96.96	5.8	1486	0.0000185	12
394	311	3/6/2005	0:42:05	429FA6E6.SO2	1.21	96.96	5.8	778	0.0000186	12
395		7/6/2005	3:27:08	42A50F6E.TA2	12.26	94.9	4.8	708	0.0000035	12
396	312	7/6/2005	3:27:08	42A511CF.KA2	12.26	94.9	4.8	515	0.0000170	12
397		8/6/2005	6:28:14	42A684F9.SO2	1.86	96.46	6	749	0.0000340	24
398	313	17/6/2005	21:26:04	42B33DD0.CM2	1.8	96.69	5.3	1867	0.0000014	24
399	314	20/6/2005	18:50:43	42B70845.CM2	4.75	94.53	4.7	1590	0.0000023	50.6
400	315	21/6/2005	1:37:41	42B76AB9.CM2	6.75	92.63	4.6	1455	0.0000137	19.7
401	316	24/6/2005	21:45:13	42BC78D1.CM2	4.37	95.12	5.3	1614	0.0000087	51
402	317	8/7/2005	21:28:20	42CEEE44.CM2	0.88	97.29	4.7	1963	0.0000016	12
403	318	13/7/2005	0:29:32	42D45EAA.CM2	10.42	92.87	5.4	1087	0.0000049	52
404	319	17/7/2005	1:04:48	42D9A4DE.CM2	20.8	95.09	5	446	0.0000575	121.6
405	320	21/7/2005	1:42:45	42DEF3DD.SO2	4.07	96.12	5.1	606	0.0000189	18.6
406	321	22/7/2005	9:50:07	42E0B5EE.SO2	2.27	96.97	5.1	679	0.0000111	15
407	322	23/7/2005	0:45:01	42E188E6.SO2	5.45	94.37	4.9	717	0.0000084	32
408	323	23/7/2005	22:53:39	42E2BE52.SO2	5.03	94.47	5.3	720	0.0000092	46.9
409		23/7/2005	22:53:39	42E2C397.CM2	5.03	94.47	5.3	1562	0.0000179	46.9
410	324	24/7/2005	15:42:16	42E3B386.CM2	7.92	91.88	7.2	1380	0.0000075	12
411		24/7/2005	15:42:16	42E3B463.SO2	7.92	91.88	7.2	967	0.0000944	12
412	325	24/7/2005	15:42:16	42E3B464.CH2	7.92	91.88	7.2	1579	0.0000116	12
413		25/7/2005	3:26:18	42E45632.SO2	8.11	91.92	5.6	964	0.0000404	12
414	326	25/7/2005	3:26:18	42E45B77.CM2	8.11	91.92	5.6	1360	0.0000422	12
415		25/7/2005	16:02:03	42E50B00.NA2	0.94	96.5	5.3	2039	0.0000043	12
416	327	26/7/2005	1:39:04	42E590E3.CM2	1.75	97.08	5	1869	0.0000422	41.2
417	328	26/7/2005	6:32:11	42E5D1F0.SO2	8.44	91.56	5.3	1008	0.0000208	12
418		26/7/2005	6:32:11	42E5D736.CM2	8.44	91.56	5.3	1350	0.0000074	12
419	329	26/7/2005	6:32:11	42E5D738.NA2	8.44	91.56	5.3	1517	0.0000168	12
420		27/7/2005	14:05:29	42E792DE.NA2	3.28	93.73	4.6	1885	0.0000378	18.7
421	330	27/7/2005	16:05:55	42E7AF09.NA2	3.43	93.76	4.8	1869	0.0000054	12
422		27/7/2005	16:05:55	42E7B023.SO2	3.43	93.76	4.8	866	0.0000028	12

GROUND MOTION RECORDS USED IN THIS RESEARCH (CONTINUED)

Data No.	Event No.	Date	Time (UTC)	Filename	Epicenter		M _w	Distance (km)	Geometric Mean of PGA (g)	Focal Depth (km)
					(°N)	(°E)				
423	331	29/7/2005	12:27:05	42EA1AFB.S02	8.49	92.27	5.3	931	0.000038	27.3
424		29/7/2005	12:27:05	42EA1E41.NA2	8.49	92.27	5.3	1464	0.000093	27.3
425		29/7/2005	12:27:05	42EA2040.CM2	8.49	92.27	5.3	1303	0.000031	27.3
426	332	29/7/2005	20:33:40	42EA8B7F.S02	2.85	93.45	5.5	928	0.000068	12
427		29/7/2005	20:33:40	42EA9272.NA2	2.85	93.45	5.5	1942	0.000009	12
428	333	30/7/2005	0:36:32	42EAC3C1.S02	0.91	97.13	5.3	797	0.000072	26
429		30/7/2005	0:36:32	42EAC906.CM2	0.91	97.13	5.3	1961	0.000579	26
430		30/7/2005	0:36:32	42EACAC8.NA2	0.91	97.13	5.3	2028	0.000106	26
431	334	30/7/2005	15:13:23	42EB8DEE.CM2	5.16	94.32	5.8	1553	0.000246	31
432		30/7/2005	15:13:23	42EB96B9.S02	5.16	94.32	5.8	731	0.000040	31
433		30/7/2005	15:13:23	42EB9700.NA2	5.16	94.32	5.8	1668	0.000040	31
434	335	31/7/2005	12:18:24	42ECBE30.S02	0.08	97.55	5.1	859	0.000040	24
435	336	31/7/2005	12:37:30	42ECC51D.S02	0.39	97.67	5	822	0.000032	37.6
436	337	1/8/2005	13:17:53	42EE1DCD.S02	1.41	97.35	4.7	736	0.000033	32.4
437	338	2/8/2005	20:56:41	42EFDICE.S02	5.22	94.25	4.9	737	0.000050	34.5
438	339	5/8/2005	14:14:47	42F373F4.CH2	26.46	103.19	5.2	811	0.000046	27
439	340	9/8/2005	11:23:03	42F88E14.S02	7.78	94.33	5.4	696	0.000094	24
440	341	13/8/2005	18:27:28	42FE36C4.S02	1.2	96.95	5	779	0.000064	22
441	342	26/8/2005	0:36:57	430E5DC3.S02	5.13	94.58	4.8	705	0.000112	62.2
442	343	28/8/2005	14:09:19	4311C06C.S02	4.31	95.17	4.8	682	0.000050	13.8
443	344	29/8/2005	14:44:49	43131DF3.CM2	11.04	91.92	5.1	1094	0.000023	21
444		29/8/2005	14:44:49	43131E67.NA2	11.04	91.92	5.1	1278	0.000131	21
445	345	29/8/2005	17:40:21	43134824.CM2	0.16	97.48	5.3	2042	0.000015	23
446	346	30/8/2005	20:59:08	4314C5FA.S02	-1.75	99.54	5	1000	0.000026	20.8
447	347	31/8/2005	7:20:20	43155088.CM2	5.33	95.8	4.8	1494	0.000048	28.5
448		31/8/2005	7:20:20	4315529F.S02	5.33	95.8	4.8	571	0.000161	28.5
449	348	1/9/2005	16:42:43	431722C1.S02	4.77	94.63	5.1	714	0.000040	51
450	349	2/9/2005	8:04:07	431803C9.S02	2.43	98.91	5.5	561	0.000147	149
451		2/9/2005	8:04:07	43180767.NA2	2.43	98.91	5.5	1831	0.000100	149
452	350	3/9/2005	21:00:05	431A0C2D.S02	4.42	94.79	5	714	0.000067	60.2
453	351	6/9/2005	11:00:49	431D742F.S02	-0.06	97.54	5.6	874	0.000074	12
454	352	6/9/2005	11:10:31	431D742F.S02	7.76	92.28	5.2	922	0.000074	28.5
455	353	6/9/2005	11:11:54	431D742F.S02	-0.04	97.54	5.2	872	0.000074	12
456	354	10/9/2005	16:57:51	43230EC6.S02	4.61	94.98	5.8	686	0.000311	46
457		10/9/2005	16:57:51	43230F42.NA2	4.61	94.98	5.8	1696	0.000031	46
458	355	13/9/2005	14:32:59	4326E21A.NA2	8.11	91.92	5.5	1521	0.000070	12
459	356	14/9/2005	8:17:02	4327D665.S02	8.14	91.93	4.9	963	0.0000685	16.7
460	357	16/9/2005	17:19:36	432AF814.S02	2.47	96.17	4.8	719	0.000031	31.4
461	358	18/9/2005	7:26:02	432D14A2.CM2	24.48	94.71	5.7	777	0.000145	105.4
462		18/9/2005	7:26:02	432D1572.CH2	24.48	94.71	5.7	731	0.000067	105.4
463	359	20/9/2005	15:00:03	43302226.S02	4.43	95.42	4.8	651	0.000153	52.2
464	360	22/9/2005	12:30:09	43329B0F.S02	3.74	95.89	5.1	648	0.000101	46
465		22/9/2005	12:30:09	4332A150.CM2	3.74	95.89	5.1	1666	0.000052	46
466	361	25/9/2005	15:37:11	4336B9E7.S02	-0.38	97.88	5	894	0.000035	49.9
467	362	3/10/2005	0:58:11	43408038.NA2	1.01	96.9	5.2	2022	0.000197	12
468	363	3/10/2005	22:09:27	4341A8C3.S02	5.31	94.35	5.5	723	0.000117	34
469		3/10/2005	22:09:27	4341AB82.NA2	5.31	94.35	5.5	1651	0.000046	34
470	364	4/10/2005	12:23:27	43426DAA.S02	5.37	94.14	5	744	0.000107	41.1
471	365	5/10/2005	8:46:48	434386F5.S02	5.33	95.71	5.7	580	0.0000712	23.3
472	366	9/10/2005	22:28:21	43499210.S02	2.11	97.99	4.9	634	0.000074	12
473	367	11/10/2005	15:05:44	434BD2B7.S02	4.49	95.02	5.9	687	0.0000878	49
474	368	16/10/2005	19:03:30	4352A2BA.S02	1.82	97.82	5.7	671	0.000254	44
475	369	25/10/2005	21:25:49	435E9B4D.CM2	0.87	98.09	4.8	1960	0.0000900	22.9
476	370	25/10/2005	0:39:30	435EC57F.CM2	3.56	94.26	5	1725	0.000136	12
477	371	27/10/2005	4:16:32	43604F4E.CM2	2.34	95.63	4.9	1824	0.000210	41.5
478	372	31/10/2005	10:34:05	4365F06D.NA2	17.58	92.68	4.7	858	0.000060	19.1
479	373	4/11/2005	17:44:50	436B92C8.S02	0.97	96.96	5.5	800	0.000129	21
480	374	19/11/2005	14:10:18	437F2FD9.S02	1.89	96.51	6.3	743	0.0000696	23
481		19/11/2005	14:10:18	437F3101.NA2	1.89	96.51	6.3	1936	0.000007	23
482	375	19/11/2005	17:11:42	437F568F.CM2	-4.31	103.45	5	2592	0.000028	23.2
483	376	27/11/2005	23:31:40	438A3AD5.S02	0.92	96.98	5.6	804	0.000094	22
484	377	4/12/2005	9:34:00	4392B555.NA2	18.7	98.5	4.1	232	0.000246	33
485		4/12/2005	9:34:00	4392B65A.CH2	18.7	98.5	4.1	187	0.0000939	33
486	378	4/12/2005	14:09:33	4392F71B.S02	0.65	97.43	4.8	807	0.000032	39
487	379	5/12/2005	4:46:50	4393C545.CM2	3.29	95.19	5	1730	0.000294	24.1
488	380	7/12/2005	9:02:00	4396A0A1.CM2	19.7	99.6	3.9	173	0.0002109	33
489		7/12/2005	9:02:00	4396A1D7.CH2	19.7	99.6	3.9	27	0.0003238	33
490		7/12/2005	9:02:00	4396A457.NA2	19.7	99.6	3.9	153	0.0000459	33

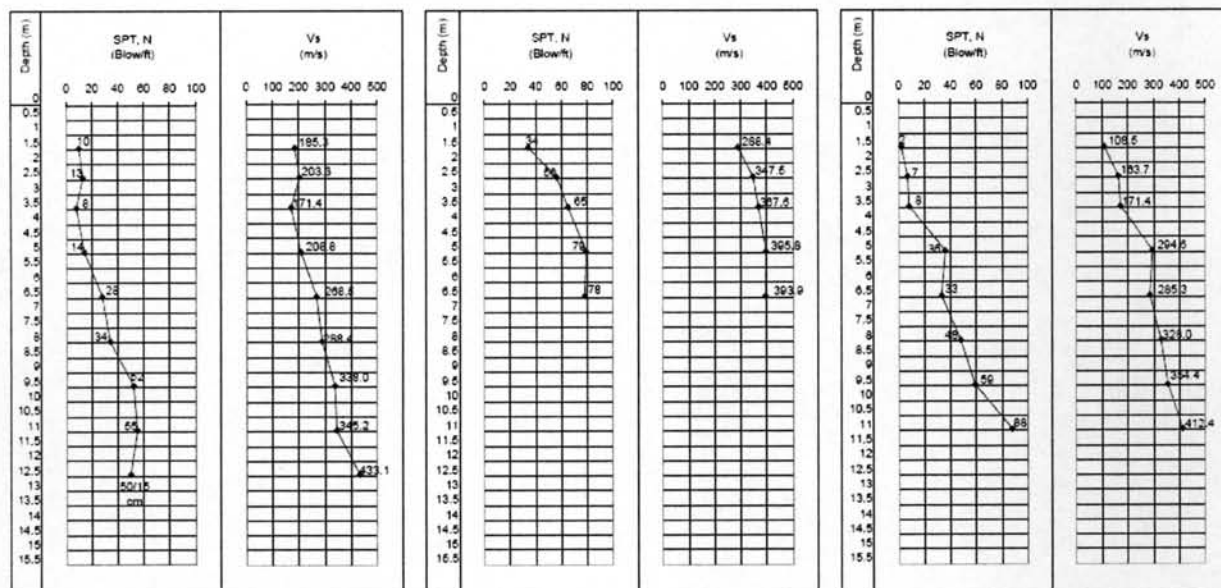
GROUND MOTION RECORDS USED IN THIS RESEARCH

Data No.	Event No.	Date	Time (UTC)	Filename	Epicenter		M _w	Distance (km)	Geometric Mean of PGA (g)	Focal Depth (km)
					(°N)	(°E)				
491	381	15/12/2005	6:48:00	43A110E7.CM2	19.43	100.2	4.1	201	0.0000833	33
492		15/12/2005	6:48:00	43A11145.NA2	19.43	100.2	4.1	88	0.0001374	33
493	382	16/12/2005	2:13:00	43A21C22.CM2	19.43	99.96	3.8	180	0.0000913	33
494	383	16/12/2005	2:14:00	43A21C22.CM2	19.43	99.96	3.9	180	0.0000913	33
495	384	18/12/2005	4:23:13	43A4E02B.SO2	2.39	95.66	5.7	765	0.0000117	24
496	385	1/1/2006	8:47:15	43B78E23.SO2	4.36	95.06	5.5	690	0.0000293	54.9
497		1/1/2006	8:47:15	43B7952C.NA2	4.36	95.06	5.5	1719	0.0000049	54.9
498	386	6/1/2006	4:25:06	43BDEEFF.SO2	12.06	95.2	5.4	805	0.0000088	12
499	387	13/1/2006	10:50:06	43C77E3D.SO2	1.22	97.58	5.1	743	0.0000077	31.2
500	388	13/1/2006	14:47:34	43C7B67F.SO2	4.86	94.49	4.8	725	0.0000073	40.5
501		13/1/2006	14:47:34	43C7BC23.NA2	4.86	94.49	4.8	1691	0.0000037	40.5
502	389	13/1/2006	22:47:36	43C82CCF.NA2	1.35	97.28	4.9	1976	0.0000044	34.6
503	390	31/1/2006	19:15:54	43DFB46E.SO2	2.34	95.9	5.9	750	0.0000317	23
504	391	3/2/2006	20:34:15	43E3B725.SO2	11.83	92.17	6.1	1061	0.0000072	12
505	392	6/2/2006	7:05:01	43E6F4D7.NA2	1.58	96.25	5.1	1976	0.0000056	45.4
506		6/2/2006	7:05:01	43E6F4F5.SO2	1.58	96.25	5.1	788	0.0000067	45.4
507	393	6/2/2006	23:55:14	43E7E0C0.NA2	1.42	96.87	5.2	1978	0.0000064	25
508	394	26/2/2006	21:32:53	440218E0.SO2	5.27	94.59	5.1	699	0.0000163	53.8
509	395	1/3/2006	14:36:05	4405AB13.SO2	2.62	95.44	5	765	0.0000045	26.2
510	396	2/3/2006	17:17:02	4407278A.NA2	24.22	94.42	4.9	886	0.0000025	69.3
511	397	8/3/2006	6:33:39	440E7569.SO2	3.88	96.22	5.3	609	0.0000205	12
512	398	9/3/2006	15:19:19	441045F9.NA2	10.89	94.68	5.2	1092	0.0000117	12
513	399	9/3/2006	18:21:55	44106FBD.SO2	10.82	94.69	5.4	767	0.0000047	12
514	400	9/3/2006	19:15:46	44107DCD.SO2	10.79	94.55	5.2	778	0.0000038	12.1
515	401	9/3/2006	20:25:48	44108B13.CM2	10.79	94.52	5.2	960	0.0000018	12
516		9/3/2006	20:25:48	44108BDE.SO2	10.79	94.52	5.2	781	0.0000026	12
517	402	9/3/2006	21:18:58	441099EE.SO2	10.86	94.66	4.9	772	0.0000081	12
518	403	9/3/2006	21:37:02	44109DFF.NA2	10.76	94.49	5.3	1116	0.0000014	12
519	404	9/3/2006	22:30:49	4410AC15.NA2	10.75	94.46	5.2	1119	0.0000057	12
520	405	12/3/2006	22:59:23	44149BDB.CM2	13.94	93.6	5.2	733	0.0000059	36.7
521		12/3/2006	22:59:23	4414A5A8.NA2	13.94	93.6	5.2	931	0.0000052	36.7
522	406	16/3/2006	15:12:17	44197A94.SO2	4.84	94.64	5	710	0.0000068	46.5
523	407	19/3/2006	4:24:36	441CD485.SO2	3.84	95.96	5.2	635	0.0000310	56.6
524	408	22/3/2006	10:08:54	44211D8F.SO2	2.61	95.24	5	783	0.0000045	38.2
525	409	25/3/2006	20:13:37	4425A21C.NA2	23.33	93.91	5.1	866	0.0000015	46
526		25/3/2006	20:13:37	4425A3B1.CM2	23.33	93.91	5.1	724	0.0000019	46
527	410	28/3/2006	8:35:45	4428EABC.SO2	3.36	97.12	4.9	574	0.0000119	30.6
528	411	2/4/2006	8:30:29	442F8127.SO2	2.03	96.17	5.4	755	0.0000116	36.1
529	412	5/4/2006	18:35:13	44340DB8.CM2	4.65	92.96	4.9	1655	0.0000007	12
530	413	19/4/2006	20:36:51	444694F1.SO2	2.7	93.22	6.2	959	0.0000459	17.2
531		19/4/2006	20:36:51	44469D22.CM2	2.7	93.22	6.2	1850	0.0000012	17.2
532		19/4/2006	20:36:51	44469D81.NA2	2.7	93.22	6.2	1967	0.0000036	17.2
533	414	22/4/2006	23:42:24	444ABEFE.SO2	1.77	96.44	5	759	0.0000034	34.7
534	415	25/4/2006	18:26:21	444E6757.CM2	1.78	96.77	6.3	1869	0.0000007	12
535		25/4/2006	18:26:21	444E6992.SO2	1.78	96.77	6.3	736	0.0000443	12
536	416	26/4/2006	16:38:55	444F9EFE.SO2	4.39	96.03	5.3	595	0.0000637	82.4
537		26/4/2006	16:38:55	444FA0B6.CM2	4.39	96.03	5.3	1592	0.0000011	82.4
538	417	8/5/2006	9:16:59	445F084B.SO2	-5.24	102.08	5.9	1391	0.0000183	39.2
539	418	May 11, 2006	17:22:59	44637075.CM2	23.31	94.3	5.6	696	0.0000069	33.7
540		May 11, 2006	17:22:59	4463718E.NA2	23.31	94.3	5.6	832	0.0000420	33.7
541	419	12/5/2006	8:17:01	44643936.SO2	-5.78	105.48	5.5	1539	0.0000052	18.1
542	420	13/5/2006	3:11:44	44654471.SO2	5.33	94.3	5.7	728	0.0000360	43.1
543		13/5/2006	3:11:44	44654BCB.CM2	5.33	94.3	5.7	1535	0.0000043	43.1
544	421	16/5/2006	15:28:31	4469EF5B.CM2	0.01	96.98	6.8	2063	0.0000037	13.5
545		16/5/2006	15:28:31	4469EF79.NA2	0.01	96.98	6.8	2129	0.0000073	13.5
546	422	17/5/2006	6:46:31	446AC2E7.SO2	6.96	92.45	4.9	902	0.0000467	13.1
547	423	22/5/2006	19:16:34	4472036E.SO2	1.81	99.61	5	607	0.0000049	176.2
548	424	27/6/2006	15:02:22	44A14351.SO2	8.81	93.75	5	778	0.0000056	19.5
549	425	30/7/2006	1:28:17	44CC0195.SO2	1.02	96.91	5.6	799	0.0000113	33.1
550		30/7/2006	1:28:17	44CC03D7.CM2	1.02	96.91	5.6	1951	0.0000054	33.1
551	426	1/8/2006	17:26:44	44CF85B8.SO2	4.76	96.27	5	551	0.0000102	21.3
552	427	2/8/2006	10:42:02	44D07713.CM2	19.08	95.74	4.7	305	0.0000153	20.7
553	428	11/8/2006	20:54:17	44DCED85.CM2	2.1	96.18	6.2	1841	0.0000009	20.6
554	429	23/8/2006	18:31:55	44EC9CBE.SO2	4.29	95.24	5.1	676	0.0000104	56.6
555		23/8/2006	18:31:55	44EC9F00.CM2	4.29	95.24	5.1	1620	0.0000006	56.6
556	430	25/8/2006	5:51:47	44EE8901.SO2	28	104.31	5	2349	0.0000058	17.4
557		25/8/2006	5:51:47	44EE8F77.CM2	28	104.31	5	1209	0.0000398	17.4

APPENDIX C
SOIL PROFILES REPRESENTING FIVE OF TMD'S SEISMIC STATIONS
(BEFORE THE 2006 SYSTEM)

C.1 Loei Station

Location of Borehole logs: Amphur Muang, Tambon Naphong



The borehole measurements are downloaded from the website of the Department of Public Works and Town and Country Planning, Interior Ministry. Table C.1 shows the details of computation process to gain an approximate value of shear wave velocity per layer, V_{si} , using empirical relationships based on Standard Penetration Test (SPT) N-values. The average of shear wave velocity above and below the layer without a given SPT N-value (marked by * in Table C.2) is calculated to fill the gaps between layers. As mentioned in Chapter 2, the V_s of the deepest level with information is set equals to the V_s of the lower strata up to 30 meters. This is to arrive at a plausible estimate of $\bar{V}_{s,30}$. Table C.2 provides a sample of the calculation of $\bar{V}_{s,30}$ for Loei station.

Table C.1 Sample of calculation of shear wave velocity using empirical correlations based on SPT N-values for Loei station

Borehole Log No. 1													
Soil Description	Depth (m)	SPT N-Value	Clay			Sand			V _s (m/sec)	d (m)	d/V _s (sec)		
			Imai and Tonouchi (1982)	Ohsaki and Iwasaki (1973)	Ohia and Goto (1978)	Average	Dickenson (1994)	Seed, Idriss and Arango (1983)				Sykora and Stokoe (1983)	Average
sand some gravel	1.0-1.45	7						165	149	177	164	0.45	0.002750
	1.5-1.95	12						191	195	207	198	0.45	0.002277
	2.0-2.45	14						199	211	216	209	0.45	0.002155
sand and gravel	3.0-3.45	10						181	178	196	185	0.45	0.002428
	4.5-4.95	17						210	232	229	224	0.45	0.002010
gravel some sand	6.0-6.45	38	304	337	295	312						0.45	0.001442
	7.5-7.95	68	365	423	360	383						0.45	0.001176
	9-9.45	100	412	492	410	438						0.45	0.001027
clayey fine to coarse sand	10.5-10.95	100	412	492	410	438						0.45	0.001027
	12.0-12.45	87	394	466	391	417						0.45	0.001079
silty clay													

Borehole Log No. 2													
Soil Description	Depth (m)	SPT N-Value	Clay			Sand			V _s (m/sec)	d (m)	d/V _s (sec)		
			Imai and Tonouchi (1982)	Ohsaki and Iwasaki (1973)	Ohia and Goto (1978)	Average	Dickenson (1994)	Seed, Idriss and Arango (1983)				Sykora and Stokoe (1983)	Average
sand and gravel	0.0-0.45	5						151	126	160	146	0.45	0.003008
	1.0-1.45	10						181	178	196	185	0.45	0.00243
	1.5-1.95	24						232	276	253	254	0.45	0.00177
silty gravel some sand	2.0-2.45	35						259	334	282	292	0.45	0.00154
	3.0-3.45	22						226	264	247	246	0.45	0.00183
silty sand some gravel	4.5-4.95	46						281	382	305	323	0.45	0.00139
	6.0-6.45	54						294	414	320	343	0.45	0.00131
	7.5-7.95	58						300	429	327	352	0.45	0.00128
sand and gravel	9-9.45	54						294	414	320	343	0.45	0.00131
	10.5-10.95	83	388	458	385	410						0.45	0.00110
clay													

Borehole Log No. 3													
Soil Description	Depth (m)	SPT N-Value	Clay			Sand			V _s (m/sec)	d (m)	d/V _s (sec)		
			Imai and Tonouchi (1982)	Ohsaki and Iwasaki (1973)	Ohia and Goto (1978)	Average	Dickenson (1994)	Seed, Idriss and Arango (1983)				Sykora and Stokoe (1983)	Average
silty fine sand	1.0-1.45	9						176	169	190	179	0.45	0.00252
	1.5-1.95	7						165	149	177	164	0.45	0.00275
	2.0-2.45	7						165	149	177	164	0.45	0.00275
coarse sand some gravel	3.0-3.45	8						171	159	184	171	0.45	0.00263
	4.5-4.95	22						226	264	247	246	0.45	0.00183
silty gravel and sand	6.0-6.45	16						207	226	225	219	0.45	0.00205
	7.5-7.95	77						327	495	354	392	0.45	0.00115
silty clay some sand	9-9.45	73	373	435	369	392						0.45	0.00115
	10.5-10.95	77	379	445	375	400						0.45	0.00113
	12.0-12.45	79	382	449	379	403						0.45	0.00112

Table C.2 Sample calculation of normalized shear wave velocity \overline{V}_s averaged over the upper 30 meters

Borehole Log No. 1

Soil Description	Depth (m)	SPT Value	V_{si}	d_i	d_i/V_{si}
silty fine sand	1.0-1.45	10	185.31	0.45	0.002428
	1.45-2.0	*	194.33	0.55	0.002830
	2.0-2.45	13	203.34	0.45	0.002213
	2.45-3.0	*	187.37	0.55	0.002935
	3.0-3.45	8	171.40	0.45	0.002625
	3.45-4.5	*	190.10	1.05	0.005523
	4.5-4.95	14	208.80	0.45	0.002155
	4.95-6.0	*	238.64	1.05	0.004400
silty fine to coarse sand	6.0-6.45	28	268.49	0.45	0.001676
	6.45-7.5	*	278.46	1.05	0.003771
	7.5-7.95	34	288.43	0.45	0.001560
	7.95-9.0	*	313.19	1.05	0.003353
silty coarse sand	9.0-9.45	52	337.95	0.45	0.001332
	9.45-10.5	*	341.55	1.05	0.003074
	10.5-10.95	55	345.15	0.45	0.001304
	10.95-12.0	*	389.11	1.05	0.002698
	12.0-12.45	100	433.08	0.45	0.001039
	12.45-31.0	*	433.08	18.55	0.042833
	Σ		30		0.087750
					$(\overline{V}_{s,30})_{BH1}$ 342 m/s

Borehole Log No. 2

Soil Description	Depth (m)	SPT Value	V_{si}	d_i	d_i/V_{si}
silty fine to coarse sand	1.0-1.45	34	288.43	0.45	0.00156016
	1.45-2.0	*	317.96	0.55	0.00172976
	2.0-2.45	56	347.49	0.45	0.00129499
	2.45-3.0	*	357.54	0.55	0.00153828
silty coarse sand	3.0-3.45	65	367.59	0.45	0.00122419
	3.45-4.5	*	381.70	1.05	0.00275084
	4.5-4.95	79	395.81	0.45	0.0011369
	4.95-6.0	*	394.86	1.05	0.00265919
	6.0-6.45	78	393.90	0.45	0.00114242
	6.45-31.0	*	393.90	24.55	0.06232547
		Σ		30	
					$(\overline{V}_{s,30})_{BH2}$ 388 m/s

Borehole Log No. 3

Soil Description	Depth	SPT Value	V _{si}	d _i	d _i /V _{si}
	(m)				
silty fine sand	1.0-1.45	2	108.54	0.45	0.004146
	1.45-2.0	*	136.10	0.55	0.004041
	2.0-2.45	7	163.66	0.45	0.002750
	2.45-3.0	*	167.53	0.55	0.003283
	3.0-3.45	8	171.40	0.45	0.002625
	3.45-4.5	*	233.00	1.05	0.004506
silty fine to coarse sand	4.5-4.95	36	294.61	0.45	0.001527
	4.95-6.0	*	289.94	1.05	0.003622
	6.0-6.45	33	285.26	0.45	0.001577
	6.45-7.5	*	306.61	1.05	0.003425
silty coarse sand	7.5-7.95	48	327.95	0.45	0.001372
	7.95-9.0	*	341.17	1.05	0.003078
	9.0-9.45	59	354.39	0.45	0.001270
	9.45-10.5	*	383.41	1.05	0.002739
	10.5-10.95	88	412.42	0.45	0.001091
	10.95-31.0	*	412.42	20.05	0.048615
Σ				30	0.089667
				(V _{s,30}) _{BH3}	335 m/s

For Borehole Log No. 1:

$$\sum_{i=1}^n d_i = 30.0 \text{ m} ; \sum_{i=1}^n \frac{d_i}{V_{si}} = 0.087750 \text{ sec} ; \therefore (\overline{V_{s,30}})_{\text{BH1}} = \frac{\sum_{i=1}^n d_i}{\sum_{i=1}^n \frac{d_i}{V_{si}}} = 342 \text{ m/sec}$$

For Borehole Log No. 2:

$$\sum_{i=1}^n d_i = 30.0 \text{ m} ; \sum_{i=1}^n \frac{d_i}{V_{si}} = 0.077362 \text{ sec} ; \therefore (\overline{V_{s,30}})_{\text{BH2}} = 388 \text{ m/sec}$$

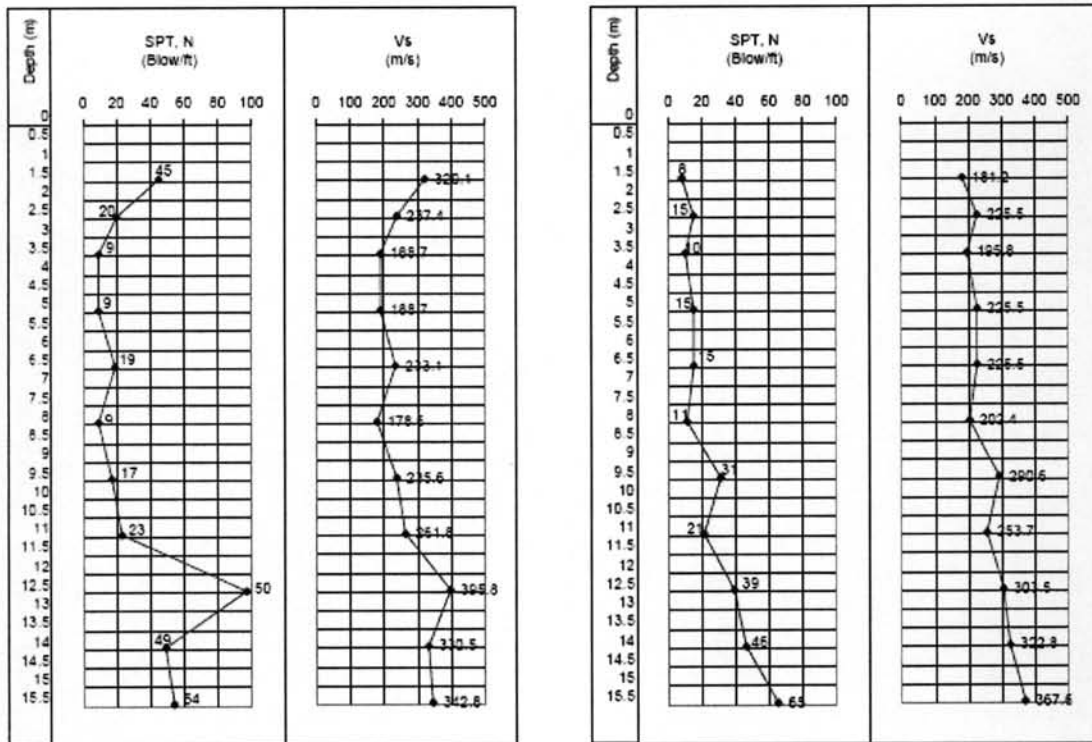
For Borehole Log No. 3:

$$\sum_{i=1}^n d_i = 30.0 \text{ m} ; \sum_{i=1}^n \frac{d_i}{V_{si}} = 0.089667 \text{ sec} \therefore (\overline{V_{s,30}})_{\text{BH3}} = 335 \text{ m/sec}$$

Hence, the normalized shear wave velocity for Loei station is approximated from the average of $\overline{V_s}$ of the three borehole logs which is equals to 355 m/sec.

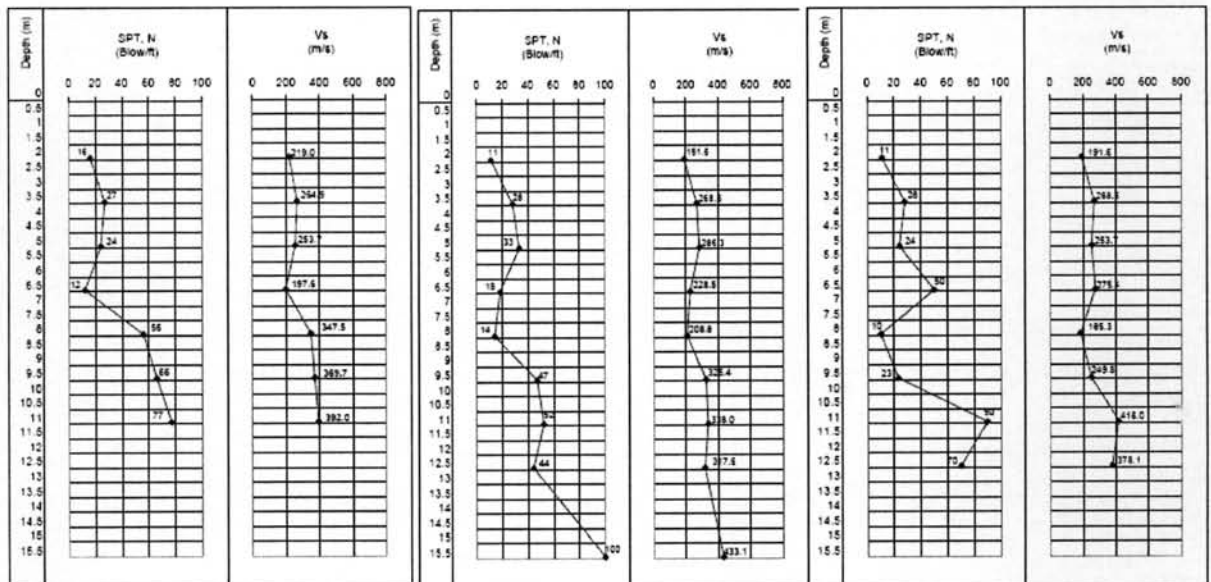
C.2 Chiangrai Station

Location of Borehole logs: Amphur Muang, Tambon Maekon



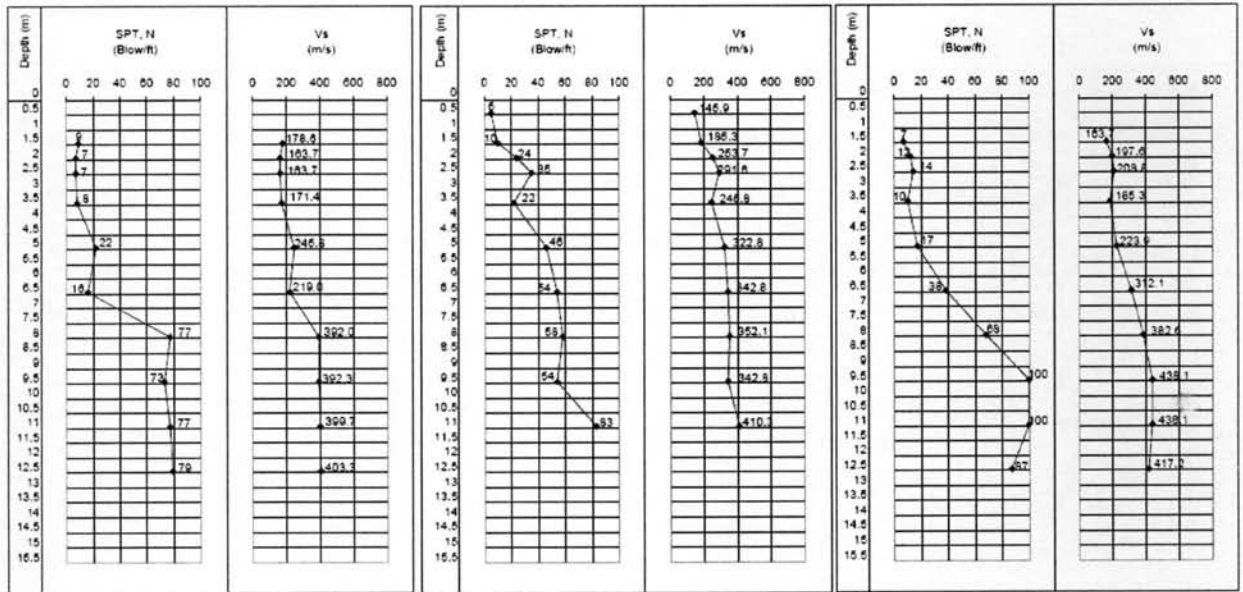
C.3 Songkhla Station

Location of Borehole logs: Amphur Muang, Tambon Boyang



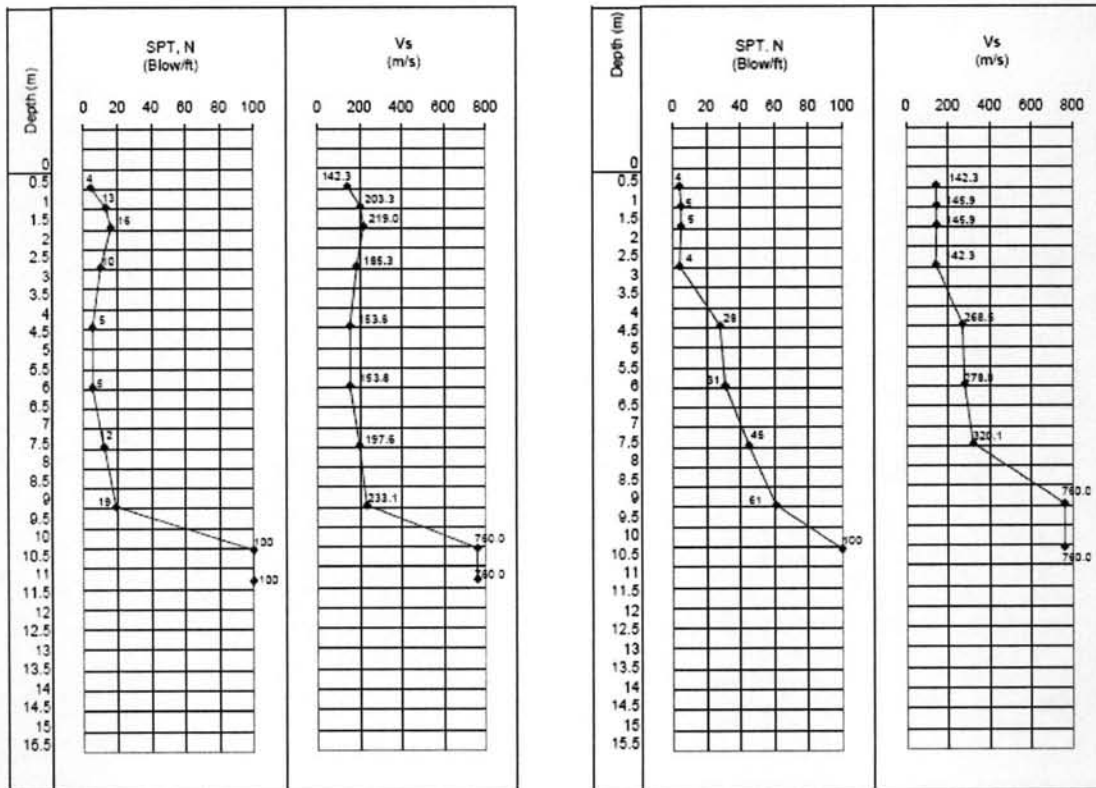
C.4 Phrae Station

Location of Borehole logs: Amphur Seung, Tambon Taophun



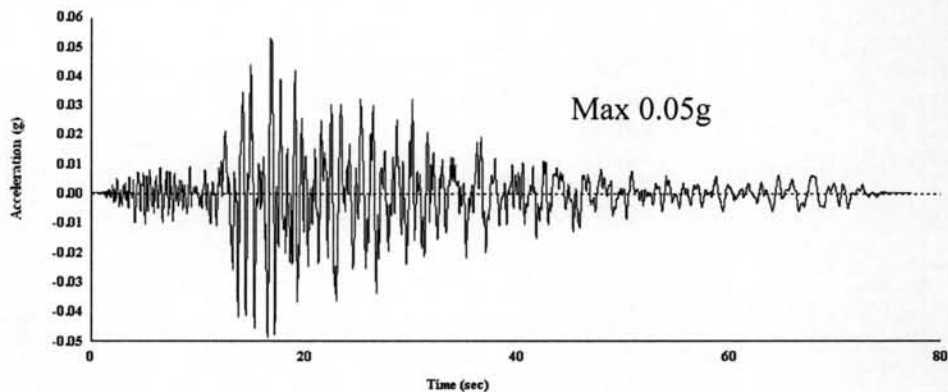
C.5 Nan Station

Location of Borehole logs: Amphur Muang, Tambon Maekon

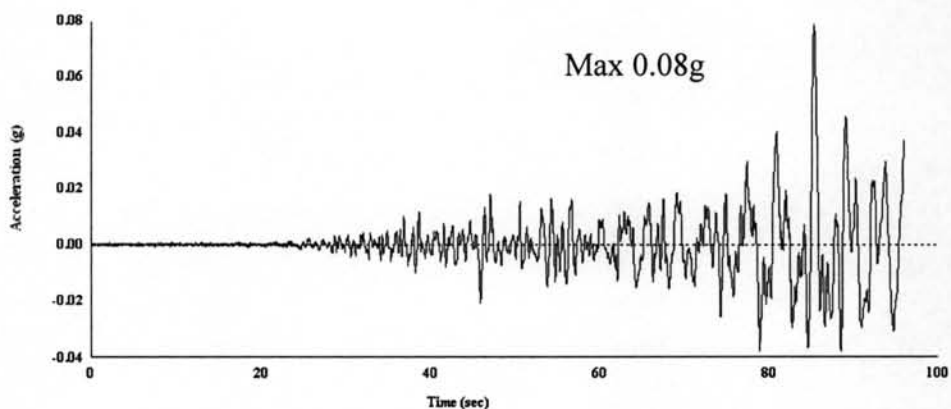


APPENDIX D
SELECTED ACCELERATION TIME HISTORIES

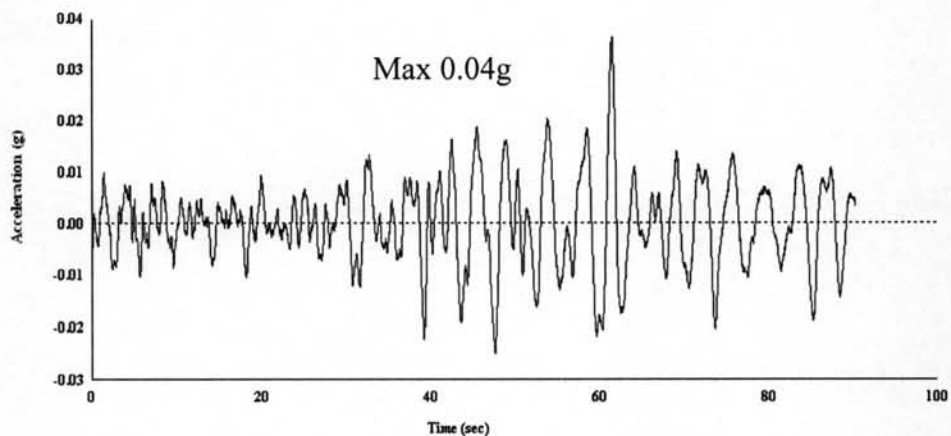
D.1 Global Earthquakes



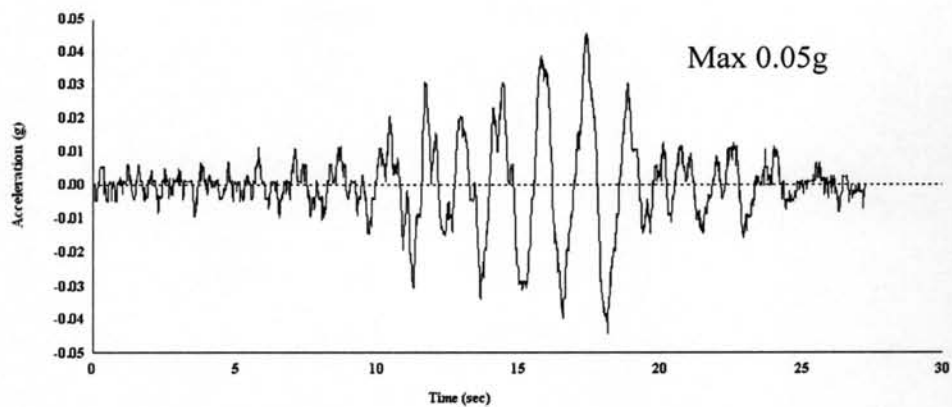
July 1952 Kern County (USA) earthquake recorded at Pasadena station



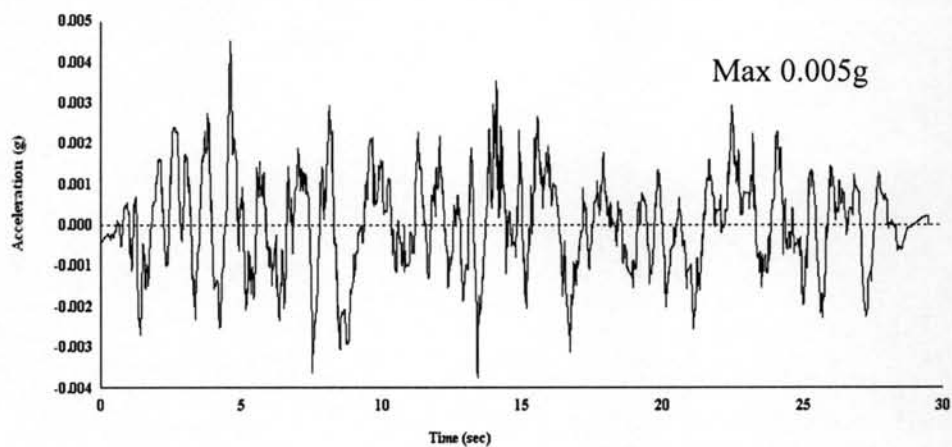
August 1999 Izmit (Turkey) earthquake recorded at Denizli station



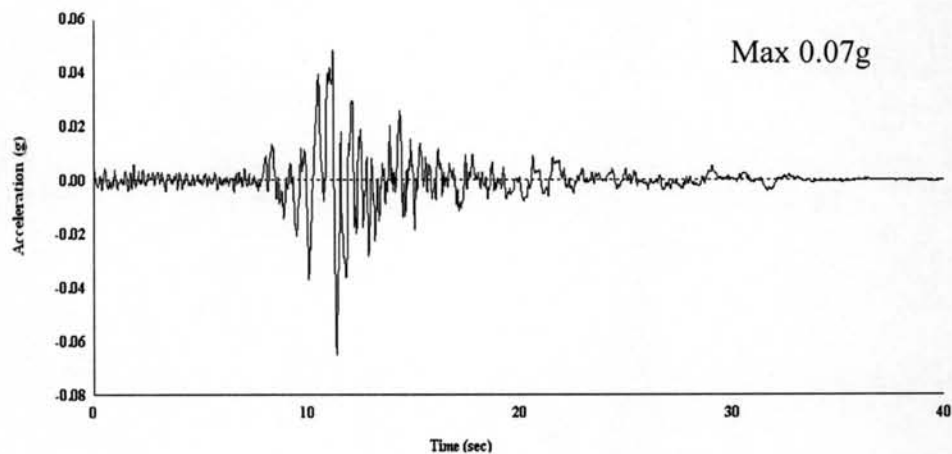
November 1999 Duzce (Turkey) earthquake recorded at Denizli station



October 1995 Dinar (Turkey) earthquake recorded at Balikesir station

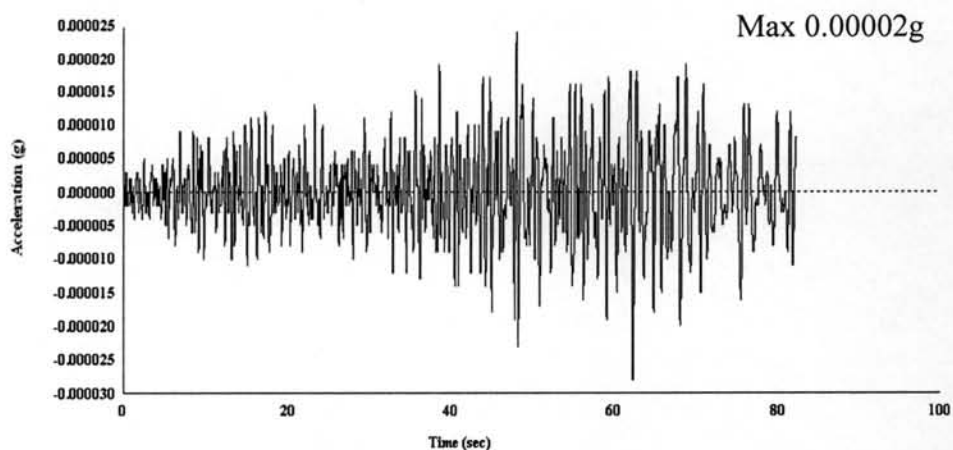


**February 1971 San Fernando (USA) earthquake
recorded at Cholame-Shandon station**

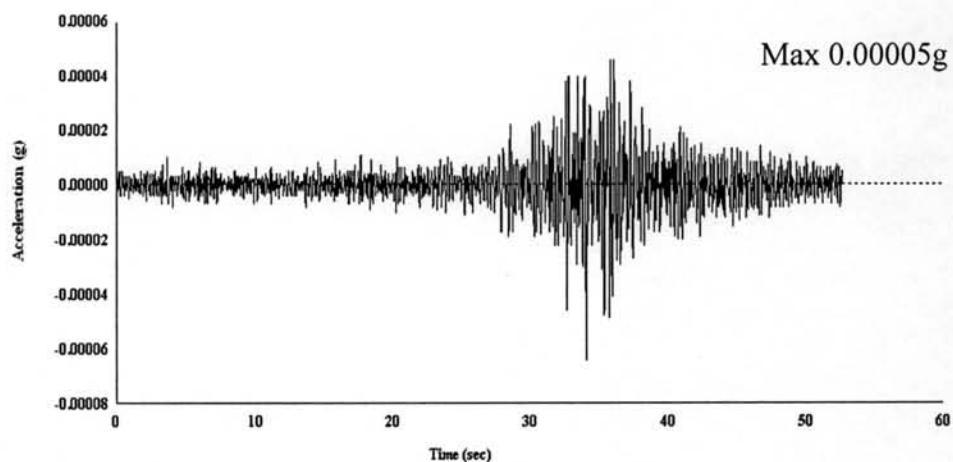


October 1989 Loma Prieta (USA) earthquake recorded at Yerba Buena station

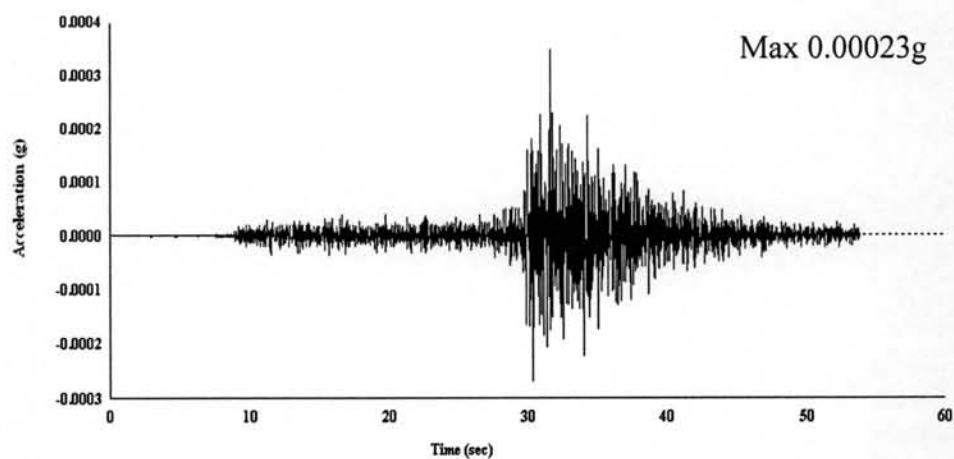
D.2 Local Earthquakes



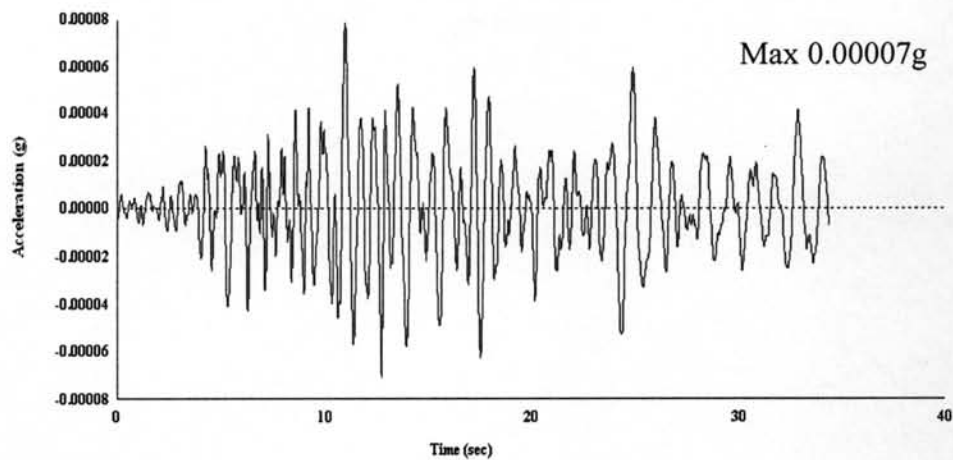
September 17, 2004 earthquake recorded at Tak station
(Filename: 414ABE09.TA2)



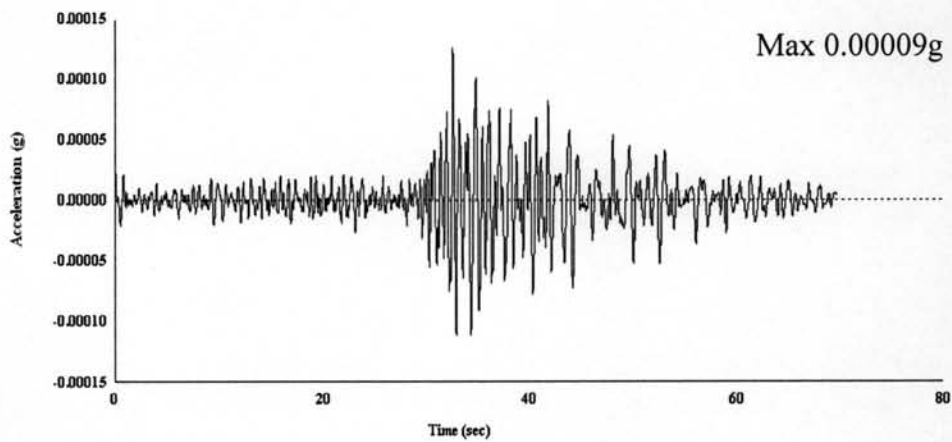
September 18, 2003 earthquake recorded at Tak station
(Filename: 3F698DAB.TA2)



September 18, 2003 earthquake recorded at Chiang Mai station
(Filename: 3F69910B.CM2)



**October 30, 2003 earthquake recorded at Tak station
(Filename: 3FA1299E.CM2)**



**October 30, 2003 earthquake recorded at Chiang Mai station
(Filename: 3FA12A29.CM2)**

APPENDIX E
RESULTS OF RESPONSE ANALYSIS OF BANGKOK AREA

E.1 Peak acceleration values and soil amplification factors for global rock outcrop motions using best-estimate soil profile

Ground Motion (g)	PGA (g)	PGA (g)	Amplification Factors	
	ground surface	bedrock	(ground surface/bedrock)	(ground surface/outcrop)
0.002				
Kern County (Pasadena): M=7.4; d=127	0.013	0.001	13.0	6.5
Izmit (Denizli): M=7.6; d=330	0.005	0.002	2.5	2.5
Duzcel(Denizli): M=7.2; d=372	0.003	0.002	1.5	1.5
Dinar (Balikersir): M=6.4; d=257	0.005	0.002	2.5	2.5
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.008	0.001	8.0	4.0
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.009	0.001	9.0	4.5
<i>Average</i>	0.007	0.002	6.1	3.6
0.011				
Kern County (Pasadena): M=7.4; d=127	0.064	0.008	8.0	5.8
Izmit (Denizli): M=7.6; d=330	0.027	0.009	3.0	2.5
Duzcel(Denizli): M=7.2; d=372	0.014	0.011	1.3	1.3
Dinar (Balikersir): M=6.4; d=257	0.029	0.010	2.9	2.6
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.042	0.008	5.3	3.8
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.044	0.007	6.3	4.0
<i>Average</i>	0.037	0.009	4.5	3.3
0.025				
Kern County (Pasadena): M=7.4; d=127	0.117	0.016	7.3	4.7
Izmit (Denizli): M=7.6; d=330	0.063	0.019	3.3	2.5
Duzcel(Denizli): M=7.2; d=372	0.035	0.024	1.5	1.4
Dinar (Balikersir): M=6.4; d=257	0.068	0.021	3.2	2.7
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.090	0.019	4.7	3.6
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.093	0.016	5.8	3.7
<i>Average</i>	0.078	0.019	4.3	3.1
0.035				
Kern County (Pasadena): M=7.4; d=127	0.151	0.023	6.6	4.3
Izmit (Denizli): M=7.6; d=330	0.090	0.027	3.3	2.6
Duzcel(Denizli): M=7.2; d=372	0.050	0.034	1.5	1.4
Dinar (Balikersir): M=6.4; d=257	0.099	0.028	3.5	2.8
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.117	0.025	4.7	3.3
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.122	0.023	5.3	3.5
<i>Average</i>	0.105	0.027	4.1	3.0
0.050				
Kern County (Pasadena): M=7.4; d=127	0.189	0.035	5.4	3.8
Izmit (Denizli): M=7.6; d=330	0.130	0.040	3.3	2.6
Duzcel(Denizli): M=7.2; d=372	0.074	0.047	1.6	1.5
Dinar (Balikersir): M=6.4; d=257	0.170	0.035	4.9	3.4
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.153	0.035	4.4	3.1
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.157	0.033	4.8	3.1
<i>Average</i>	0.146	0.038	4.0	2.9
0.075				
Kern County (Pasadena): M=7.4; d=127	0.237	0.058	4.1	3.2
Izmit (Denizli): M=7.6; d=330	0.203	0.061	3.3	2.7
Duzcel(Denizli): M=7.2; d=372	0.165	0.068	2.4	2.2
Dinar (Balikersir): M=6.4; d=257	0.297	0.051	5.8	4.0
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.203	0.052	3.9	2.7
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.204	0.047	4.3	2.7
<i>Average</i>	0.218	0.056	4.0	2.9
0.100				
Kern County (Pasadena): M=7.4; d=127	0.283	0.081	3.5	2.8
Izmit (Denizli): M=7.6; d=330	0.279	0.082	3.4	2.8
Duzcel(Denizli): M=7.2; d=372	0.174	0.090	1.9	1.7
Dinar (Balikersir): M=6.4; d=257	0.360	0.077	4.7	3.6
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.241	0.068	3.5	2.4
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.239	0.062	3.9	2.4
<i>Average</i>	0.263	0.077	3.5	2.6

E.2 Peak acceleration values and soil amplification factors for global rock outcrop motions using upper-bound soil profile

Ground Motion (g)	PGA (g)	PGA (g)	Amplification Factors	
	ground surface	bedrock	(ground surface/bedrock)	(ground surface/outcrop)
0.002				
Kern County (Pasadena): M=7.4; d=127	0.009	0.002	4.5	4.5
Izmit (Denizli): M=7.6; d=330	0.005	0.001	5.0	2.5
DuzceI(Denizli): M=7.2; d=372	0.003	0.002	1.5	1.5
Dinar (Balikersir): M=6.4; d=257	0.005	0.002	2.5	2.5
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.006	0.001	6.0	3.0
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.007	0.001	7.0	3.5
<i>Average</i>	0.006	0.002	4.4	2.9
0.011				
Kern County (Pasadena): M=7.4; d=127	0.048	0.009	5.3	4.4
Izmit (Denizli): M=7.6; d=330	0.027	0.008	3.4	2.5
DuzceI(Denizli): M=7.2; d=372	0.016	0.010	1.6	1.5
Dinar (Balikersir): M=6.4; d=257	0.028	0.009	3.1	2.5
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.030	0.009	3.3	2.7
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.040	0.008	5.0	3.6
<i>Average</i>	0.032	0.009	3.6	2.9
0.025				
Kern County (Pasadena): M=7.4; d=127	0.102	0.020	5.1	4.1
Izmit (Denizli): M=7.6; d=330	0.059	0.018	3.3	2.4
DuzceI(Denizli): M=7.2; d=372	0.039	0.023	1.7	1.6
Dinar (Balikersir): M=6.4; d=257	0.066	0.019	3.5	2.6
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.064	0.021	3.0	2.6
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.093	0.019	4.9	3.7
<i>Average</i>	0.071	0.020	3.6	2.8
0.035				
Kern County (Pasadena): M=7.4; d=127	0.139	0.027	5.1	4.0
Izmit (Denizli): M=7.6; d=330	0.081	0.026	3.1	2.3
DuzceI(Denizli): M=7.2; d=372	0.057	0.032	1.8	1.6
Dinar (Balikersir): M=6.4; d=257	0.106	0.023	4.6	3.0
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.085	0.029	2.9	2.4
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.129	0.026	5.0	3.7
<i>Average</i>	0.100	0.027	3.8	2.8
0.050				
Kern County (Pasadena): M=7.4; d=127	0.193	0.037	5.2	3.9
Izmit (Denizli): M=7.6; d=330	0.114	0.038	3.0	2.3
DuzceI(Denizli): M=7.2; d=372	0.086	0.045	1.9	1.7
Dinar (Balikersir): M=6.4; d=257	0.154	0.030	5.1	3.1
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.109	0.042	2.6	2.2
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.179	0.035	5.1	3.6
<i>Average</i>	0.139	0.038	3.8	2.8
0.075				
Kern County (Pasadena): M=7.4; d=127	0.266	0.055	4.8	3.5
Izmit (Denizli): M=7.6; d=330	0.159	0.060	2.7	2.1
DuzceI(Denizli): M=7.2; d=372	0.127	0.067	1.9	1.7
Dinar (Balikersir): M=6.4; d=257	0.192	0.052	3.7	2.6
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.140	0.063	2.2	1.9
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.243	0.050	4.9	3.2
<i>Average</i>	0.188	0.058	3.4	2.5
0.100				
Kern County (Pasadena): M=7.4; d=127	0.313	0.076	4.1	3.1
Izmit (Denizli): M=7.6; d=330	0.188	0.084	2.2	1.9
DuzceI(Denizli): M=7.2; d=372	0.167	0.090	1.9	1.7
Dinar (Balikersir): M=6.4; d=257	0.227	0.076	3.0	2.3
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.171	0.083	2.1	1.7
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.288	0.065	4.4	2.9
<i>Average</i>	0.226	0.079	2.9	2.3

E.3 Peak acceleration values and soil amplification factors for global rock outcrop motions using lower-bound soil profile

Ground Motion (g)	PGA (g)	PGA (g)	Amplification Factors	
	ground surface	bedrock	(ground surface/bedrock)	(ground surface/outcrop)
0.002				
Kern County (Pasadena): M=7.4; d=127	0.010	0.002	5.0	5.0
Izmit (Denizli): M=7.6; d=330	0.006	0.002	3.0	3.0
Duzcel(Denizli): M=7.2; d=372	0.004	0.002	2.0	2.0
Dinar (Balikersir): M=6.4; d=257	0.012	0.002	6.0	6.0
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.009	0.002	4.5	4.5
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.007	0.001	7.0	3.5
<i>Average</i>	0.008	0.002	4.6	4.0
0.011				
Kern County (Pasadena): M=7.4; d=127	0.038	0.008	4.8	3.5
Izmit (Denizli): M=7.6; d=330	0.033	0.009	3.7	3.0
Duzcel(Denizli): M=7.2; d=372	0.019	0.010	1.9	1.7
Dinar (Balikersir): M=6.4; d=257	0.080	0.011	7.3	7.3
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.038	0.008	4.8	3.5
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.035	0.008	4.4	3.2
<i>Average</i>	0.041	0.009	4.5	3.7
0.025				
Kern County (Pasadena): M=7.4; d=127	0.071	0.016	4.4	2.8
Izmit (Denizli): M=7.6; d=330	0.066	0.022	3.0	2.6
Duzcel(Denizli): M=7.2; d=372	0.053	0.023	2.3	2.1
Dinar (Balikersir): M=6.4; d=257	0.126	0.025	5.0	5.0
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.063	0.017	3.7	2.5
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.074	0.018	4.1	3.0
<i>Average</i>	0.076	0.020	3.8	3.0
0.035				
Kern County (Pasadena): M=7.4; d=127	0.095	0.023	4.1	2.7
Izmit (Denizli): M=7.6; d=330	0.101	0.030	3.4	2.9
Duzcel(Denizli): M=7.2; d=372	0.073	0.032	2.3	2.1
Dinar (Balikersir): M=6.4; d=257	0.140	0.035	4.0	4.0
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.076	0.023	3.3	2.2
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.097	0.025	3.9	2.8
<i>Average</i>	0.097	0.028	3.5	2.8
0.050				
Kern County (Pasadena): M=7.4; d=127	0.126	0.035	3.6	2.5
Izmit (Denizli): M=7.6; d=330	0.127	0.044	2.9	2.5
Duzcel(Denizli): M=7.2; d=372	0.102	0.046	2.2	2.0
Dinar (Balikersir): M=6.4; d=257	0.160	0.050	3.2	3.2
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.097	0.032	3.0	1.9
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.124	0.035	3.5	2.5
<i>Average</i>	0.123	0.040	3.1	2.5
0.075				
Kern County (Pasadena): M=7.4; d=127	0.153	0.057	2.7	2.0
Izmit (Denizli): M=7.6; d=330	0.150	0.066	2.3	2.0
Duzcel(Denizli): M=7.2; d=372	0.154	0.070	2.2	2.1
Dinar (Balikersir): M=6.4; d=257	0.173	0.075	2.3	2.3
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.130	0.050	2.6	1.7
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.157	0.050	3.1	2.1
<i>Average</i>	0.153	0.061	2.5	2.0
0.100				
Kern County (Pasadena): M=7.4; d=127	0.168	0.073	2.3	1.7
Izmit (Denizli): M=7.6; d=330	0.170	0.085	2.0	1.7
Duzcel(Denizli): M=7.2; d=372	0.215	0.094	2.3	2.2
Dinar (Balikersir): M=6.4; d=257	0.196	0.100	2.0	2.0
San Fernando (Cholame-Shandon Array #8): M=6.6; d=223	0.161	0.062	2.6	1.6
Loma Prieta (Yerba Buena Island): M=6.9; d=80	0.179	0.063	2.8	1.8
<i>Average</i>	0.182	0.080	2.3	1.8

E.4 Peak acceleration values and soil amplification factors for local rock outcrop motions using best-estimate soil profile

Ground Motion (g)	PGA (g)	PGA (g)	Ratio	Ratio
	<i>ground surface</i>	<i>bedrock</i>	<i>ground surface/bedrock</i>	<i>ground surface/outcrop</i>
0.002				
414ABE09.TA2	0.009	0.001	9.0	4.5
3F698DAB.TA2	0.008	0.001	8.0	4.0
3F69910B.CM2	0.005	0.001	5.0	2.5
3FA12A29.CM2	0.010	0.002	5.0	5.0
3FA1299E.TA2	0.010	0.002	5.0	5.0
<i>Average</i>	0.008	0.001	6.4	4.2
0.011				
414ABE09.TA2	0.050	0.007	7.1	4.5
3F698DAB.TA2	0.035	0.007	5.0	3.2
3F69910B.CM2	0.023	0.007	3.3	2.1
3FA12A29.CM2	0.048	0.009	5.3	4.4
3FA1299E.TA2	0.054	0.007	7.7	4.9
<i>Average</i>	0.042	0.007	5.7	3.8
0.025				
414ABE09.TA2	0.110	0.017	6.5	4.4
3F698DAB.TA2	0.067	0.015	4.5	2.7
3F69910B.CM2	0.044	0.017	2.6	1.8
3FA12A29.CM2	0.095	0.017	5.6	3.8
3FA1299E.TA2	0.111	0.018	6.2	4.4
<i>Average</i>	0.085	0.017	5.1	3.4
0.035				
414ABE09.TA2	0.145	0.023	6.3	4.1
3F698DAB.TA2	0.088	0.022	4.0	2.5
3F69910B.CM2	0.056	0.024	2.3	1.6
3FA12A29.CM2	0.127	0.021	6.0	3.6
3FA1299E.TA2	0.143	0.026	5.5	4.1
<i>Average</i>	0.112	0.023	4.8	3.2
0.050				
414ABE09.TA2	0.188	0.032	5.9	3.8
3F698DAB.TA2	0.109	0.033	3.3	2.2
3F69910B.CM2	0.084	0.035	2.4	1.7
3FA12A29.CM2	0.176	0.032	5.5	3.5
3FA1299E.TA2	0.184	0.038	4.8	3.7
<i>Average</i>	0.148	0.034	4.4	3.0
0.075				
414ABE09.TA2	0.246	0.050	4.9	3.3
3F698DAB.TA2	0.143	0.052	2.8	1.9
3F69910B.CM2	0.125	0.051	2.5	1.7
3FA12A29.CM2	0.238	0.052	4.6	3.2
3FA1299E.TA2	0.236	0.057	4.1	3.1
<i>Average</i>	0.198	0.052	3.8	2.6
0.100				
414ABE09.TA2	0.288	0.066	4.4	2.9
3F698DAB.TA2	0.176	0.070	2.5	1.8
3F69910B.CM2	0.150	0.067	2.2	1.5
3FA12A29.CM2	0.283	0.073	3.9	2.8
3FA1299E.TA2	0.285	0.074	3.9	2.9
<i>Average</i>	0.236	0.070	3.4	2.4

E.5 Peak acceleration values and soil amplification factors for local rock outcrop motions using upper-bound soil profile

Ground Motion (g)	PGA (g)	PGA (g)	Ratio	Ratio
	<i>ground surface</i>	<i>bedrock</i>	<i>ground surface/bedrock</i>	<i>ground surface/outcrop</i>
0.002				
414ABE09.TA2	0.008	0.001	8.0	4.0
3F698DAB.TA2	0.005	0.002	2.5	2.5
3F69910B.CM2	0.005	0.001	5.0	2.5
3FA12A29.CM2	0.008	0.002	4.0	4.0
3FA1299E.TA2	0.008	0.001	8.0	4.0
<i>Average</i>	0.007	0.001	5.5	3.4
0.011				
414ABE09.TA2	0.038	0.008	4.8	3.5
3F698DAB.TA2	0.028	0.008	3.5	2.5
3F69910B.CM2	0.022	0.008	2.8	2.0
3FA12A29.CM2	0.041	0.008	5.1	3.7
3FA1299E.TA2	0.042	0.008	5.3	3.8
<i>Average</i>	0.034	0.008	4.3	3.1
0.025				
414ABE09.TA2	0.078	0.019	4.1	3.1
3F698DAB.TA2	0.057	0.018	3.2	2.3
3F69910B.CM2	0.038	0.018	2.1	1.5
3FA12A29.CM2	0.092	0.020	4.6	3.7
3FA1299E.TA2	0.094	0.016	5.9	3.8
<i>Average</i>	0.072	0.018	4.0	2.9
0.035				
414ABE09.TA2	0.108	0.027	4.0	3.1
3F698DAB.TA2	0.075	0.025	3.0	2.1
3F69910B.CM2	0.053	0.026	2.0	1.5
3FA12A29.CM2	0.125	0.027	4.6	3.6
3FA1299E.TA2	0.125	0.023	5.4	3.6
<i>Average</i>	0.097	0.026	3.8	2.8
0.050				
414ABE09.TA2	0.156	0.037	4.2	3.1
3F698DAB.TA2	0.107	0.037	2.9	2.1
3F69910B.CM2	0.077	0.038	2.0	1.5
3FA12A29.CM2	0.168	0.036	4.7	3.4
3FA1299E.TA2	0.161	0.034	4.7	3.2
<i>Average</i>	0.134	0.036	3.7	2.7
0.075				
414ABE09.TA2	0.226	0.053	4.3	3.0
3F698DAB.TA2	0.141	0.056	2.5	1.9
3F69910B.CM2	0.112	0.057	2.0	1.5
3FA12A29.CM2	0.120	0.026	4.6	1.6
3FA1299E.TA2	0.220	0.053	4.2	2.9
<i>Average</i>	0.164	0.049	3.5	2.2
0.100				
414ABE09.TA2	0.279	0.071	3.9	2.8
3F698DAB.TA2	0.176	0.076	2.3	1.8
3F69910B.CM2	0.132	0.076	1.7	1.3
3FA12A29.CM2	0.276	0.077	3.6	2.8
3FA1299E.TA2	0.267	0.071	3.8	2.7
<i>Average</i>	0.226	0.074	3.1	2.3

E.6 Peak acceleration values and soil amplification factors for local rock outcrop motions using lower-bound soil profile

Ground Motion (g)	PGA (g)	PGA (g)	Ratio	
	<i>ground surface</i>	<i>bedrock</i>	<i>ground surface/bedrock</i>	<i>ground surface/outcrop</i>
0.002				
414ABE09.TA2	0.010	0.001	10.0	5.0
3F698DAB.TA2	0.005	0.001	5.0	2.5
3F69910B.CM2	0.005	0.001	5.0	2.5
3FA12A29.CM2	0.008	0.001	8.0	4.0
3FA1299E.TA2	0.009	0.001	9.0	4.5
<i>Average</i>	0.007	0.001	7.4	3.7
0.011				
414ABE09.TA2	0.040	0.007	5.7	3.6
3F698DAB.TA2	0.024	0.006	4.0	2.2
3F69910B.CM2	0.023	0.007	3.3	2.1
3FA12A29.CM2	0.037	0.007	5.3	3.4
3FA1299E.TA2	0.038	0.007	5.4	3.5
<i>Average</i>	0.032	0.007	4.7	2.9
0.025				
414ABE09.TA2	0.071	0.016	4.4	2.8
3F698DAB.TA2	0.050	0.015	3.3	2.0
3F69910B.CM2	0.043	0.016	2.7	1.7
3FA12A29.CM2	0.065	0.015	4.3	2.6
3FA1299E.TA2	0.077	0.017	4.5	3.1
<i>Average</i>	0.061	0.016	3.9	2.4
0.035				
414ABE09.TA2	0.092	0.023	4.0	2.6
3F698DAB.TA2	0.065	0.021	3.1	1.9
3F69910B.CM2	0.060	0.024	2.5	1.7
3FA12A29.CM2	0.075	0.020	3.8	2.1
3FA1299E.TA2	0.098	0.025	3.9	2.8
<i>Average</i>	0.078	0.023	3.5	2.2
0.050				
414ABE09.TA2	0.122	0.031	3.9	2.4
3F698DAB.TA2	0.086	0.031	2.8	1.7
3F69910B.CM2	0.081	0.035	2.3	1.6
3FA12A29.CM2	0.102	0.029	3.5	2.0
3FA1299E.TA2	0.125	0.036	3.5	2.5
<i>Average</i>	0.103	0.032	3.2	2.1
0.075				
414ABE09.TA2	0.151	0.045	3.4	2.0
3F698DAB.TA2	0.117	0.044	2.7	1.6
3F69910B.CM2	0.102	0.054	1.9	1.4
3FA12A29.CM2	0.139	0.048	2.9	1.9
3FA1299E.TA2	0.160	0.053	3.0	2.1
<i>Average</i>	0.134	0.049	2.8	1.8
0.100				
414ABE09.TA2	0.166	0.063	2.6	1.7
3F698DAB.TA2	0.154	0.060	2.6	1.5
3F69910B.CM2	0.128	0.072	1.8	1.3
3FA12A29.CM2	0.161	0.067	2.4	1.6
3FA1299E.TA2	0.178	0.070	2.5	1.8
<i>Average</i>	0.157	0.066	2.4	1.6

BIOGRAPHY

Muriel Enriquez Naguit

I was born in Bataan, a province in the northern part of the Philippines, on the 6th day of April, 1981. I finished my elementary and secondary studies in schools located in Bataan's capital city called Balanga. Afterwhich, I pursued my undergraduate studies at University of the Philippines in Diliman, Quezon City where I earned bachelor's degree in Civil Engineering in 2003. Soon after, I took and passed the Professional Licensure Exam for Civil Engineers on the same year. As a registered Civil Engineer, I worked for AMH Philippines, Inc. which is an engineering consultancy and design firm. In 2005, I have received AUN/SEED-Net JICA Scholarship to further my study under the Master's program in which this thesis is a partial requirement in the fulfillment of the degree.