Example

This example shows how to read and resample earthquake record time histories from external ASCII files that can be downloaded from the Pacific Earthquake Engineering Research Center (PEER) Ground Motion Data Base, available at the following link:

https://ngawest2.berkeley.edu/users/sign_in?unauthenticated=true

and hosted by the University of California, Berkeley, CA. Initially the user must download an earthquake record suite from this website and save all ASCII files inside the folder 'Records' of this package.

After downloading the various records from the above data base, this main script is run to load and resample the time history data of the ASCII files, assemble them in cell arrays and plot them.

The time histories read in this example include displacement, velocity and acceleration, both for horizontal and vertical components of the earthquakes considered.

After reading the time history data from an ASCII file, the time history data are resampled, i.e. the time step of the data is adjusted to a new value that is specified by the user.

Contents

- Install directory
- Read and resample the vertical components of the suite
- Read and resample the horizontal components of the suite

Install directory

```
S=mfilename('fullpath');
f=filesep;
ind=strfind(S,f);
S1=S(1:ind(end)-1);
addpath(genpath(S1));
cd(S1)
```

Read and resample the vertical components of the suite

Specify the time step of the vertical components

```
dt=0.02;
```

File names ending in 'UP'

```
S = dir([S1,'\Records\*UP.*']);
C={S.name};
eqmotionsVer=C(:);
```

File names ending in 'DWN'

```
S = dir([S1,'\Records\*DWN.*']);
C={S.name};
eqmotionsVer=[eqmotionsVer;C(:)];
```

File names ending in '-V'

```
S = dir([S1,'\Records\*-V.*']);
C={S.name};
eqmotionsVer=[eqmotionsVer;C(:)];
```

File names ending in '-Z'

```
S = dir([S1,'\Records\*-Z.*']);
C={S.name};
eqmotionsVer=[eqmotionsVer;C(:)];
```

File names ending in '-Z'

```
S = dir([S1,'\Records\*UD.*']);
C={S.name};
eqmotionsVer=[eqmotionsVer;C(:)];
```

Read files containing time histories of vertical components

```
[n,timeHistVer,L]=NGARecordAssembly(eqmotionsVer,dt);
```

Number of vertical components

```
n
```

```
n =

    21
```

Maximum duration of the vertical components

```
L
```

```
L =

        3170
```

Vertical displacement components

```
DT2=strfind(eqmotionsVer,'DT2');
DT2indV=~cellfun('isempty',DT2);
xgVert=timeHistVer(DT2indV);
```

Vertical acceleration components

```
VT2=strfind(eqmotionsVer,'VT2');
VT2indV=~cellfun('isempty',VT2);
xgtVert=timeHistVer(VT2indV);
```

Vertical acceleration components

```
AT2=strfind(eqmotionsVer,'AT2');
AT2indV=~cellfun('isempty',AT2);
xgttVert=timeHistVer(AT2indV);
```

Read and resample the horizontal components of the suite

```
S = dir([S1,'\Records\*.*']);
C={S.name};
```

Delete single and double dots

```
C(1:2)=[];
```

Load all file names inside the 'Records' folder

```
eqmotions=C(:);
```

Find indices of horizontal motions

```
ind1=strfind(eqmotions,'UP.');
ind1=~cellfun('isempty',ind1);
ind2=strfind(eqmotions,'DWN.');
ind2=~cellfun('isempty',ind2);
ind3=strfind(eqmotions,'-V.');
ind3=~cellfun('isempty',ind3);
ind4=strfind(eqmotions,'-Z.');
ind4=~cellfun('isempty',ind4);
ind5=strfind(eqmotions,'UD.');
ind5=~cellfun('isempty',ind5);
```

Retain only the file names corresponding to horizontal ground motions

```
ind=(~ind1) & (~ind2) & (~ind3) & (~ind4) & (~ind5);
eqmotionsHor=eqmotions(ind);
```

Read files containing time histories of horizontal components

```
[n,timeHistHor,L]=NGARecordAssembly(eqmotionsHor,dt);
```

Number of horizontal components

```
n
```

```
n =

    42
```

Maximum duration of the horizontal components

```
L
```

```
L =

        3170
```

Horizontal displacement components

```
DT2=strfind(eqmotionsHor,'DT2');
DT2indH=find(~cellfun('isempty',DT2));
xgHor=timeHistHor(DT2indH);
```

Horizontal velocity components

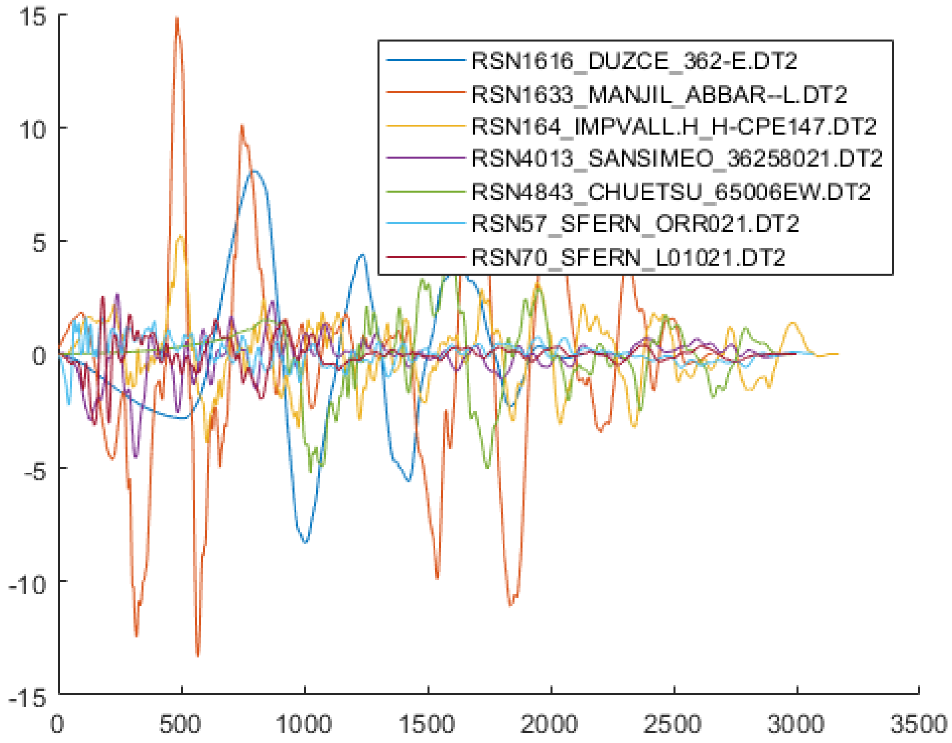
```
VT2=strfind(eqmotionsHor,'VT2');
VT2indH=find(~cellfun('isempty',VT2));
xgtHor=timeHistHor(VT2indH);
```

Horizontal acceleration components

```
AT2=strfind(eqmotionsHor,'AT2');
AT2indH=find(~cellfun('isempty',AT2));
xgttHor=timeHistHor(AT2indH);
```

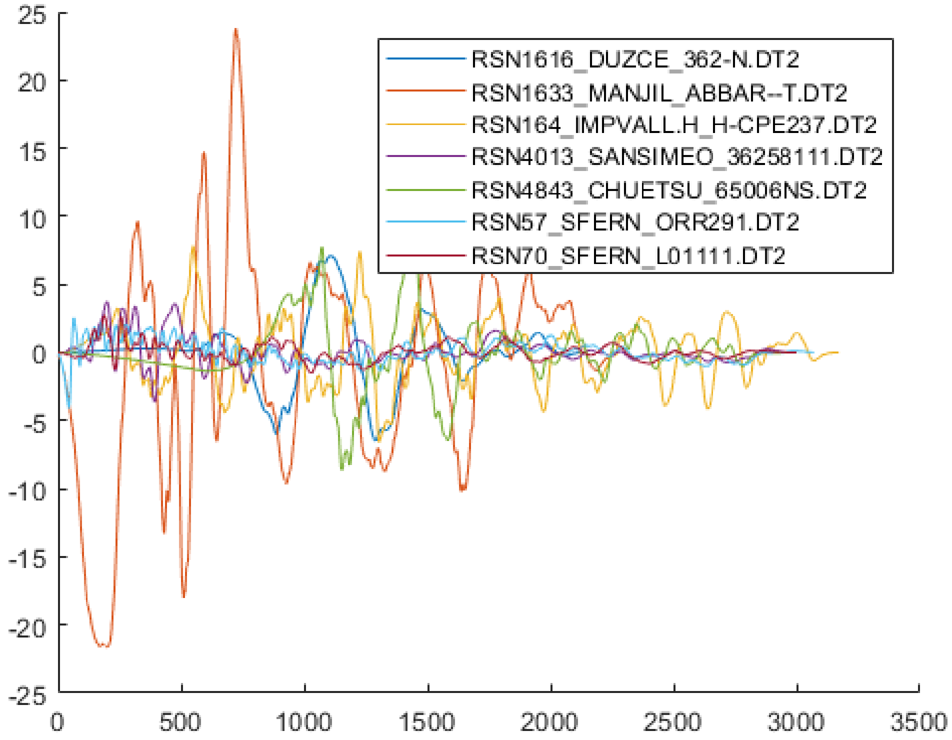
Plot the horizontal displacement time histories, first component

```
figure(1)
hold on
for i=1:2:size(xgHor,1)
    plot(xgHor{i})
end
leg=legend(eqmotionsHor(DT2indH(1:2:end)));
set(leg,'Interpreter','none');
```



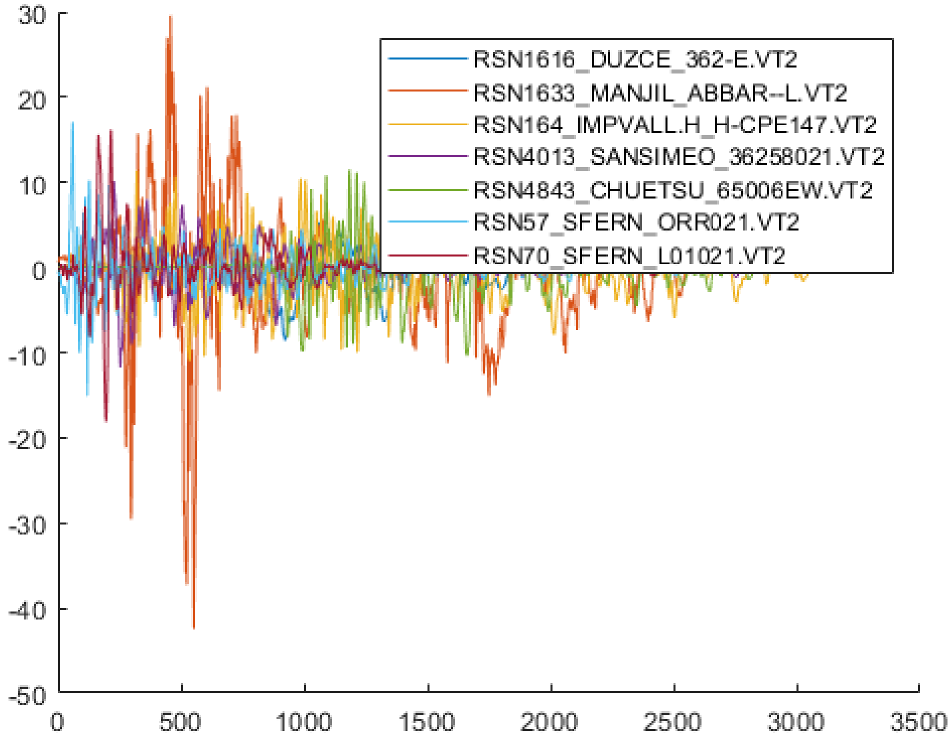
Plot the horizontal displacement time histories, second component

```
figure(2)
hold on
for i=2:2:size(xgHor,1)
    plot(xgHor{i})
end
leg=legend(eqmotionsHor(DT2indH(2:2:end)));
set(leg,'Interpreter','none');
```



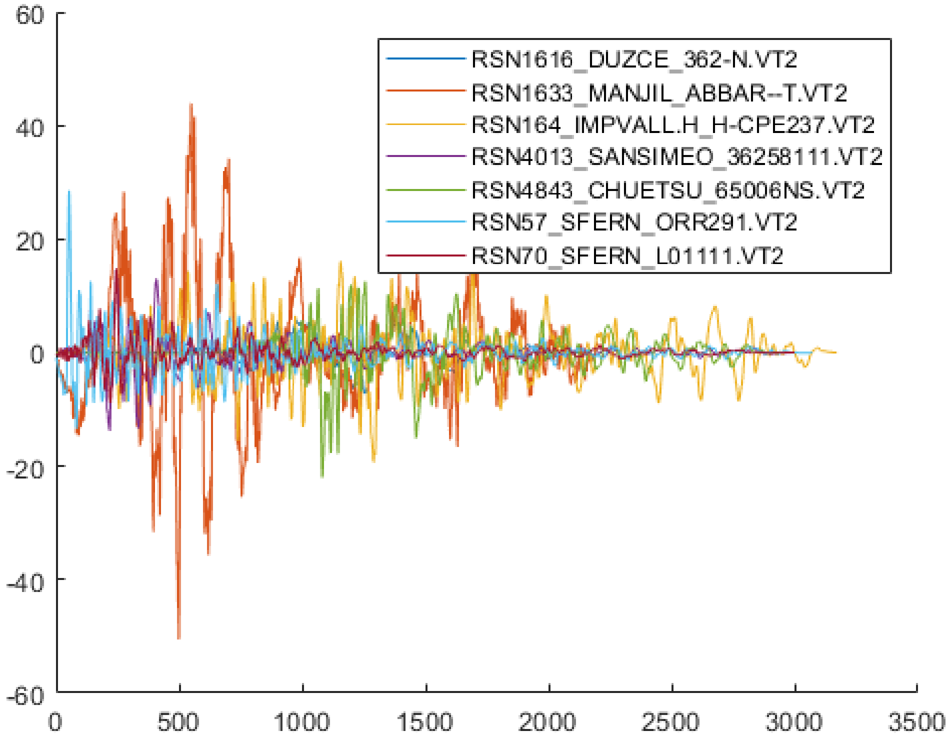
Plot the horizontal velocity time histories, first component

```
figure(3)
hold on
for i=1:2:size(xgtHor,1)
    plot(xgtHor{i})
end
leg=legend(eqmotionsHor(VT2indH(1:2:end)));
set(leg,'Interpreter','none');
```



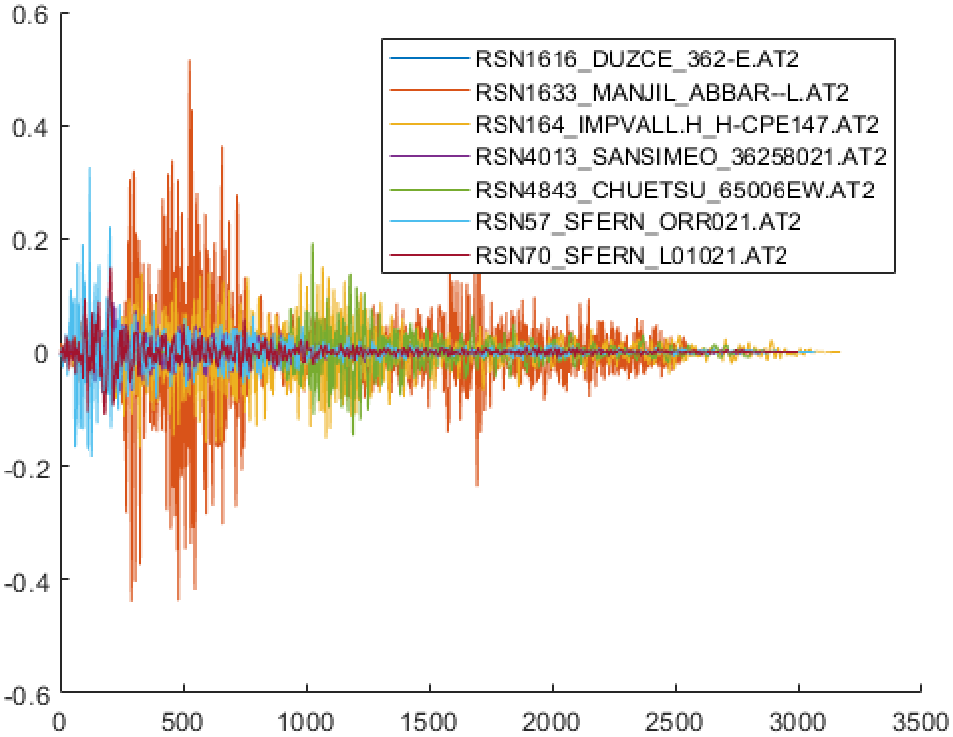
Plot the horizontal velocity time histories, second component

```
figure(4)
hold on
for i=2:2:size(xgtHor,1)
    plot(xgtHor{i})
end
leg=legend(eqmotionsHor(VT2indH(2:2:end)));
set(leg,'Interpreter','none');
```



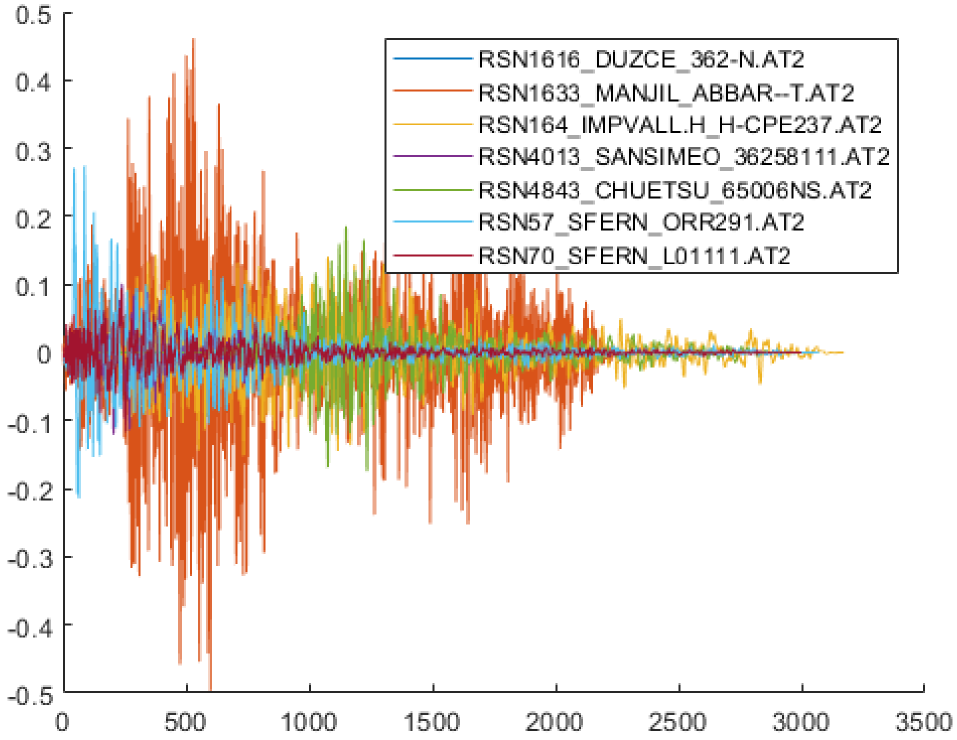
Plot the horizontal acceleration time histories, first component

```
figure(5)
hold on
for i=1:2:size(xgttHor,1)
    plot(xgttHor{i})
end
leg=legend(eqmotionsHor(AT2indH(1:2:end)));
set(leg,'Interpreter','none');
```



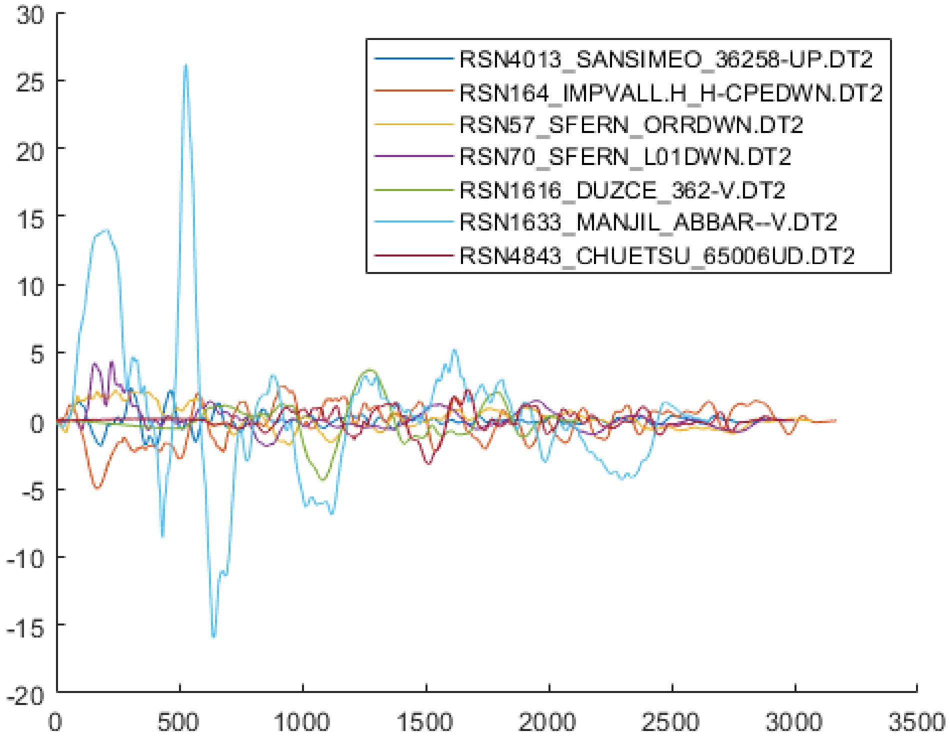
Plot the horizontal acceleration time histories, second component

```
figure(6)
hold on
for i=2:2:size(xgttHor,1)
    plot(xgttHor{i})
end
leg=legend(eqmotionsHor(AT2indH(2:2:end)));
set(leg,'Interpreter','none');
```



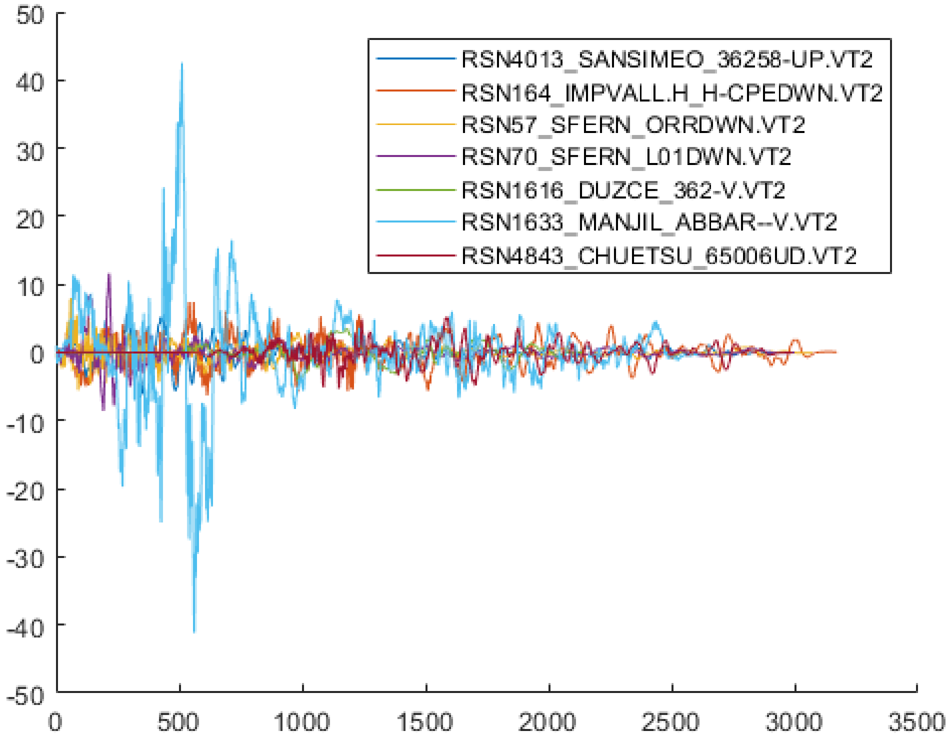
Plot the vertical displacement time histories

```
figure(7)
hold on
for i=1:size(xgVert,1)
    plot(xgVert{i})
end
leg=legend(eqmotionsVer(DT2indV));
set(leg,'Interpreter','none');
```



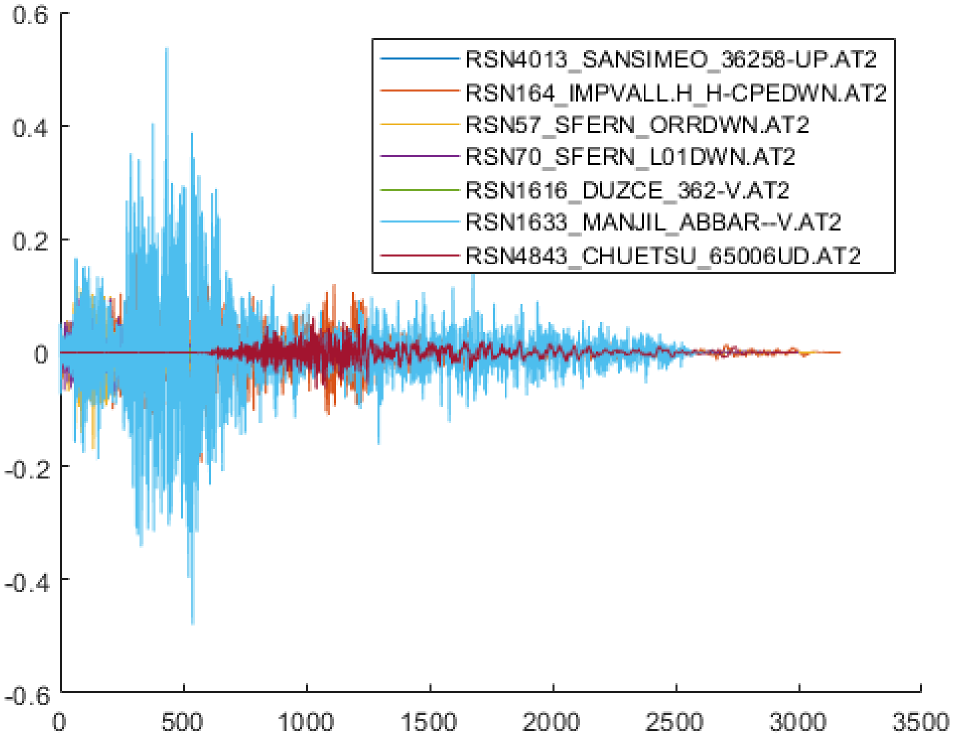
Plot the vertical velocity time histories

```
figure(8)
hold on
for i=1:size(xgtVert,1)
    plot(xgtVert{i})
end
leg=legend(eqmotionsVer(VT2indV));
set(leg,'Interpreter','none');
```



Plot the vertical acceleration time histories

```
figure(9)
hold on
for i=1:size(xgttVert,1)
    plot(xgttVert{i})
end
leg=legend(eqmotionsVer(AT2indV));
set(leg,'Interpreter','none');
```



```
__________________________________________________________________________
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