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# SEISMOGRAPH 2022

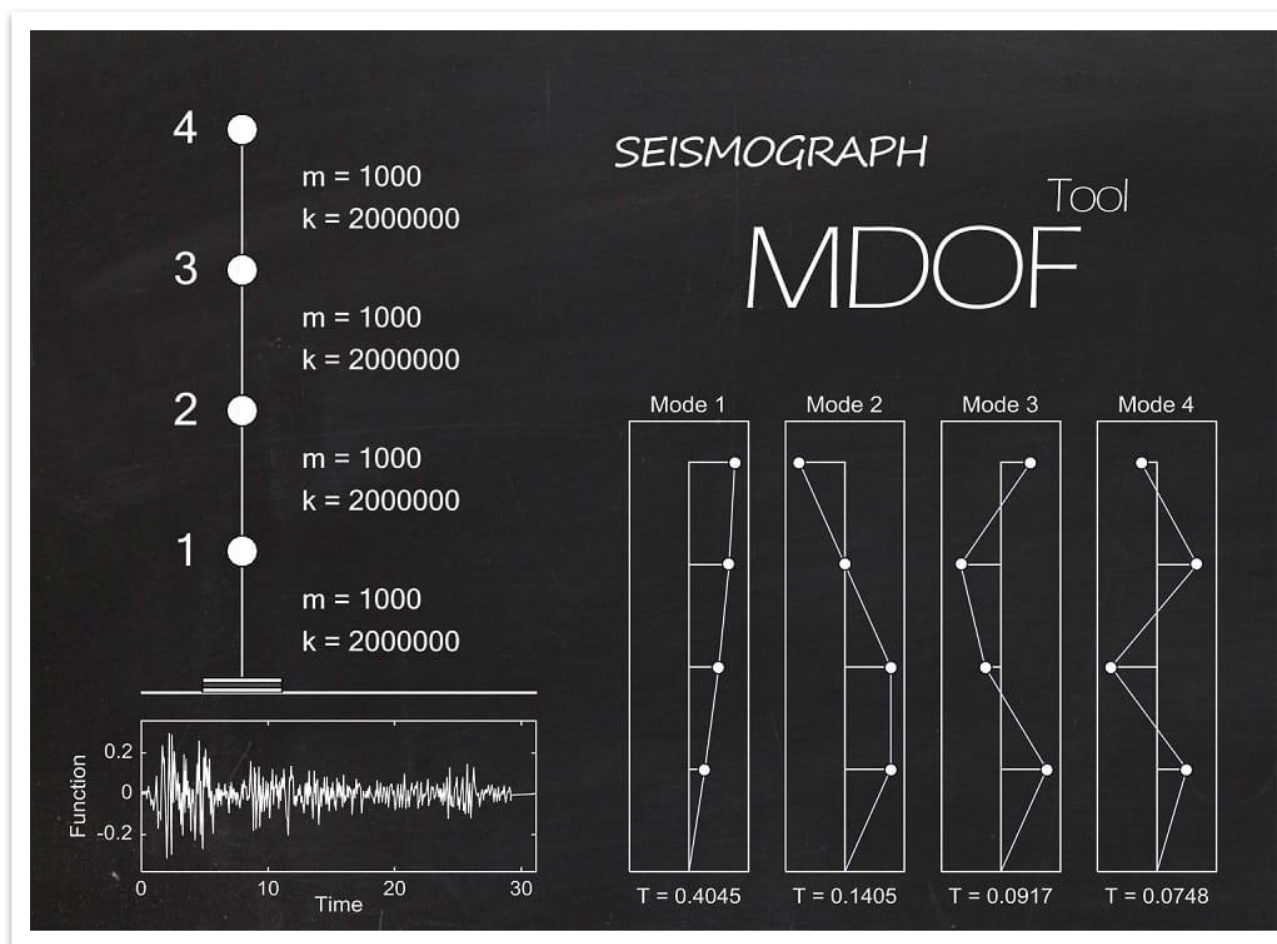
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<https://SEISMOGRAPH.me>

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## Dynamic Analysis of MDOF Systems



### MDOF Analyzer: All In One!

- Linear / Nonlinear Analysis | Seismic Excitation / Direct Force
- Seismic Isolator (LRB - FPS - PF - HDR) / Viscous Damper/ General Bilinear Model
- Live Simulation
- Critical Excitation (Synthetic Earthquake)
- Built-in Scale Tool

# Seismograph MDOF Tool

The screenshot displays the SEISMOGRAPH MDOF Tool interface for a file named 'Test File.smp'. The software is configured for a Multi-Degree of Freedom (MDF) system with 7 stories, including mass, stiffness, and damping parameters for each story. It features a table of system properties, a vertical diagram of the building structure, and a list of five analysis cases, all using the 'El-Centro, 1940' seismic function. The interface includes various control panels for editing cases, plotting functions, and running simulations.

**System Properties**

Number of Stories: 7

System Type:  SDF  MDF

Add Isolator  Add Damper

**Analysis Cases**

Load	Case	Function	Run?
Save	Case 1	El-Centro, 1940	<input checked="" type="checkbox"/>
Apply	Case 2	El-Centro, 1940	<input checked="" type="checkbox"/>
Purge	Case 3	El-Centro, 1940	<input checked="" type="checkbox"/>
Info	Case 4	El-Centro, 1940	<input checked="" type="checkbox"/>
	Case 5	El-Centro, 1940	<input checked="" type="checkbox"/>

**System Properties Table**

Story	Mass
1	9.1774
2	9.1774
3	9.1774
4	9.1774
5	8.1577
6	8.1577
7	8.1577

**Structure Diagram Parameters**

m = 8.1577	k = 4462.2222
	c = 0
m = 8.1577	k = 4462.2222
	c = 0
m = 8.1577	k = 4462.2222
	c = 0
m = 9.1774	k = 6563.5556
	c = 0
m = 9.1774	k = 6563.5556
	c = 0
m = 9.1774	k = 6563.5556
	c = 0
m = 9.1774	k = 6563.5556
	c = 0
m = 9.1774	k = 6563.5556
	c = 0

**Inputs**

Function: El-Centro, 1940

Time: 0 to 30

**Tools**

Plot All Functions

T.S.  Disp.  Vel.  Acc.

R.S.  PSV  PSA  F.A.  P.A.

F / P  IE.  Info...

**Results**

Analysis Case: Case 2

Plot Function: Displacement

One Story  All Stories

Isolator:  Selected Cases

View Loops: Springs

Trace Loop  Animate Loop

Display Table

**Simulation**

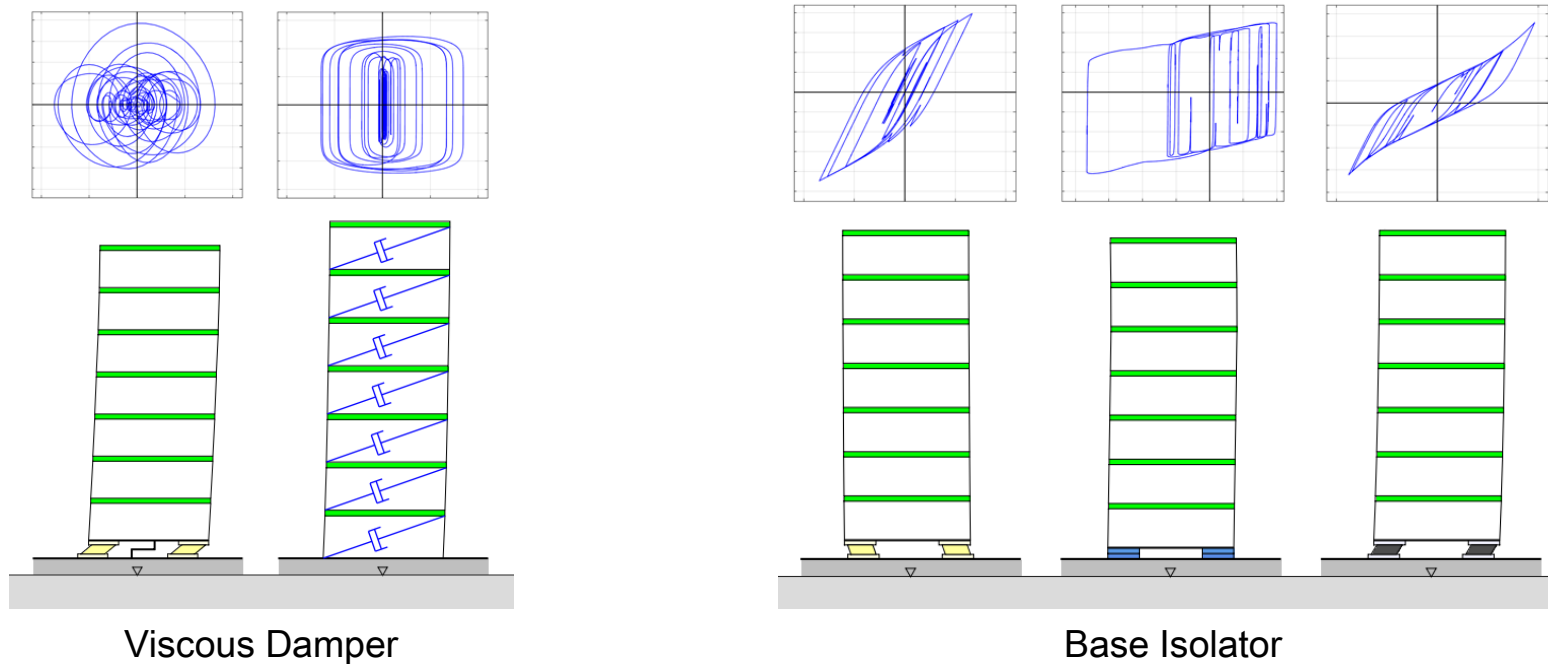
Relative Disp.  Mass & Spring Style  Trace Acceleration

Duration:

Compress Video  Frame Skip: 1

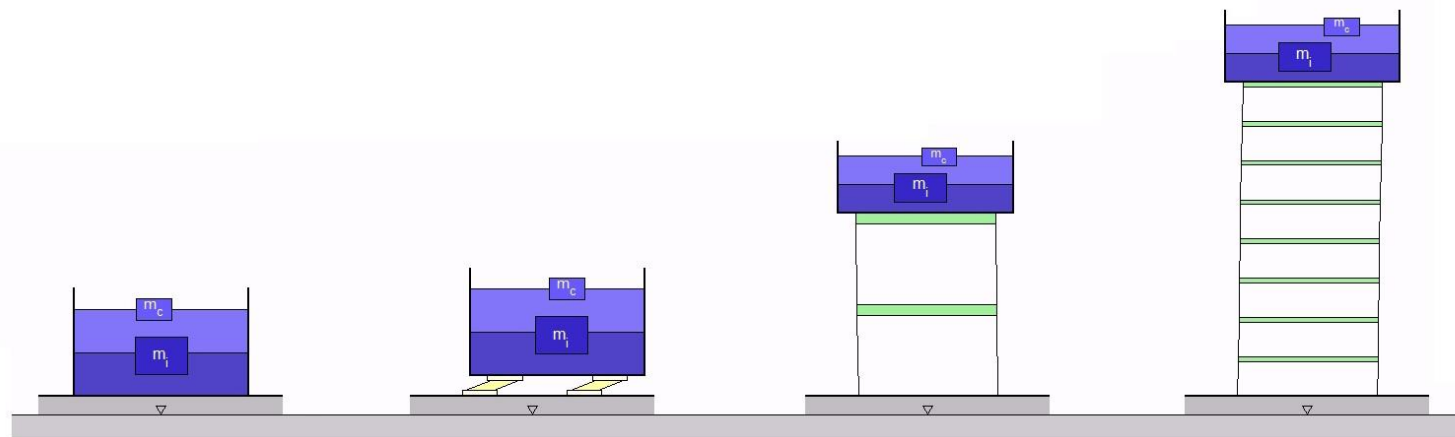
Scale Factor: 1

## Modeling Tools



Viscous Damper

Base Isolator



Liquid Storage Tanks (Available in [Seismograph LST Tool](#))

## Critical Excitation (Synthetic Earthquake)

The screenshot displays the 'CE' (Critical Excitation) software interface. The window is divided into several sections:

- System Type:** SDF (radio button), MDF (radio button, selected).
- Function:** Drift (radio button, selected), Acceleration (radio button), Energy (SDF) (radio button).
- Basic Parameters:** T1: 6, F1: 0.05, DT: 2, DF: 0.05, T2: 12, F2: 20. A 'Run' button and a 'Use PPD' checkbox are present.
- PSDF Parameters:** DW: 16.696, AI: 1.8658, s0: 10, A: 6.6209, PGA: 0.20873. A 'Get' button is present.
- Settings:** Max iterations: 1000, Fraction: 50, Tolerance: 0.0001.
- Envelop Function:** Tma: 50, DT: 0.02, Alpb: 0.1, Bet: 0.35. Includes an 'Envelope Function' plot showing a curve peaking around 5 seconds.
- Double PSDF:** Enable (checkbox, checked), Delta W: 0.4, Low W1: 0.5, Low W2: 10, s1/s2: 0.1395. Includes a 'Display PSDF' checkbox.
- CE Results:** Buttons for 'Critical PSDF', 'OF-i', 'OF-c', 'Transfer Functions', 'PSD Functions', and 'Settings'. Includes checkboxes for 'Animate' and 'Plot all in one'.
- PSDF Plot:** A plot of Power Spectral Density (PSDF) vs. Frequency (0 to 20 Hz). A table of peaks is shown:
 

Freq.	Value
0.0767	0
0.1534	0
0.2301	0
- Stationary Record Plot:** A plot of a stationary time history record vs. Time (0 to 50 seconds). The y-axis is scaled by  $\times 10^{-3}$ . A table of peak values is shown:
 

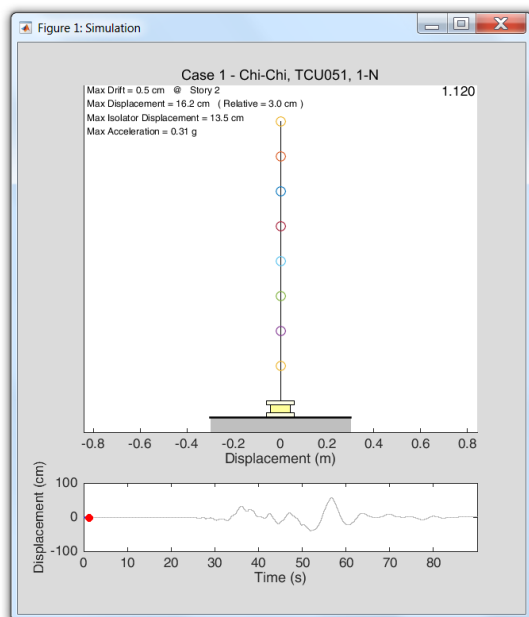
Time	Value
0	3.2778e-04
0.0200	3.3408e-04
0.0400	3.3601e-04
- NonStationary Record Plot:** A plot of a non-stationary time history record vs. Time (0 to 50 seconds). The y-axis is scaled by  $\times 10^{-4}$ . A table of peak values is shown:
 

Time	Value
0	0
0.0200	1.6629e-06
0.0400	3.3300e-06
- Generate Time History:** N: 1, Scale: 9.80665. Filter Settings: Order: 4, Frea 1 (Hz): 0.1, Frea 2 (Hz): 25. Includes checkboxes for 'Ideal White Noise', 'Correct for PGA', 'Correct for Peak', and 'Exact Match'. Includes a 'Filter' button and a 'TOL' field set to 0.01.
- Review:** A list of 'CE 1' is shown. Includes buttons for 'Delete', 'Keep', 'R.S.', 'F/P', 'T.S.', 'I.E.', and 'Info...'. Includes checkboxes for 'D', 'V', 'A', 'PSV', 'PSA', 'F.A.', and 'P.A.'. Includes 'Cancel' and 'OK' buttons.

\* Critical Excitation Tool

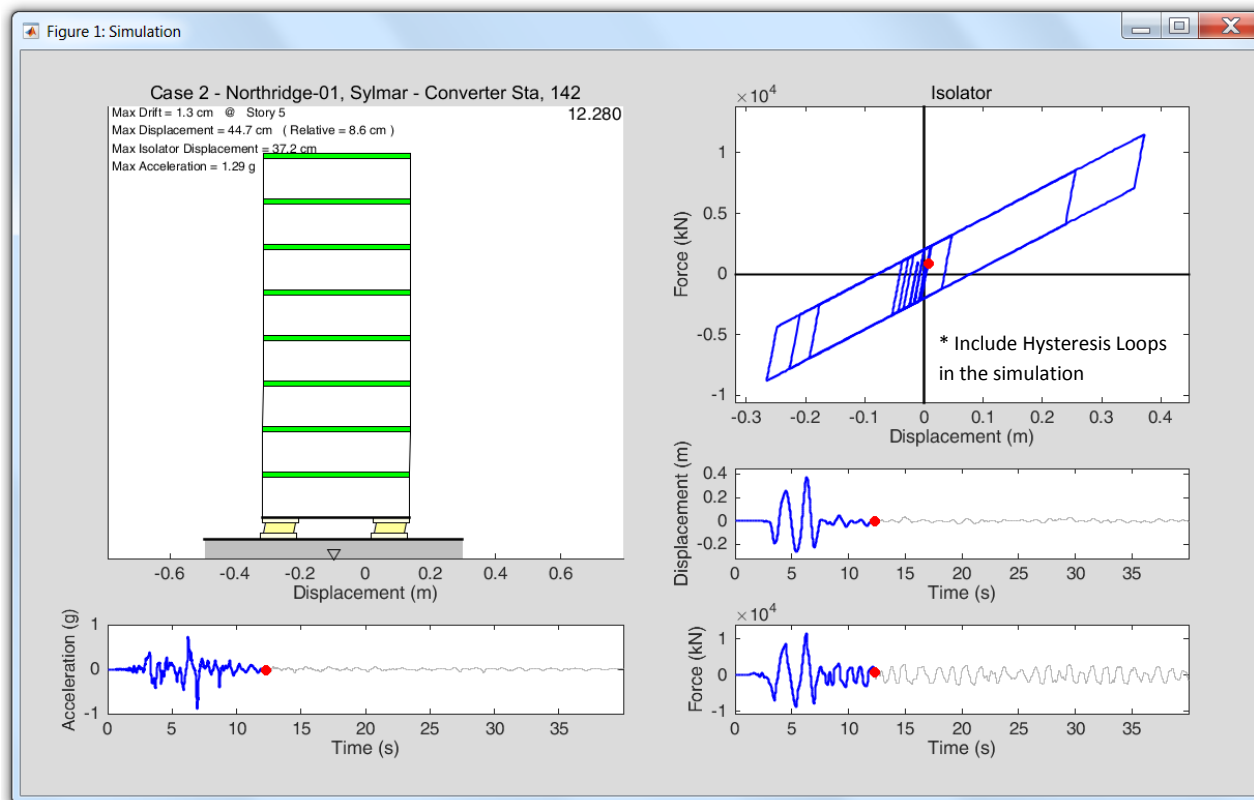
# Live Simulation

\* Basic *Mass-Spring* Style



\* Add ground motion displacement (or Acceleration)  
Trace to the simulation

\* More detailed *Frame-Like* Style



## Display & Edit Model Data

\* Display Modal Information (Period, Frequency, PFn, MPFn, ...)

Figure 1: Modal Info

Mode	Modal Damping (%)	Period (s)	Wn (Rad/s)	Wd (Rad/s)	fn (Hz)	PFn	MPFn
1	18.9907	2.2827	2.7525	2.7024	0.4381	8.3392	0.9884
2	8.4250	0.5939	10.5793	10.5417	1.6837	0.8496	0.0103
3	6.2181	0.3236	19.4163	19.3787	3.0902	0.2805	0.0011
4	4.5652	0.2221	28.2960	28.2665	4.5035	0.1071	1.6311e-04
5	4.5507	0.1784	35.2148	35.1783	5.6046	0.0686	6.6861e-05

\* Review Mass, Stiffness & Damping Matrices

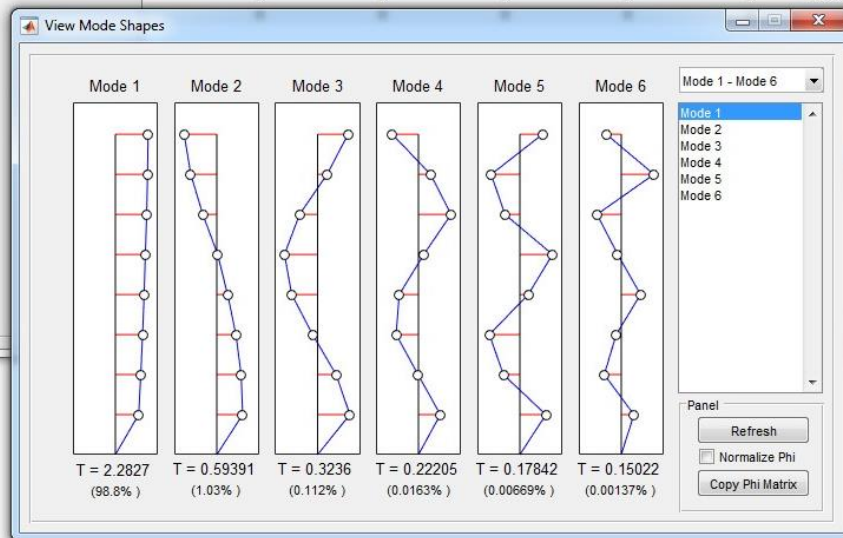
MKC Data

Mass

7.2199e+03	-6.5636e+03	0	0	0	0	0	0	0
-6.5636e+03	1.3127e+04	-6.5636e+03	0	0	0	0	0	0
0	-6.5636e+03	1.3127e+04	-6.5636e+03	0	0	0	0	0
0	0	-6.5636e+03	1.3127e+04	-6.5636e+03	0	0	0	0
0	0	0	-6.5636e+03	1.1026e+04	-4.4622e+03	0	0	0
0	0	0	0	-4.4622e+03	8.9244e+03	-4.4622e+03	0	0
0	0	0	0	0	-4.4622e+03	8.9244e+03	-4.4622e+03	0
0	0	0	0	0	0	-4.4622e+03	4.4622e+03	0

Stiffness

Damping



\* Display Mode Shapes

\* Quickly build model using the Quick Build Tool

Quick Build Tool

M = 2405 Ton

K = 8842600 KN / m

C = 21500 KN.s / m

T1 = 1.52 s T2 = 0.336 s T3 = 0.199 s

Calculate Period

h1 = 8.8 % h2 = 39 % h3 = 66 %

Calculate Damping

Info

M, K & C Matrices...

Modal Parameters

Current Run Info

Force Matrix...

Case 1

-- Current Settings --

Linear Superstructure

Nonlinear Analysis

Rayleigh - Calculated

Direct Integration

Newmark

HDR | - | -

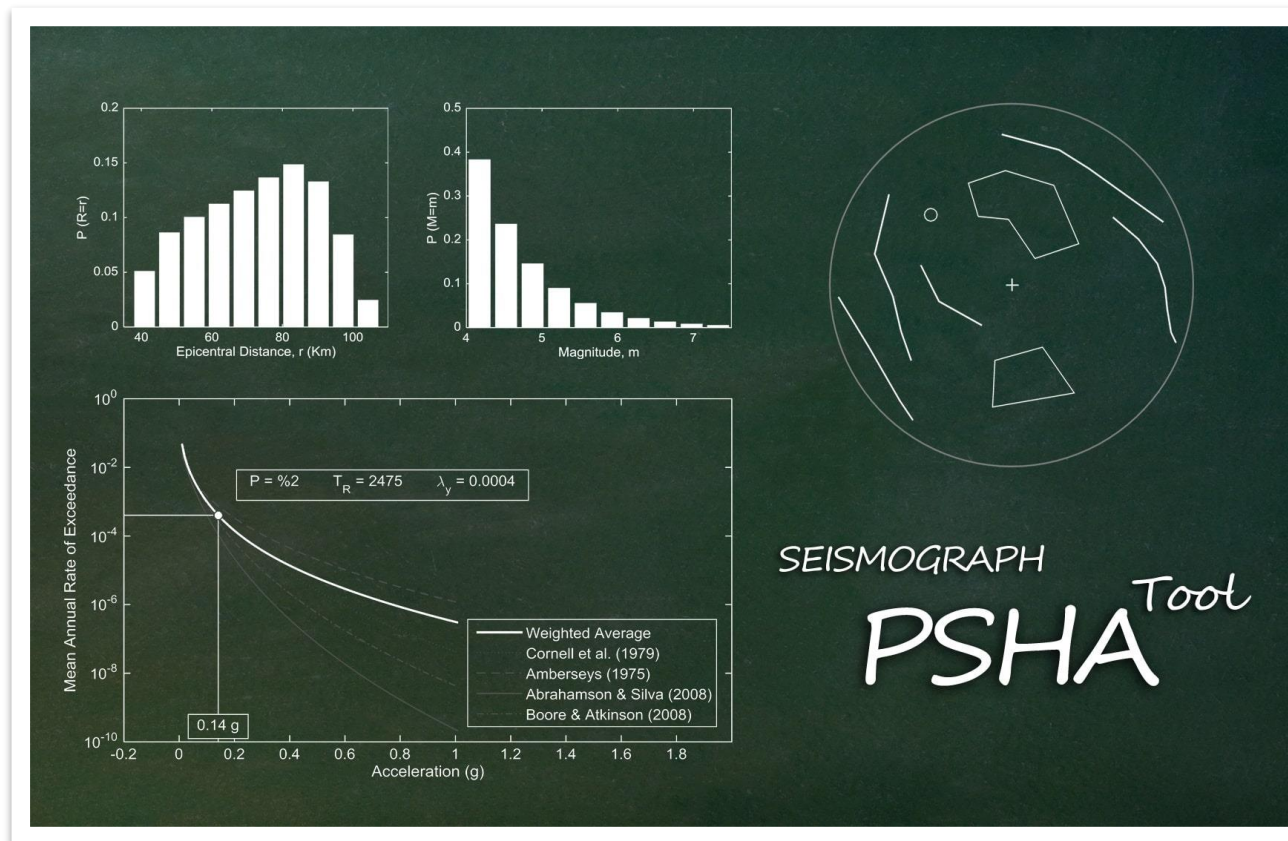
Bilinear

Cancel OK

\* Check input parameters, force matrix and other settings before running the analysis.



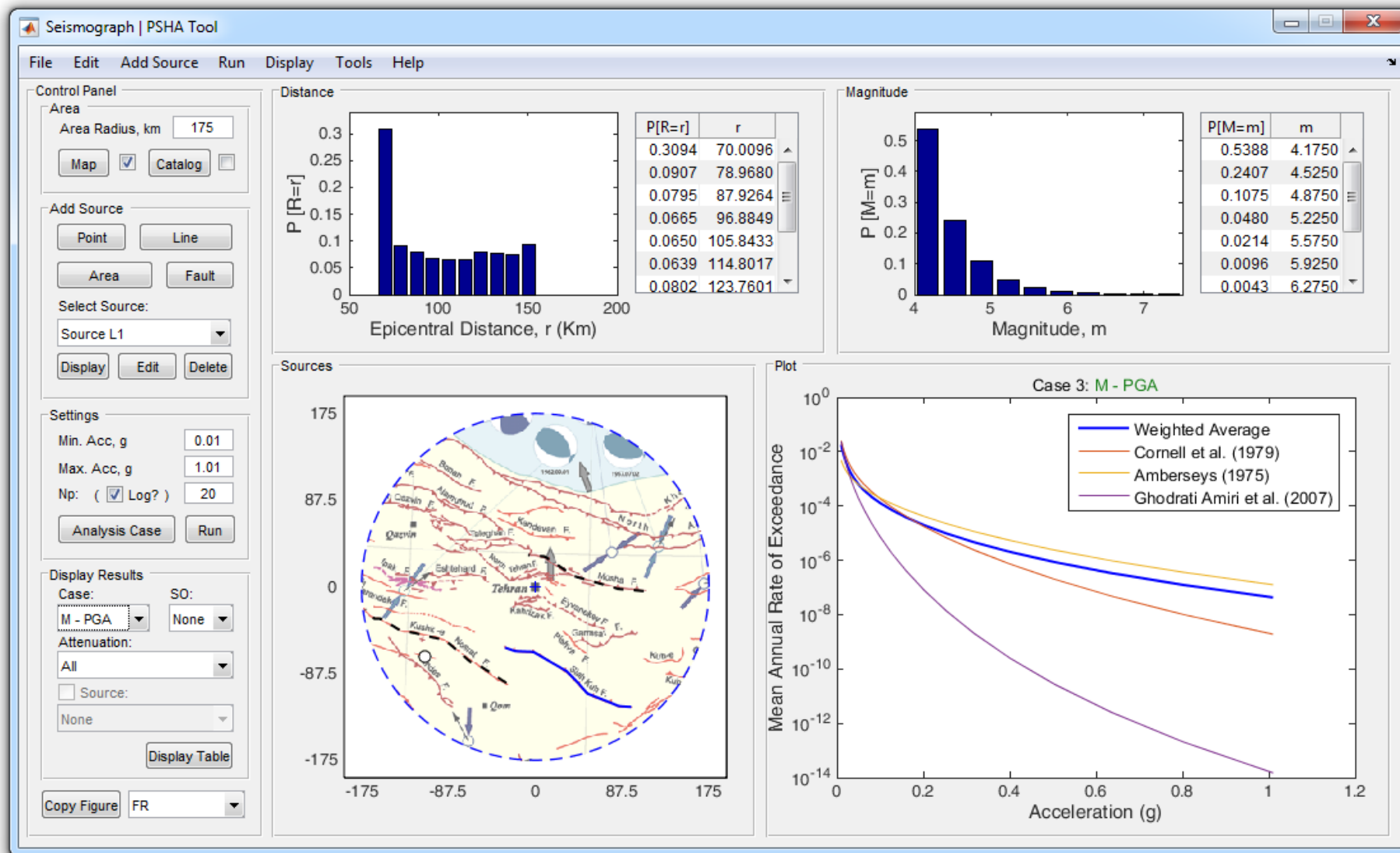
## Probabilistic Seismic Hazard Analysis



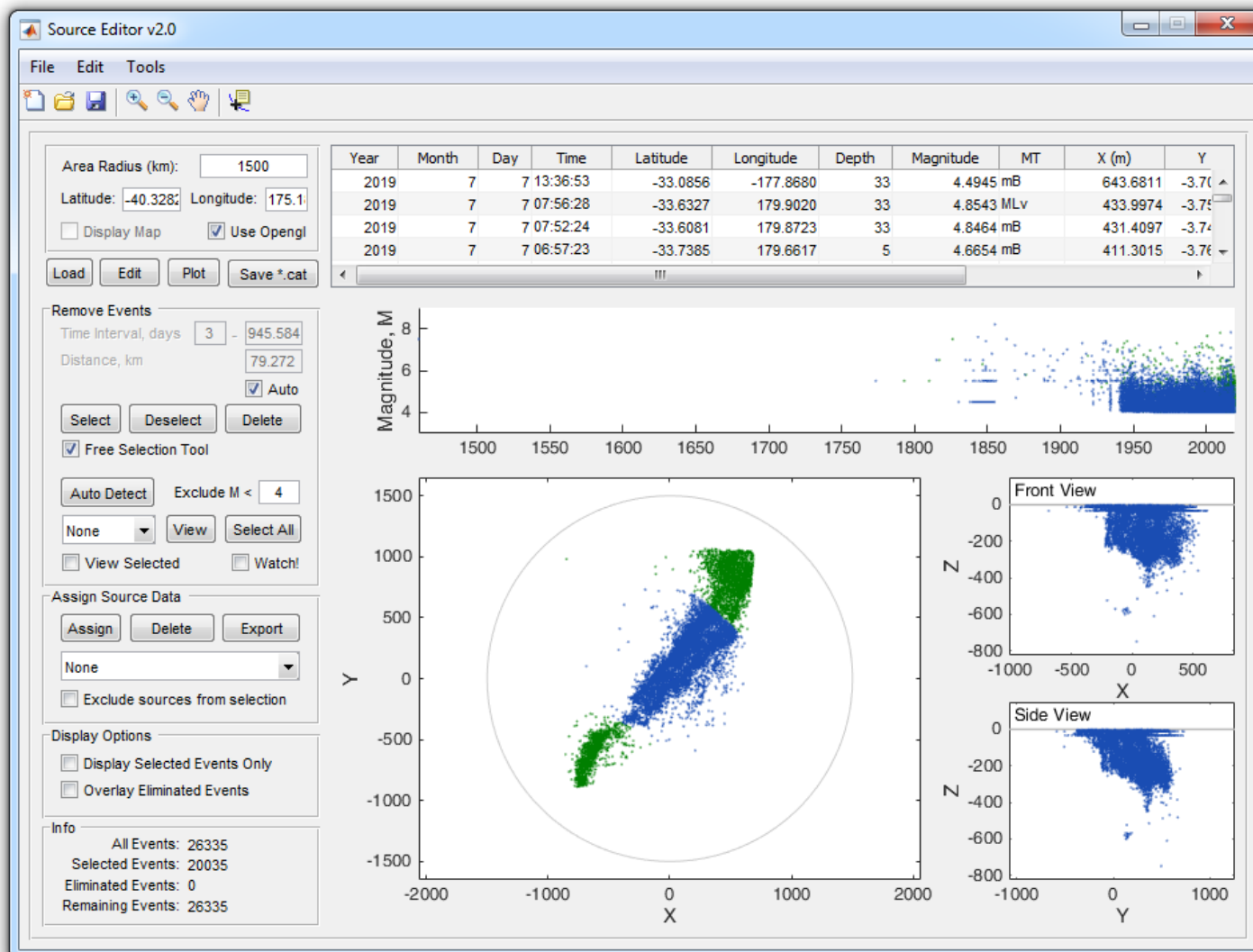
### PSHA Tool: Site-Specific Probabilistic Seismic Hazard Analysis Package

- Site-Specific Probabilistic Seismic Hazard Analysis
- **22** Attenuation Models (Including **4 NGA Models**) / **Attenuation Plotter**
- 4 Source Types: Point / Line / Area / **3D Fault**
- Auto-Compute Magnitude and Distance Distributions
- 3 Analysis Cases: Single / Multiple / **Logic Tree**
- Hazard Curves / Uniform Hazard Spectrum / Deaggregation Tool
- Advanced **Source Editor** Tool: Magnitude Conversion / Declustering (Remove Foreshocks & Aftershocks)

# Seismograph PSHA Tool

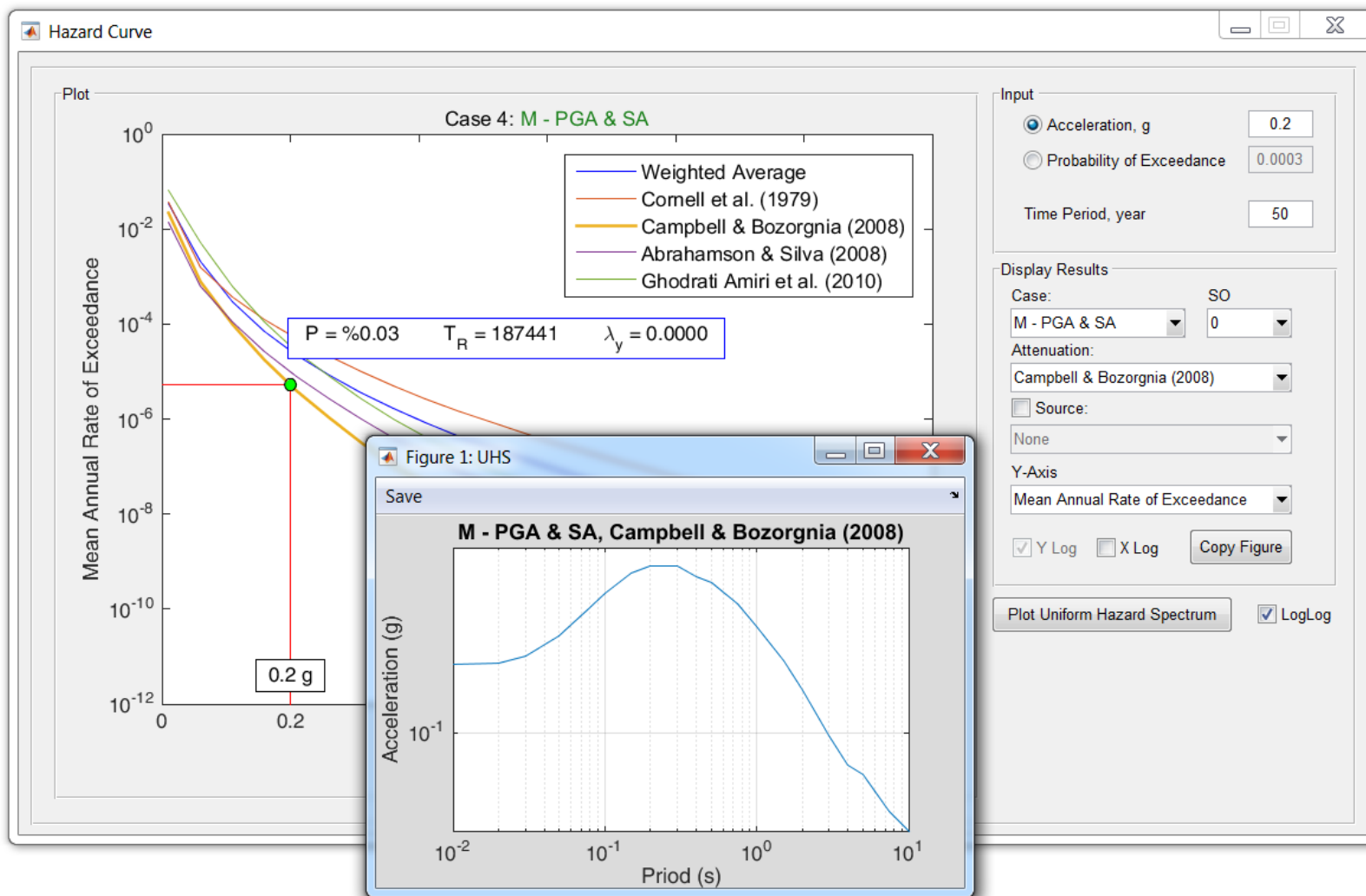


## Advanced Source Editor (v2.0)



- Remove Foreshocks & Aftershocks
- Build sources by assigning events
- Export Sources Data into PSHA Tool
- Convert different Magnitude scales:
  - ML -> Mw (Shoja & Taheri, 2007)
  - MS -> Mw (EMME, 2011 – Scordilis, 2006)
  - mb -> Mw (Scordilis, 2006)
  - ML -> Ms (Gutenberg & Richter, 1956)
  - Mb -> Ms (Mirzaei, 2011 – Ambraseys & Melville, 1982)
  - mB -> Ms (Gutenberg & Richter, 1956)

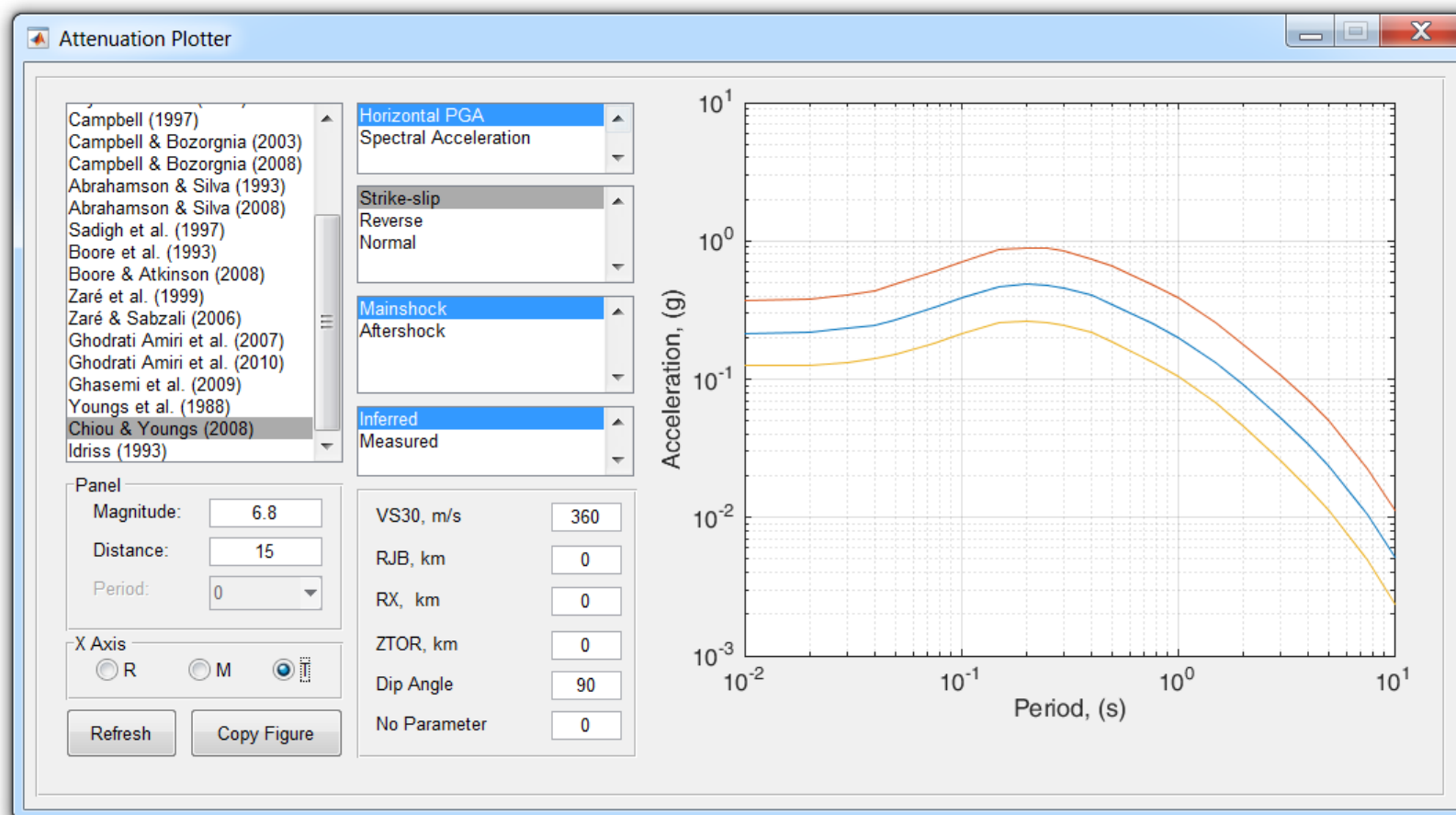
## Hazard Curve & UHS



\* Plot Uniform Hazard Spectrum for appropriate Attenuation Models.

\* Review and compare Hazard Curves for different Attenuation Models and Seismic Sources.

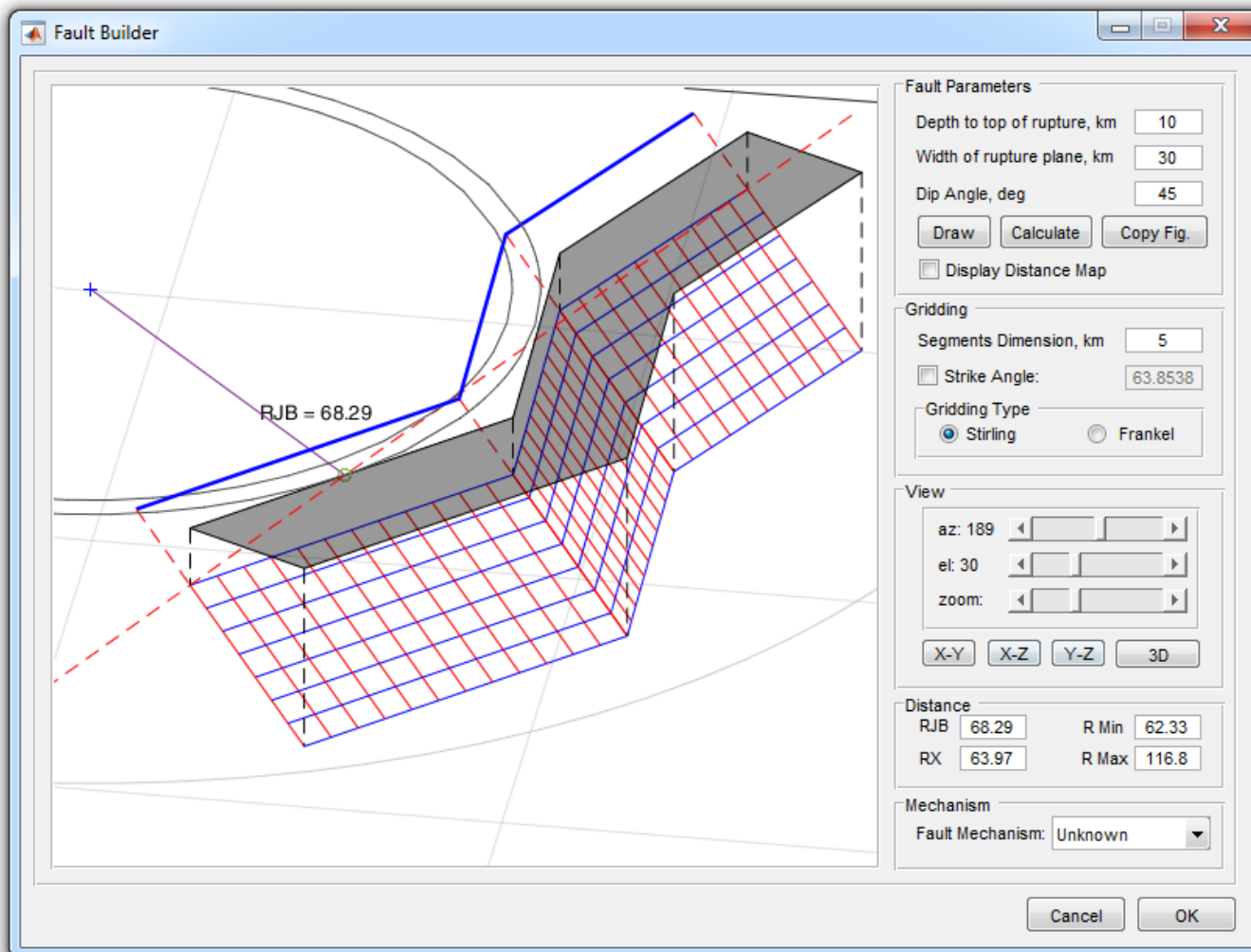
## 22 Attenuation Relationships



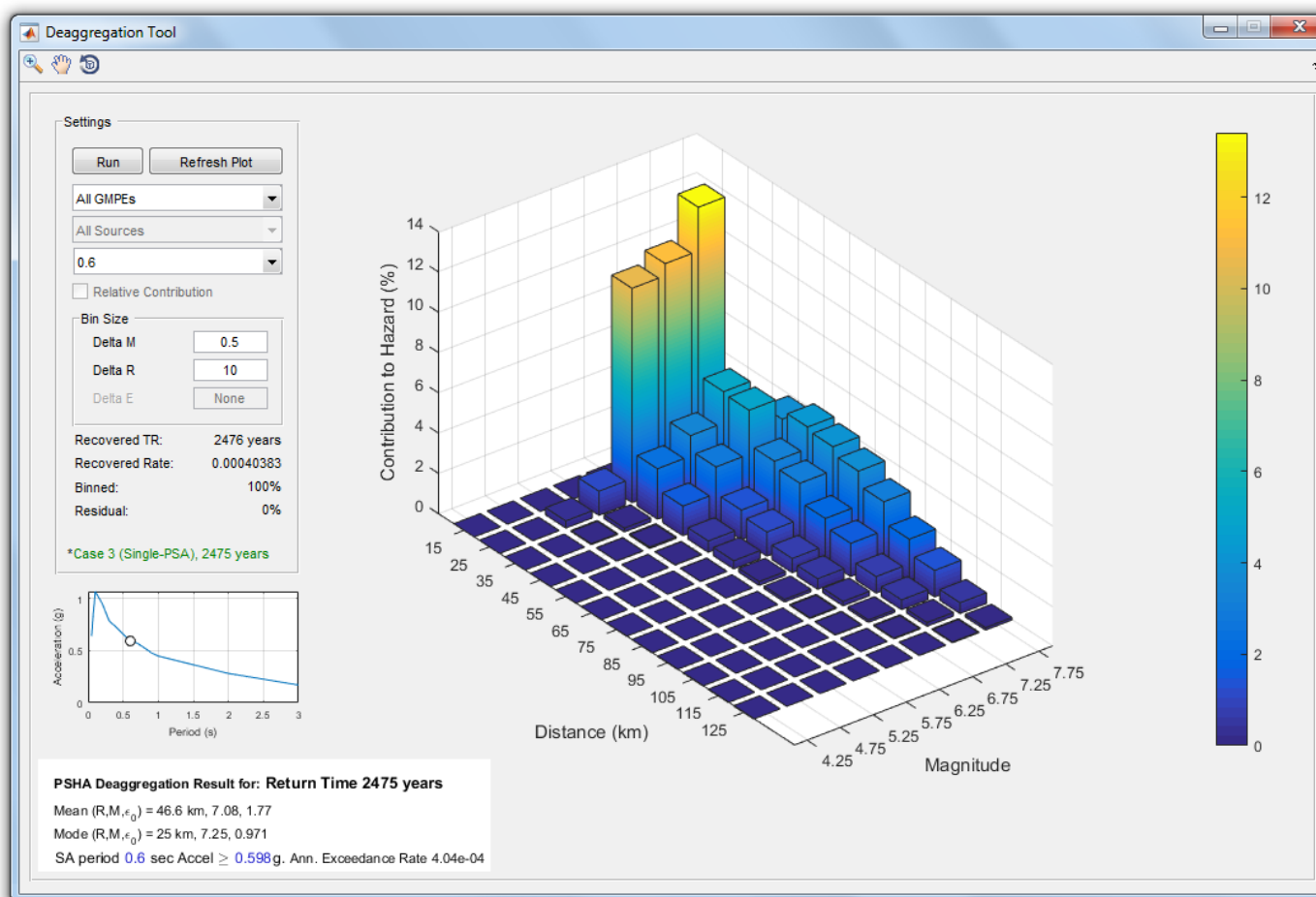
\* Cornell et al. (1979), Ambraseys (1975), Ambraseys (1990), Campbell (1989), Joyner & Boore (1981, 1988), Campbell (1997), **Campbell & Bozorgnia** (2003, 2008), **Abrahamson & Silva** (1993, 2008), Sadigh et al. (1997), Boore et al. (1993), **Boore & Atkinson** (2008), Zaré et al. (1999), Zaré & Sabzali (2006), Ghodrati Amiri et al. (2007, 2010), Ghasemi et al. (2009), Youngs et al. (1988), **Chiu & Youngs** (2008), Idriss (1993)

## Advanced 3D Fault Model

- Easily build 3D geometry: Draw fault trace / set Depth, Width and Dip Angle / Use Stirling or Frankel method for gridding.
- Assign Fault Mechanism
- Compute Magnitude and Distance Distributions
- Calculate various distances:  $R_{JB}$ ,  $R_X$ ,  $R_{min}$  and  $R_{max}$

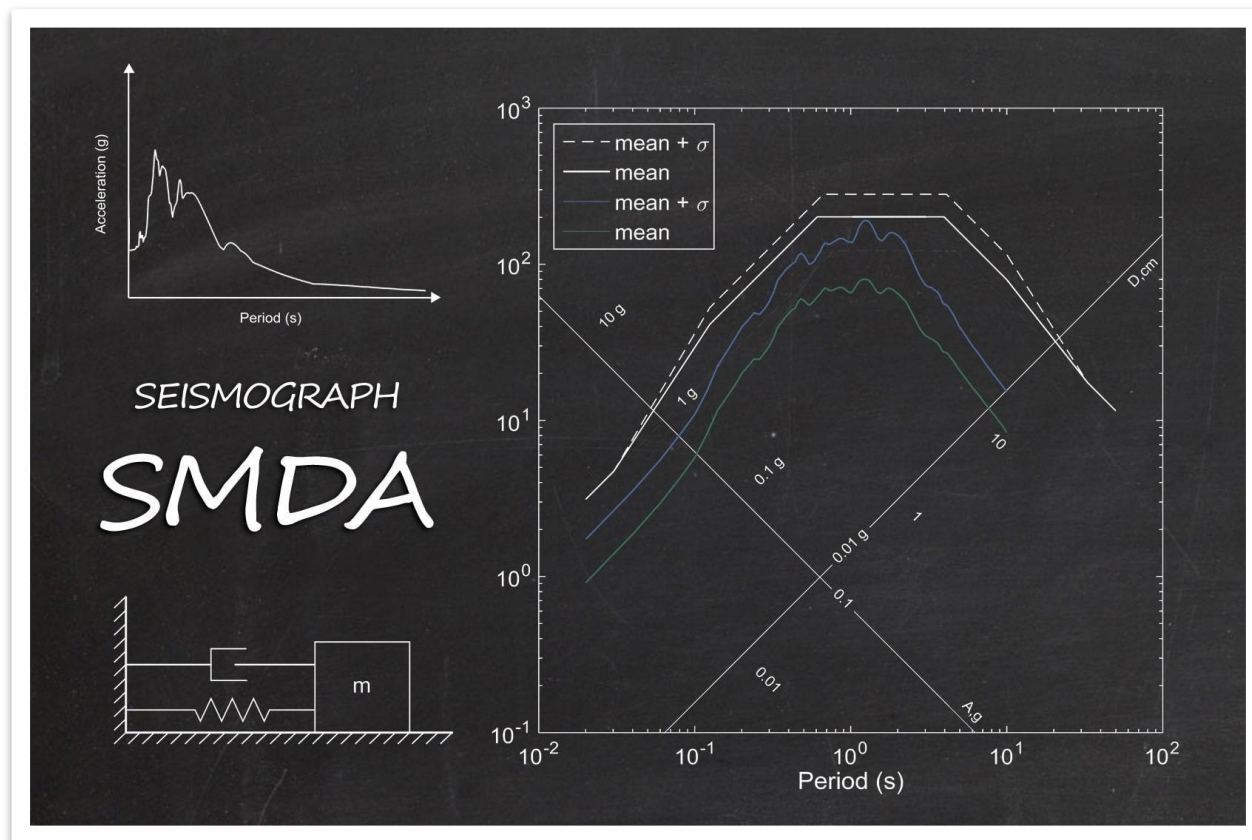


## Deaggregation Tool



- Identify the magnitude and distance combination with the largest contribution to seismic hazard
- Compute Mean and Modal Values (for M, R and ε)
- Break down the deaggregation result to individual sources, GMPEs and Magnitude sets
- Perform UHS deaggregation for desired spectral period
- User-friendly design and workflow

## Strong-Motion Data Processing

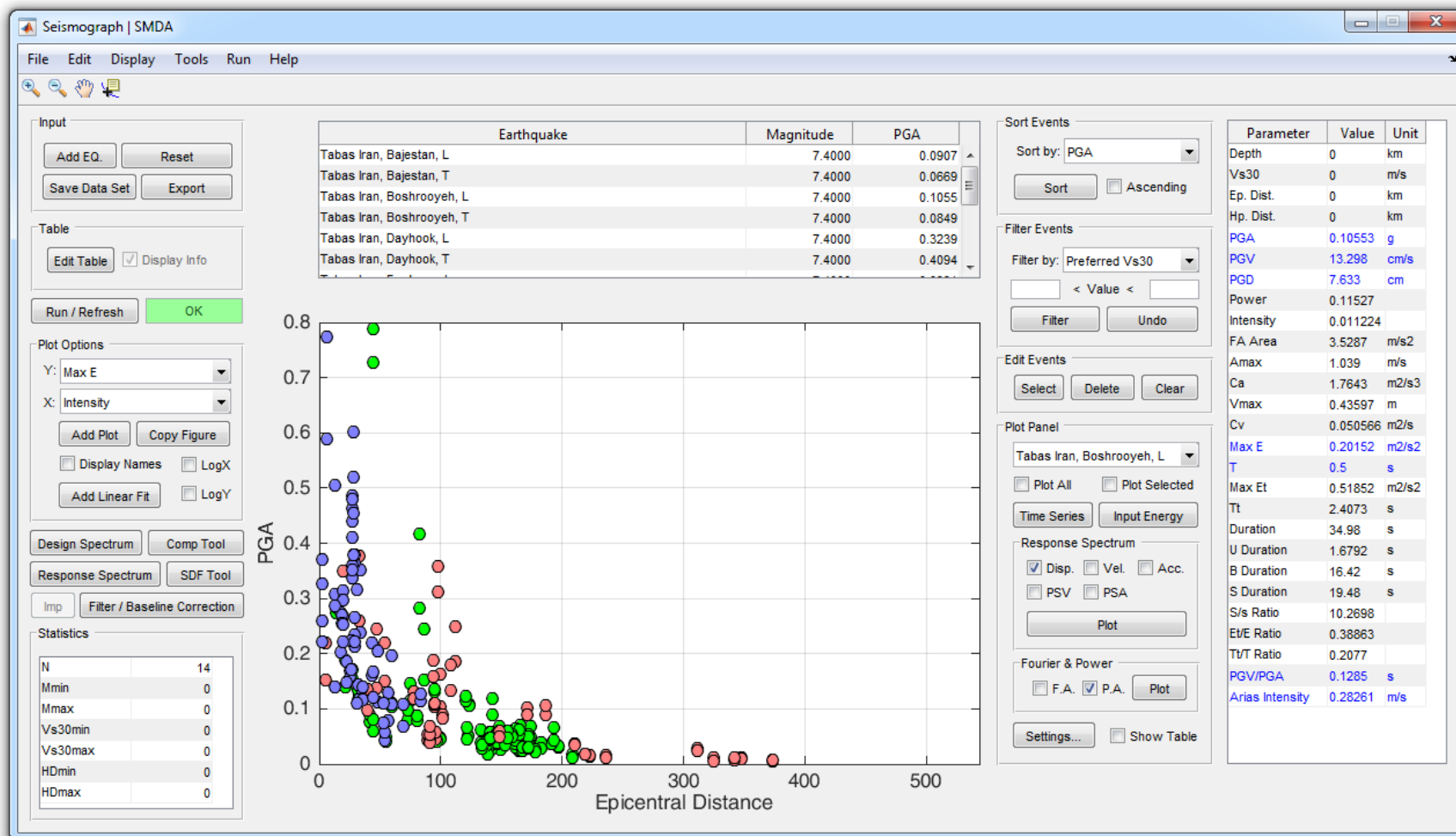


### SMDA: Strong-Motion Data Analyzer

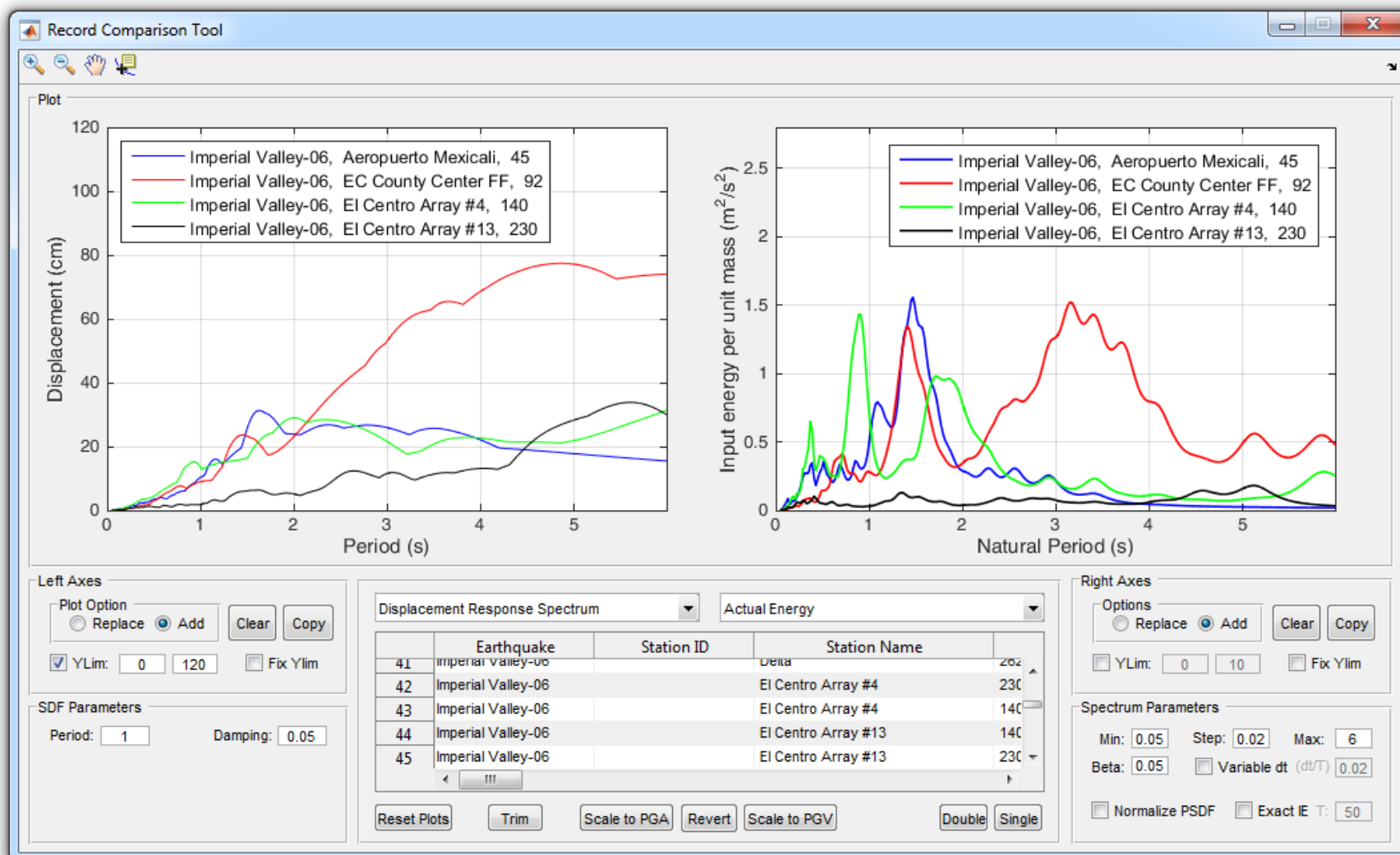
- Manage **Multiple** Records (Edit, Sort, Search & Filter, Add/Delete Event, Build Database, etc.)
- Compute **Ground Motion Parameters** (Durations / Arias Intensity / Power & Intensity / Peak Values)
- Elastic / Inelastic Response Spectra | Fourier / Power Spectra
- **Design Spectrum**: Elastic & Inelastic Spectra / Response Spectrum Compatible Design Spectra
- **Spectral Matching / Artificial Accelerogram** Generation / Filtering & Baseline Correction
- **SDF Analyzer** Tool: Nonlinear Analysis / Damping Calculation / Live Simulation / Nonlinear Parameters Calculation (Ductility Ratio / Normalized Yield Strength)



# Seismograph SMDA

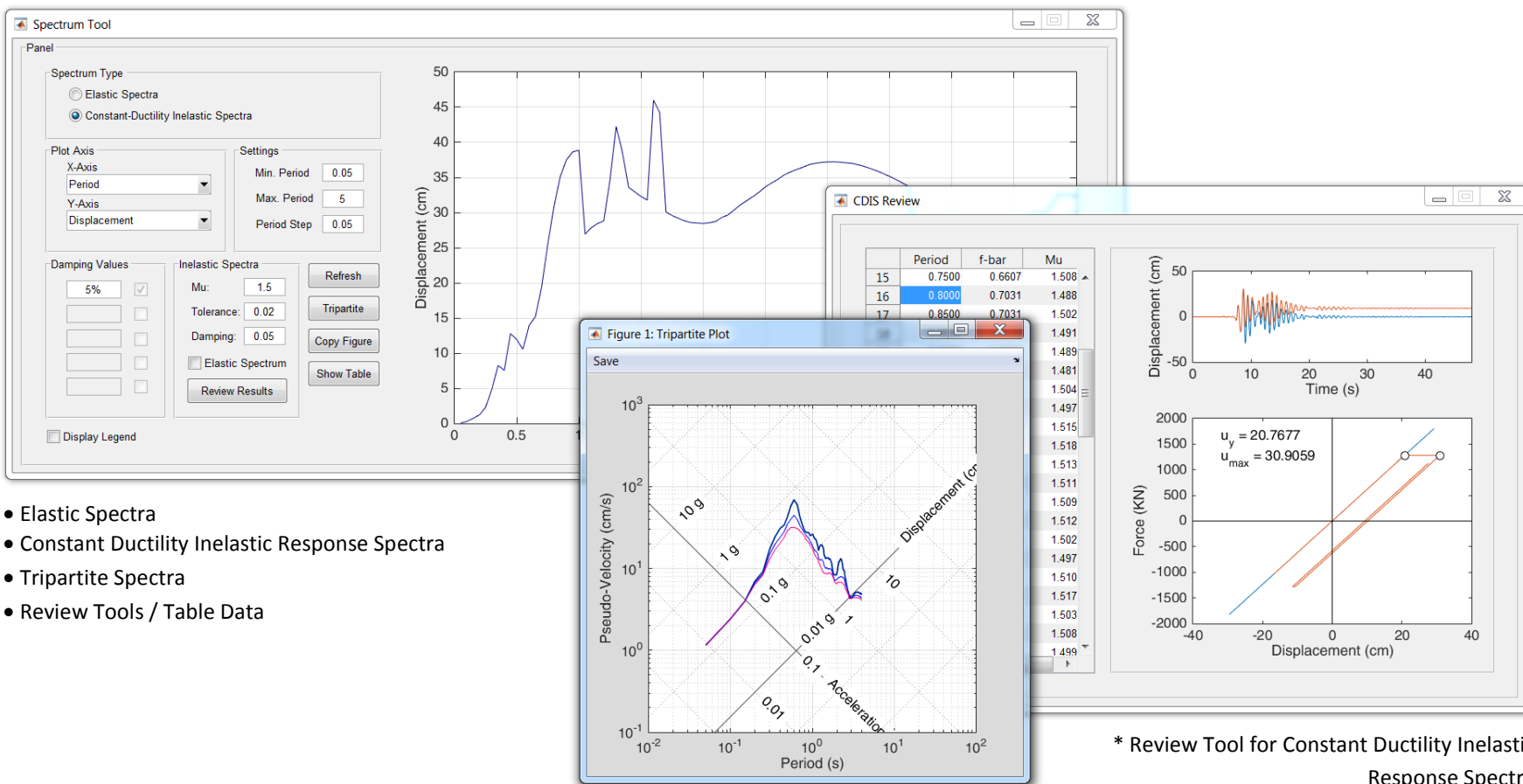


## Record Comparison Tool



- \* Plot and compare various earthquake parameters (Time Series, Response Spectra, Fourier / Power Spectra, Input Energy, Input Energy Rate, etc.)
- \* Scale Records by PGA & PGV
- \* Trim Records

# Response Spectrum Tool

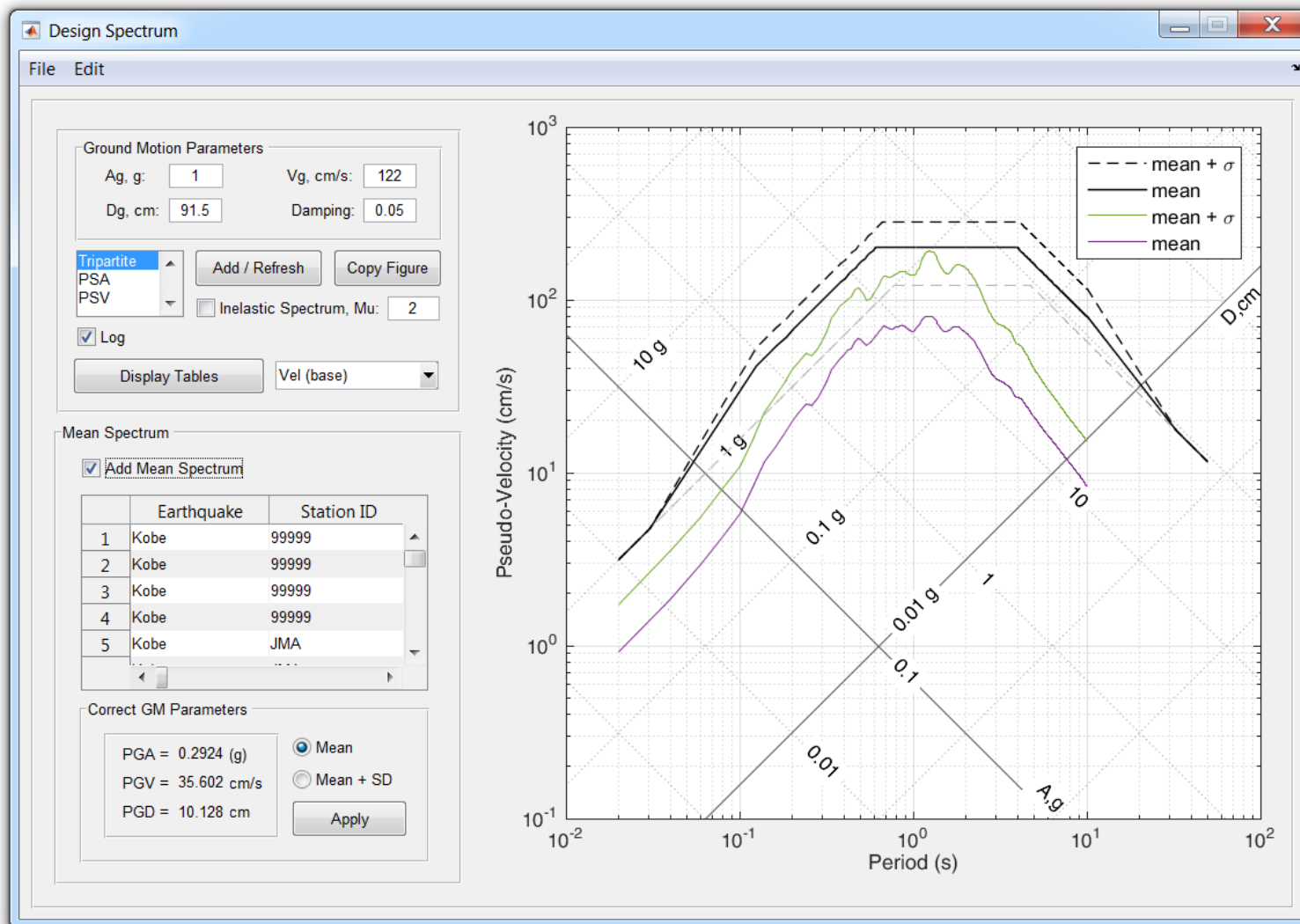


- Elastic Spectra
- Constant Ductility Inelastic Response Spectra
- Tripartite Spectra
- Review Tools / Table Data

\* Sample Tripartite Spectra

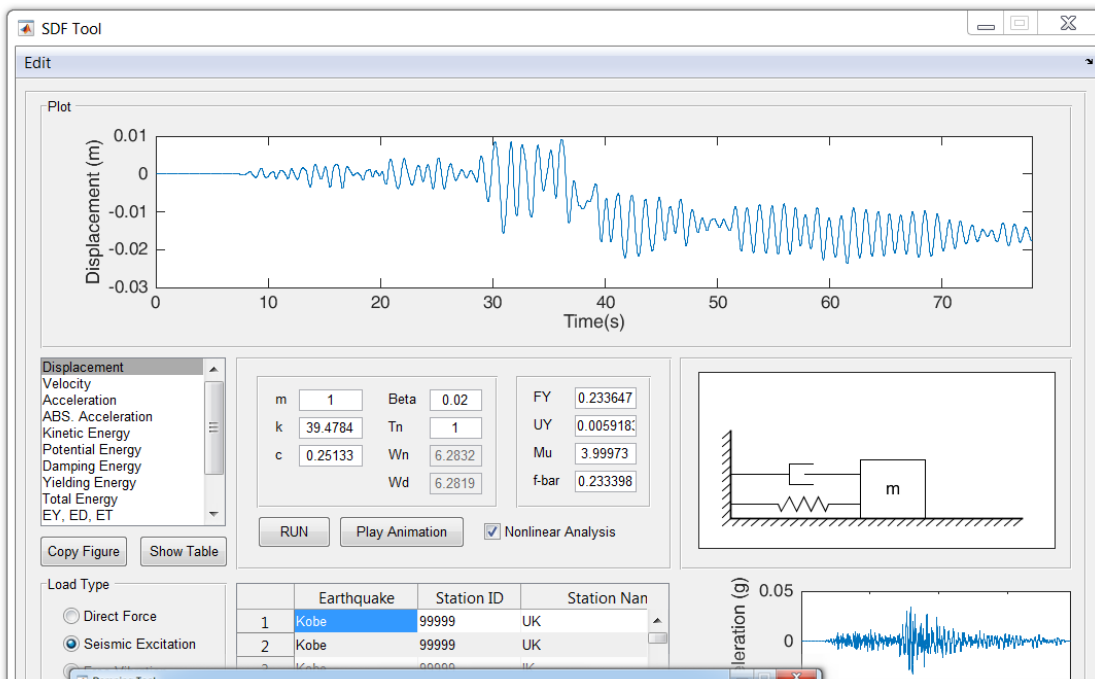
\* Review Tool for Constant Ductility Inelastic Response Spectra

# Design Spectrum Tool

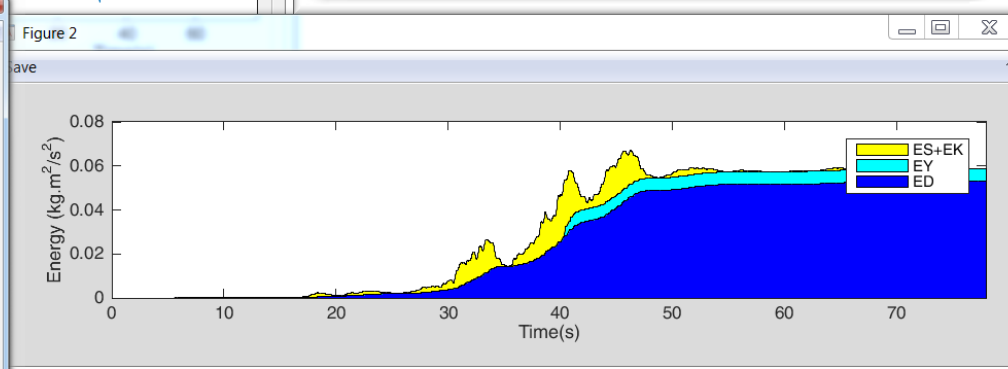
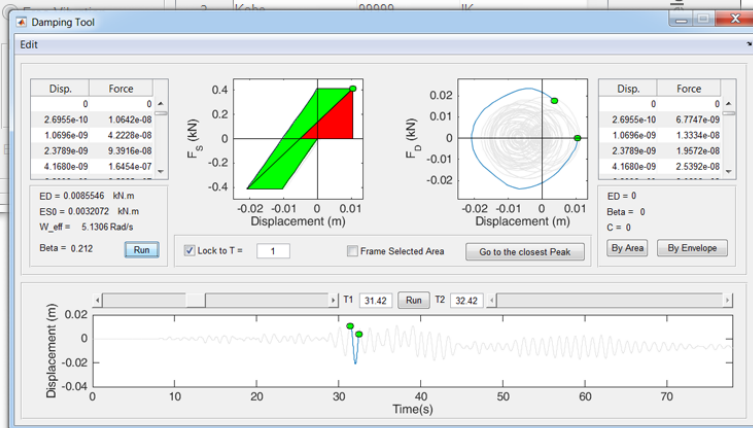
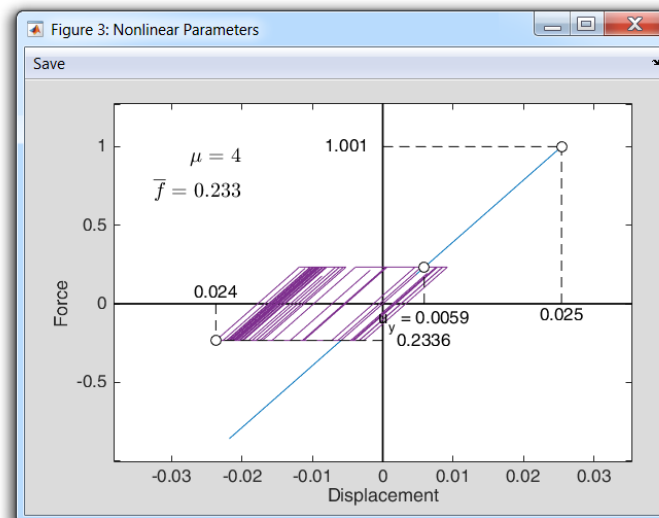


- Elastic / Inelastic Spectra
- Response Spectrum Compatible Design Spectra

# SDOF Analyzer Tool



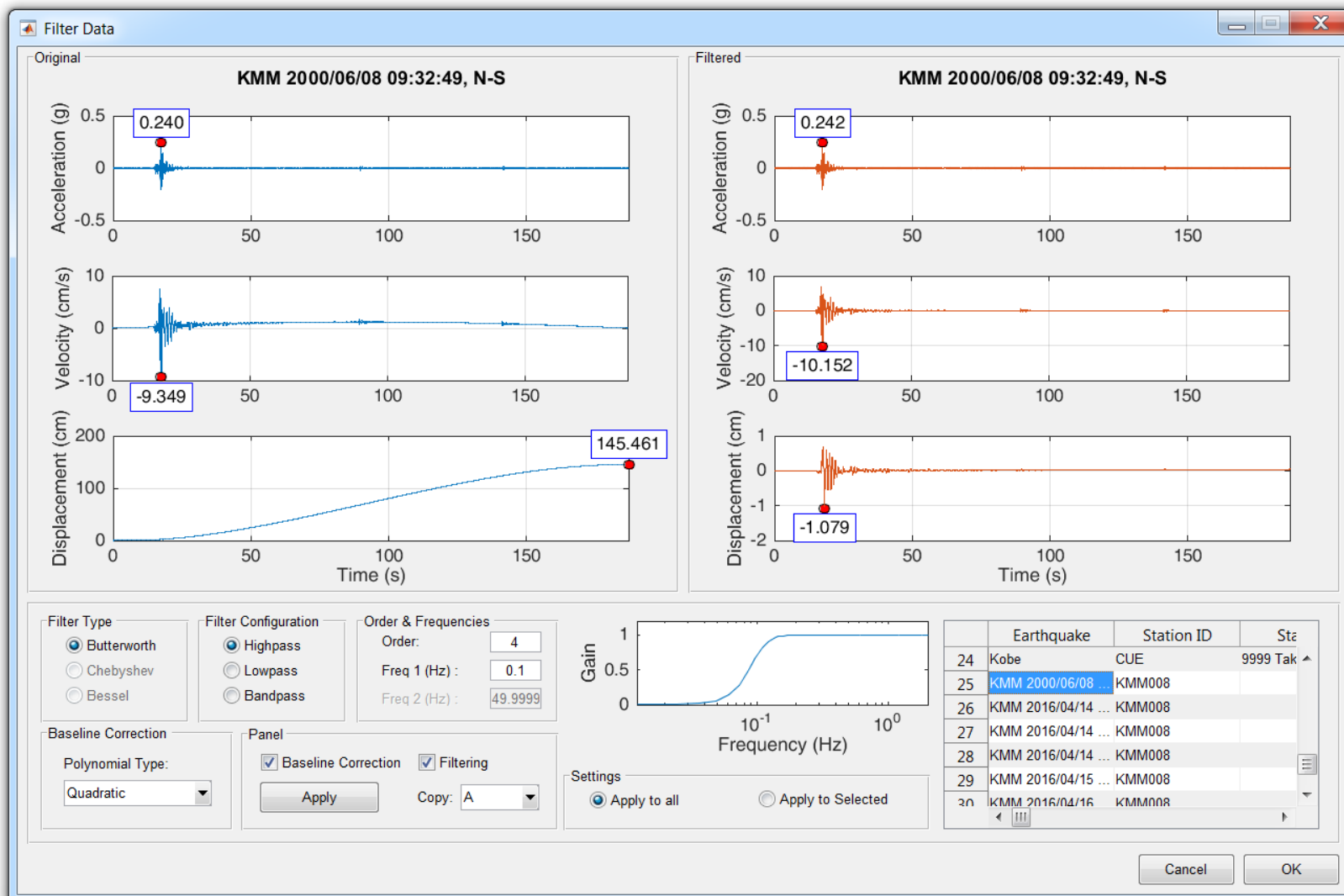
- Linear / Nonlinear Analysis
- Seismic Input / Direct Force / Free Vibration
- Damping Calculation Tool
- Live Simulation



\* Potential, Kinetic, Yielding and Damping Energy Plots

\* Damping Calculation Tool

## Filtering & Baseline Correction



\* Apply Filtering & Baseline Correction to multiple records.

## Artificial Accelerogram Generator

**Artificial Accelerogram**

**PSDF**

Freq.	Value
0.0767	0
0.1534	0.0716
0.2301	0.5162
0.3068	0.5320
0.3835	0.4206

Copy Table Copy Figure

**Stationary Process**

Time	Value
0	0.7173
0.0200	0.7403
0.0400	0.5898
0.0600	0.4539
0.0800	0.3995

Copy Table Copy Figure

**Nonstationary Time History**

Time	Value
0	0
0.0200	1.5983e...
0.0400	1.0135e...
0.0600	2.6073e...
0.0800	5.3952e...

Copy Table Copy Figure

**General Settings**

Tmax: 45 N: 1  
DT: 0.02 Nm: 500

**Filter Settings**

G0: 0.8  
W: 8.5  
Beta: 0.95  
S0: 1  
W1: 2  
W2: 30

**Additional Corrections**

PGA Correction? 0.2  
 Filtering? Order: 4  
Freq 1 (Hz): 0.1  
 Baseline Correction? Linear

**Frequency Filter**

Band Limited  
 Kanai-Tajimi ?

**Envelope Function**

Exponential (Liu)  
 Jennings  
 Saragoni & Hart

**Envelope Settings**

Ts/Tmax: 0.2  
Te/Tmax: 0.4  
Amp.: 0.2  
Gamma: 0.2  
n: 3  
Alpha: 0.1  
Beta: 0.35  
Tm: 5  
e: 0.05

**Review**

T. S.  D  
I. E.  V  
R. S.  A  
PSDF  PSV  
 PSA

Generate

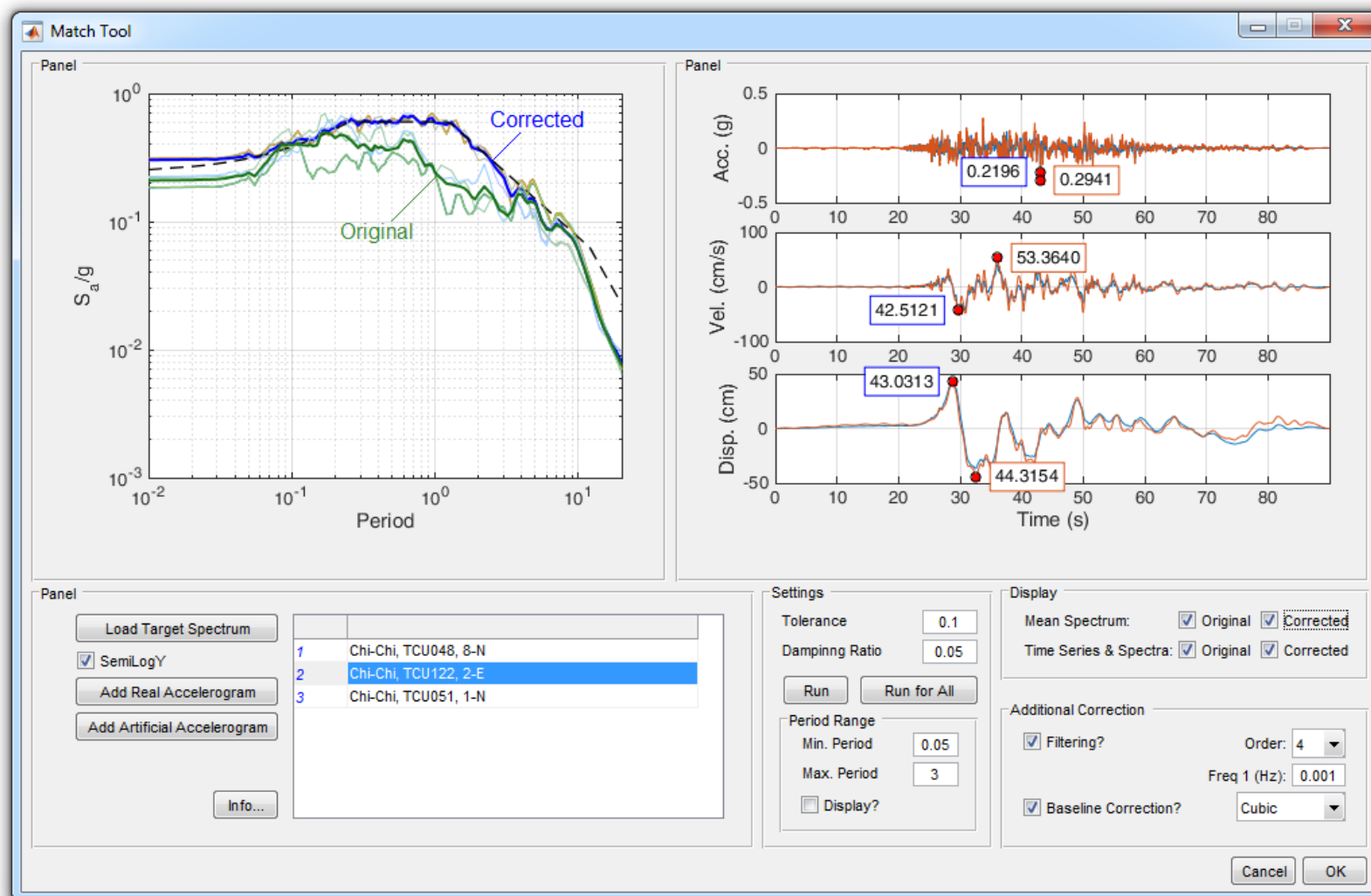
EQ 1

Envelope Function

Cancel OK

- 2 Frequency Filters (Band Limited / Kanai-Tajimi)
- 3 Envelope Functions (Liu / Jennings / Saragoni & Hart)

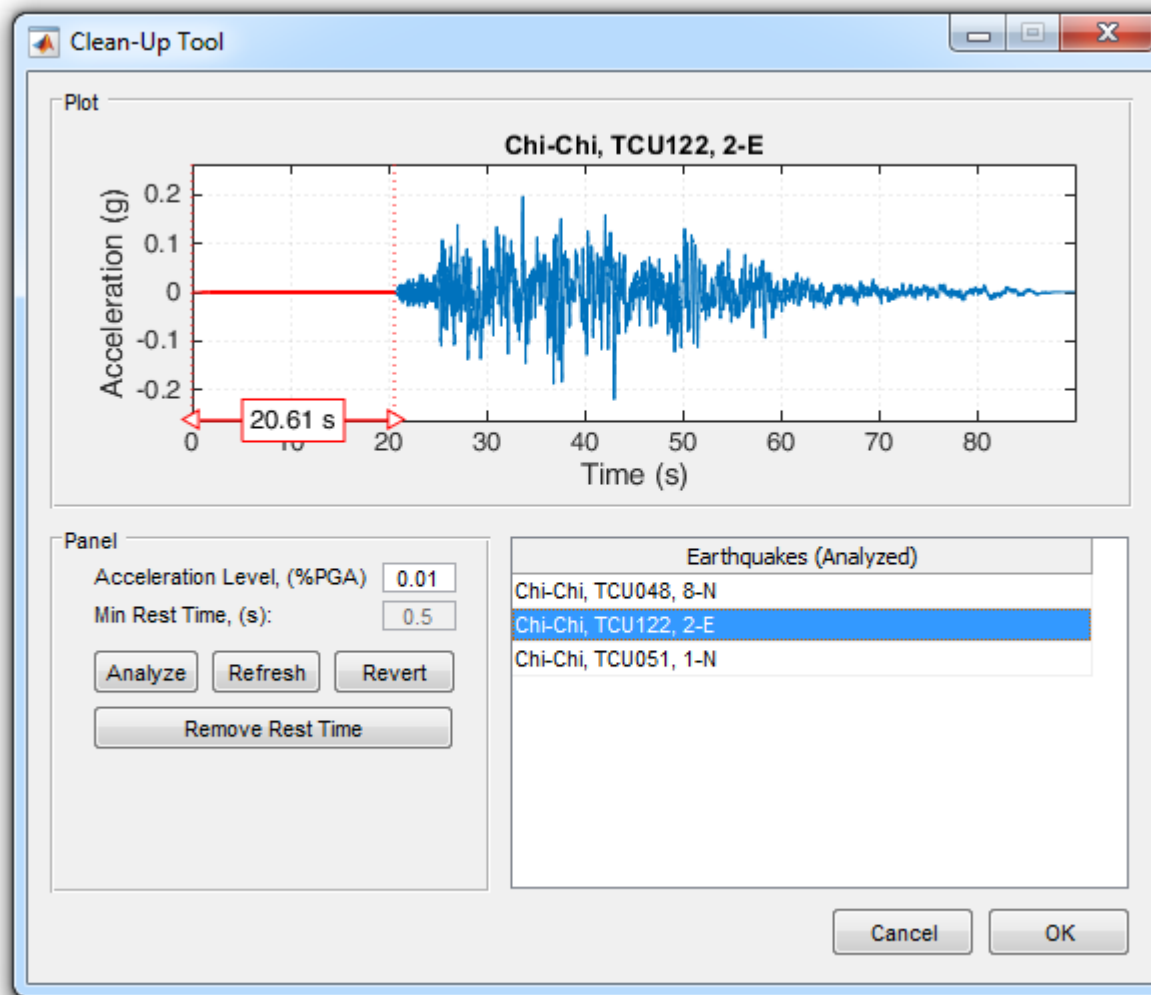
## Spectral Matching Tool



\* Modify Real (or Artificial) Accelerograms to match with any target spectrum.

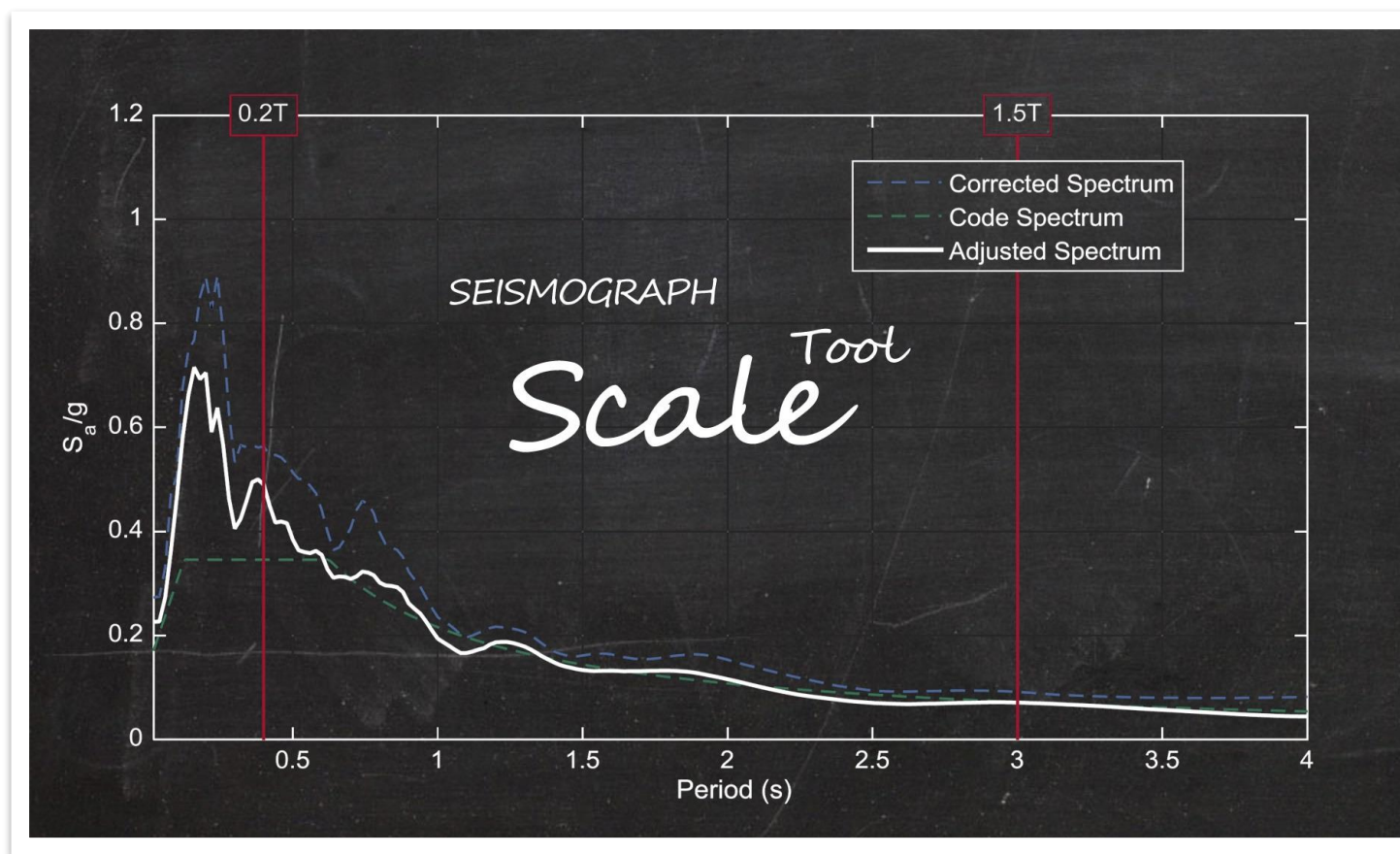


## Clean-Up Tool



\* Remove Initial Rest time from all records

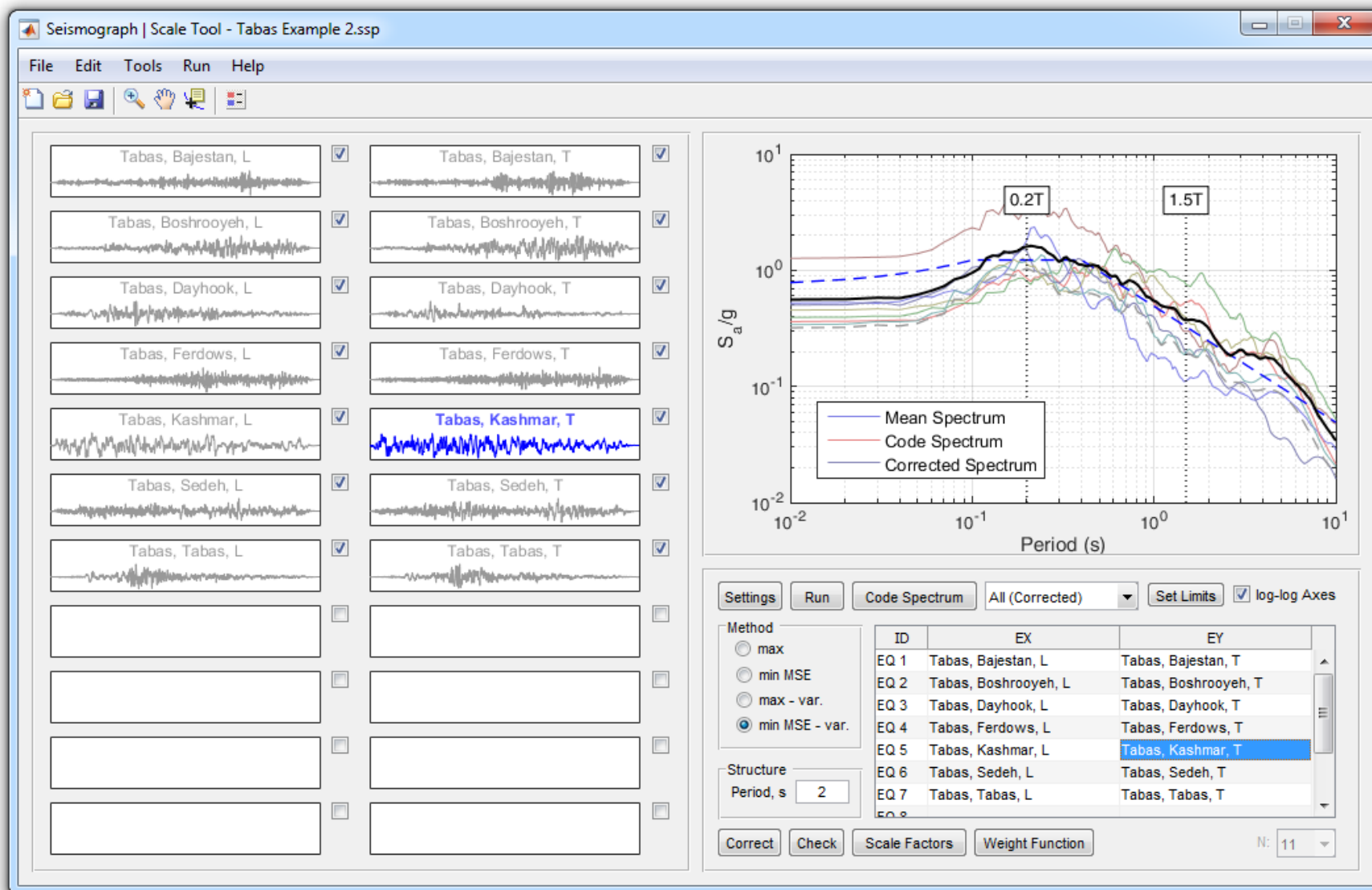
## Accelerogram-Scaling



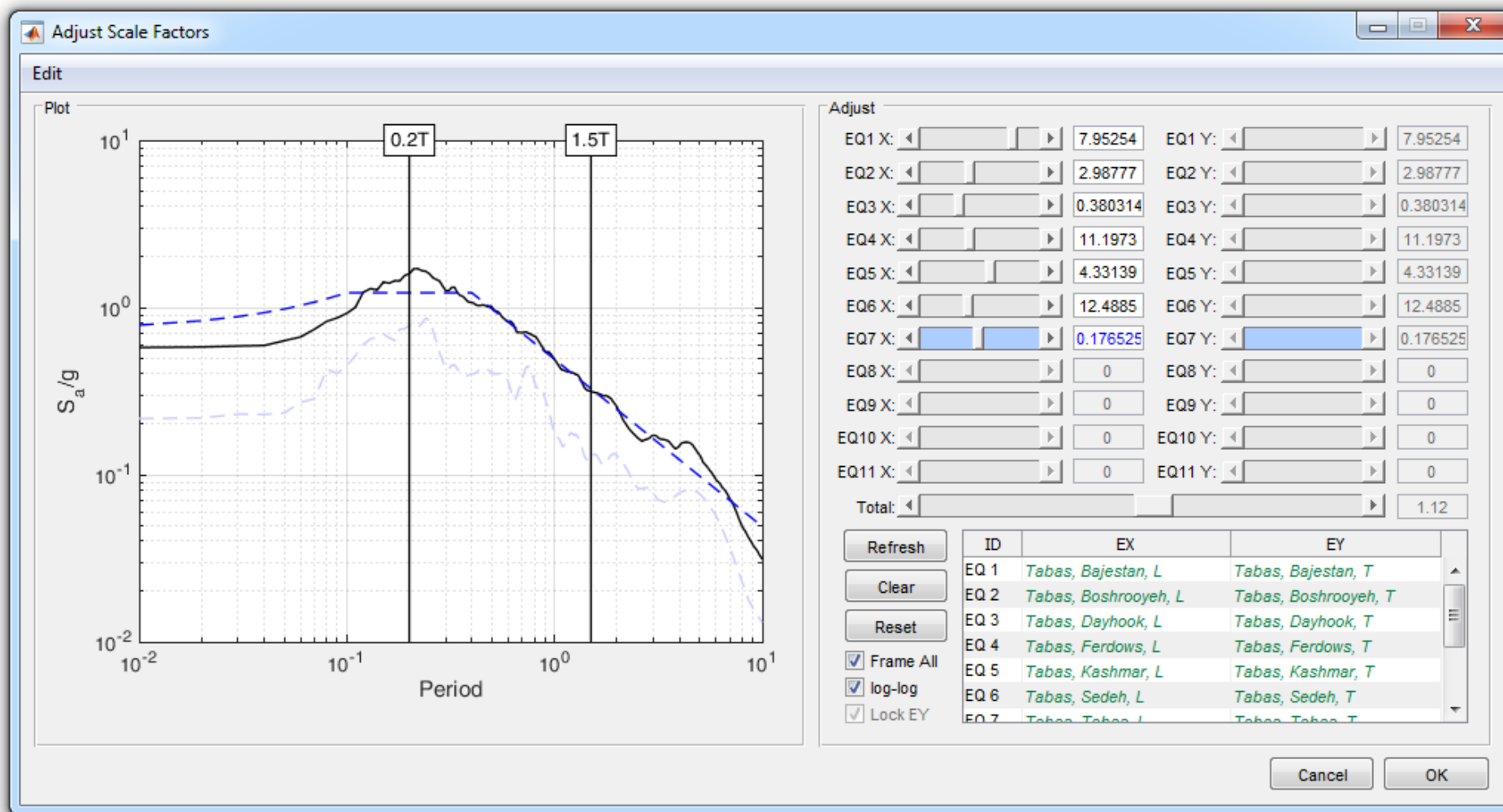
### A Comprehensive Tool for Scaling Ground Motions

- Up to **11 pairs** of horizontal records
- Min MSE / Direct Scale Method + **Free Adjustment Tool**
- Single Period Scale / Scale to Peak Values (PGA/PGV)
- Built-in Code Spectrum: 2800 v4 / ASCE 7 (2010 & 2016) / Eurocode 8
- User-Friendly Design & Workflow

# Seismograph SCALE Tool

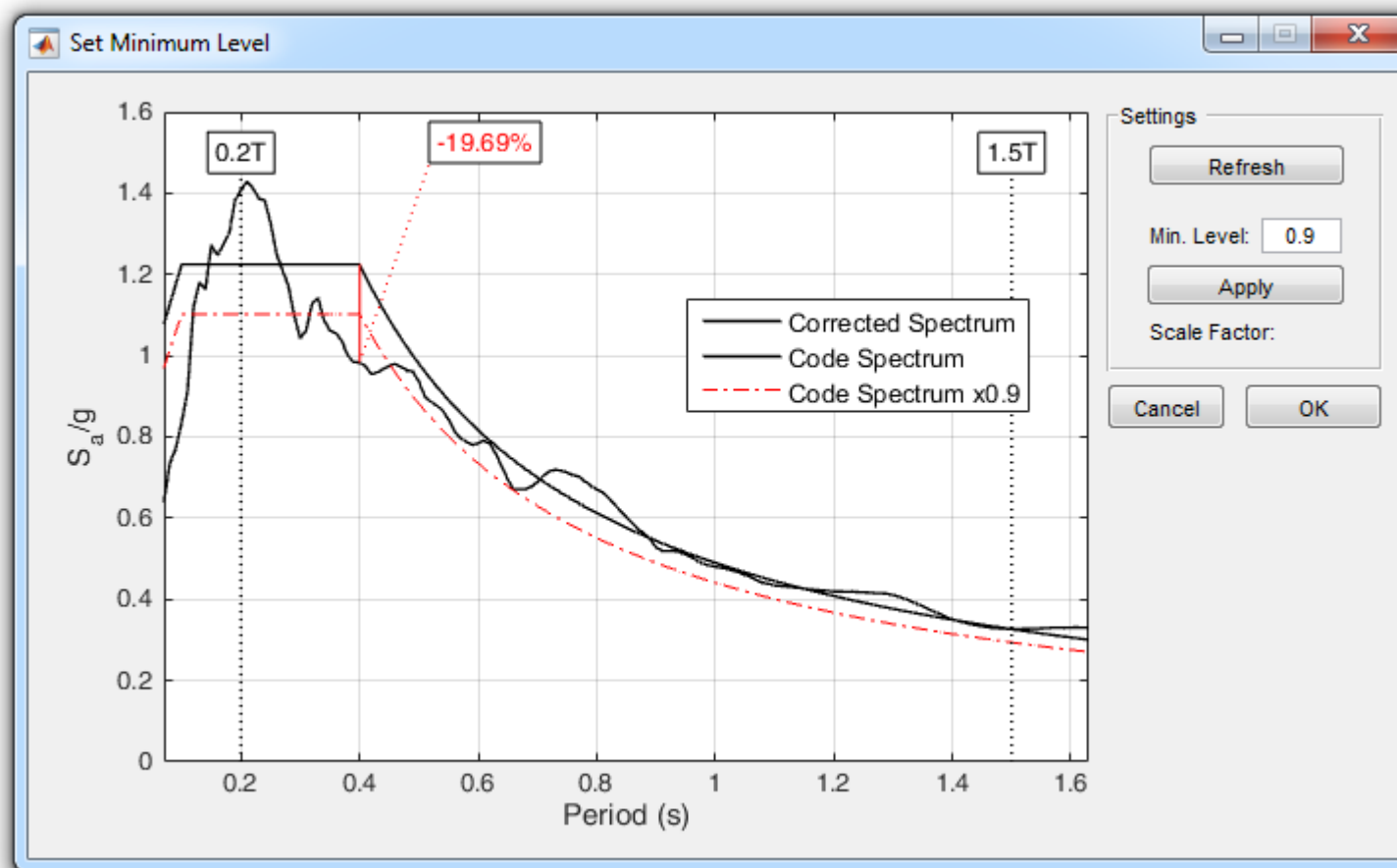


## Free Adjustment Tool



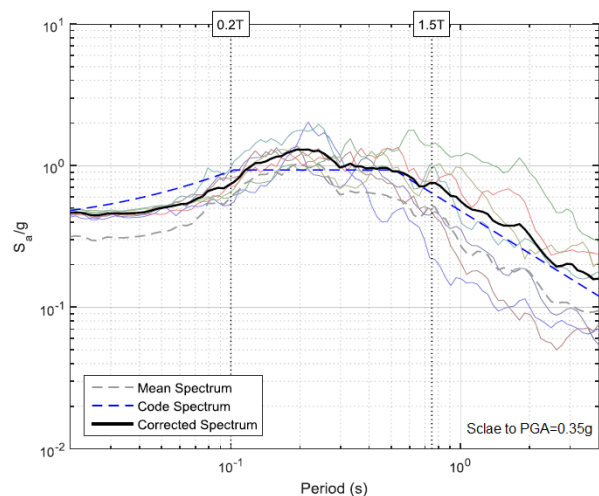
\* Adjust scale factors to achieve best match

## Set Minimum Level

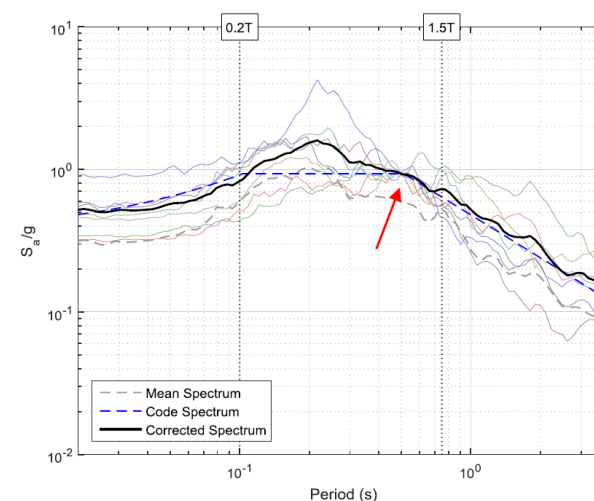
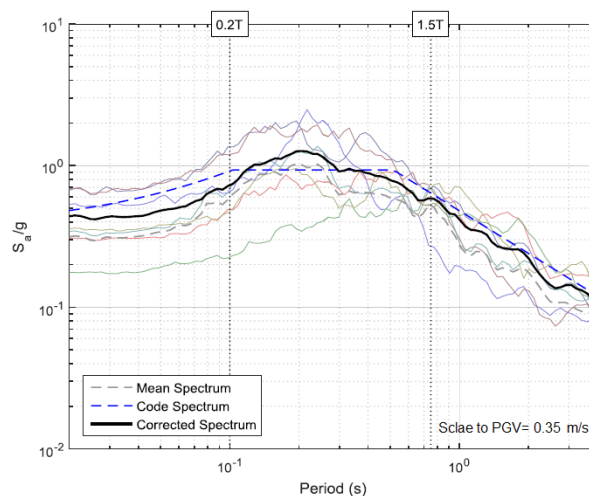


\* Specify the minimum value for the ratio of the corrected spectrum to the target spectrum.

## Scale to PGA, PGV / Single Period Scale



**Scale to specific Peak Value (PGA/PGV):** Scale to the specific level of PGA (or PGV) as required by some building codes.



**Single Period Scale:** Easily control the period of interest at which the mean spectrum crosses the target spectrum.

**Peak Value Scale**

ID	EX	PGA (g)	EY	PGA (g)	Scale Factor
EQ 1	Tabas, Bajestan, L	0.35	Tabas, Bajestan, T	0.25796	3.8575
EQ 2	Tabas, Boshrooyeh, L	0.35	Tabas, Boshrooyeh, T	0.28145	3.31671
EQ 3	Tabas, Dayhook, L	0.27691	Tabas, Dayhook, T	0.35	0.854962
EQ 4	Tabas, Ferdows, L	0.31076	Tabas, Ferdows, T	0.35	3.33797
EQ 5	Tabas, Kashmar, L	0.31297	Tabas, Kashmar, T	0.35	9.68013
EQ 6	Tabas, Sedeh, L	0.3432	Tabas, Sedeh, T	0.35	12.7829
EQ 7	Tabas, Tabas, L	0.34684	Tabas, Tabas, T	0.35	0.406146
EQ 8		0		0	0
EQ 9		0		0	0
EQ 10		0		0	0
EQ 11		0		0	0

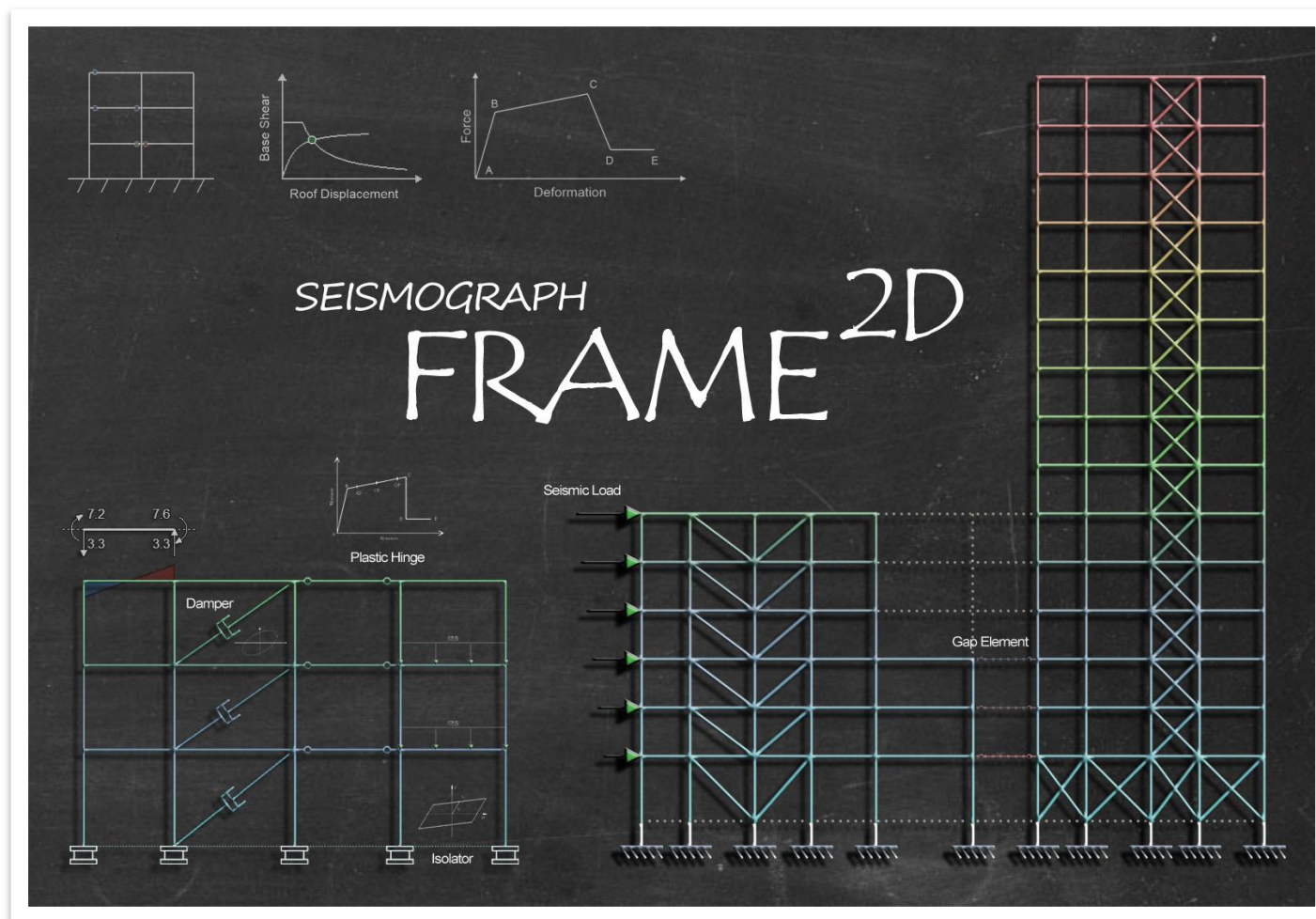
Settings

Scale to:  PGA  PGV

PGA =  g

\* Scale to the specific level of PGA (or PGV) as required by some building codes.

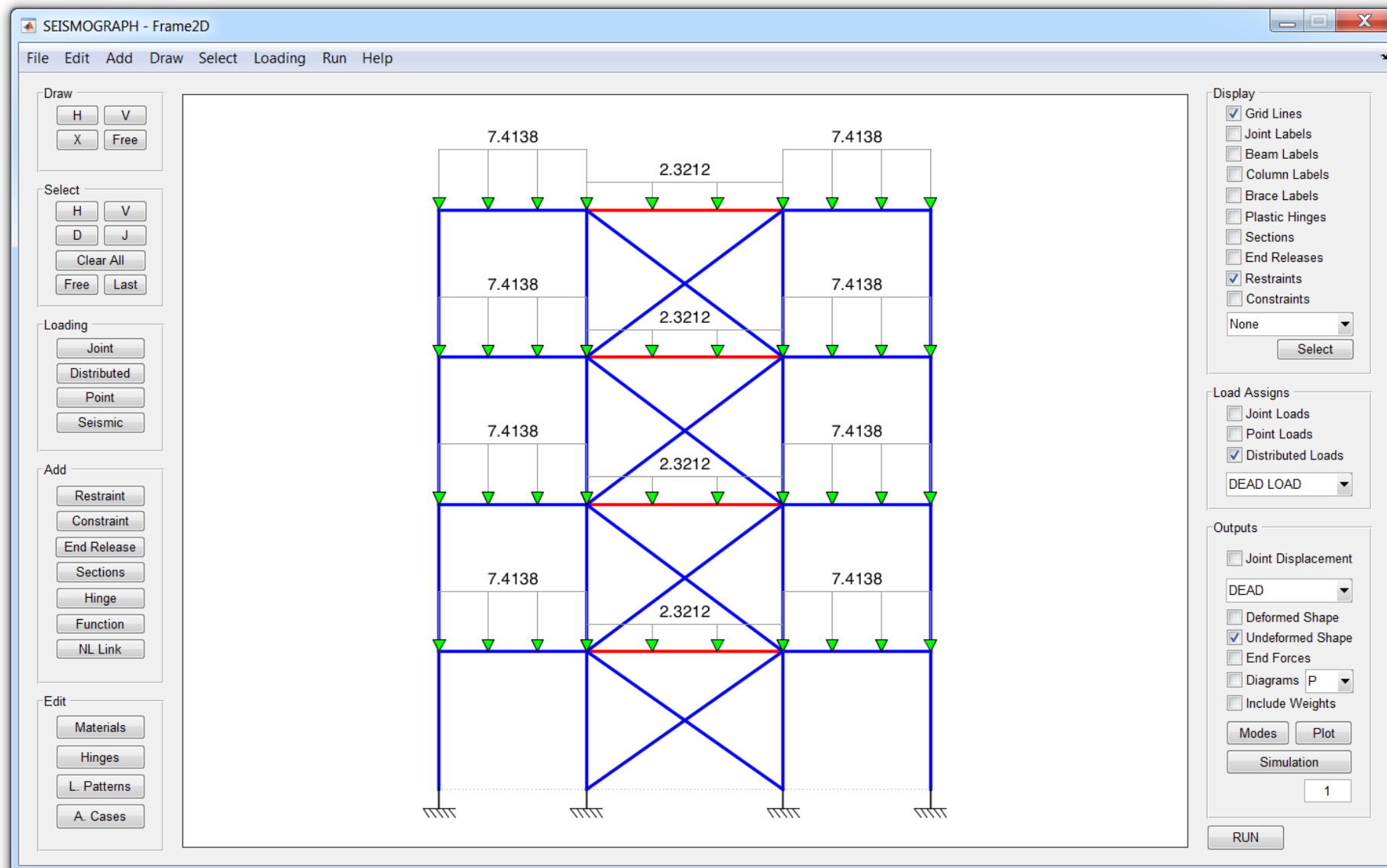
## 2D Structural Analysis



### FRAME2D: 2D Frames Analysis Package

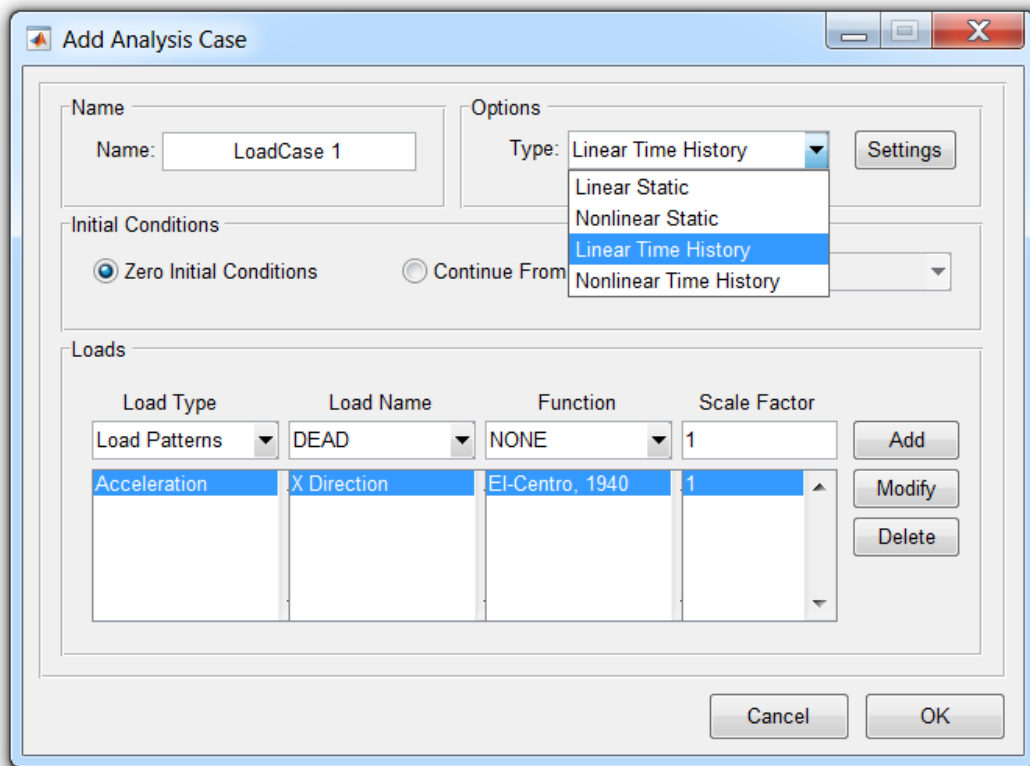
- Linear & Nonlinear Static Analysis (Pushover)
- P-Delta Analysis
- Linear & Nonlinear Dynamic Analysis (Gap - Isolator - Damper)

# Seismograph Frame2D

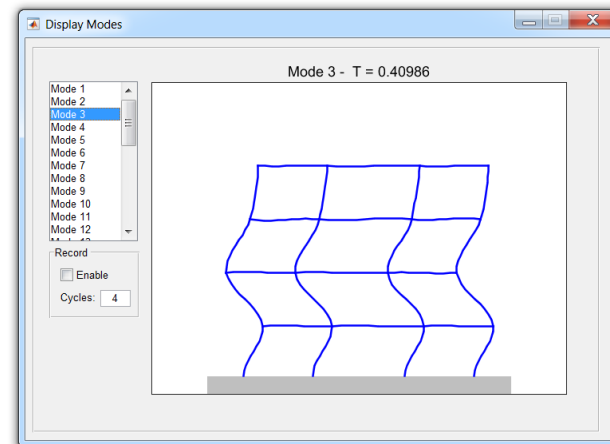




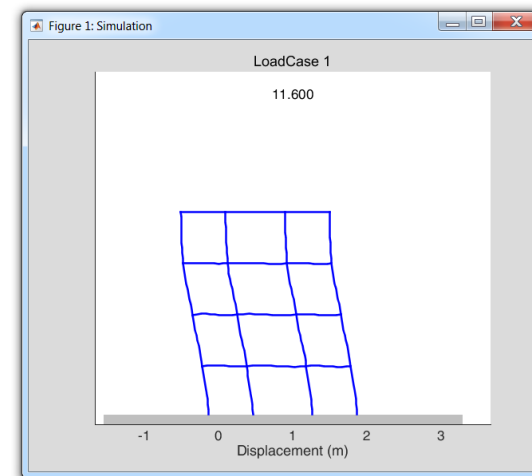
## Dynamic Analysis



\* Define Analysis Cases window

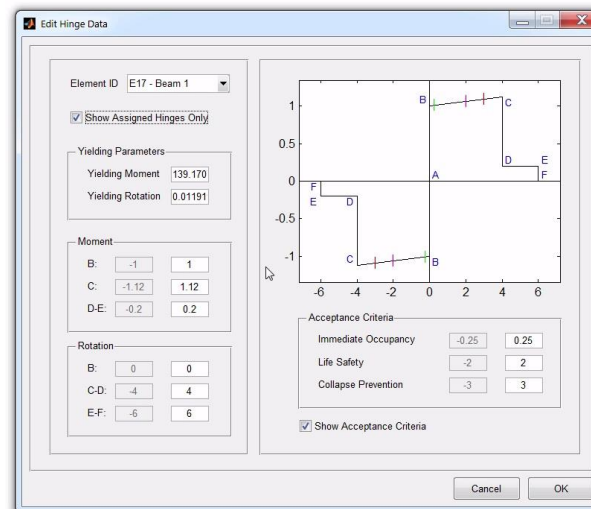
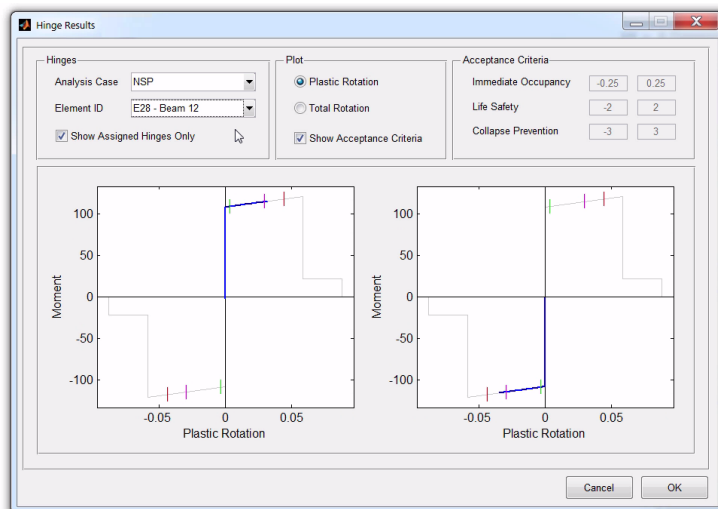


Display Mode Shapes



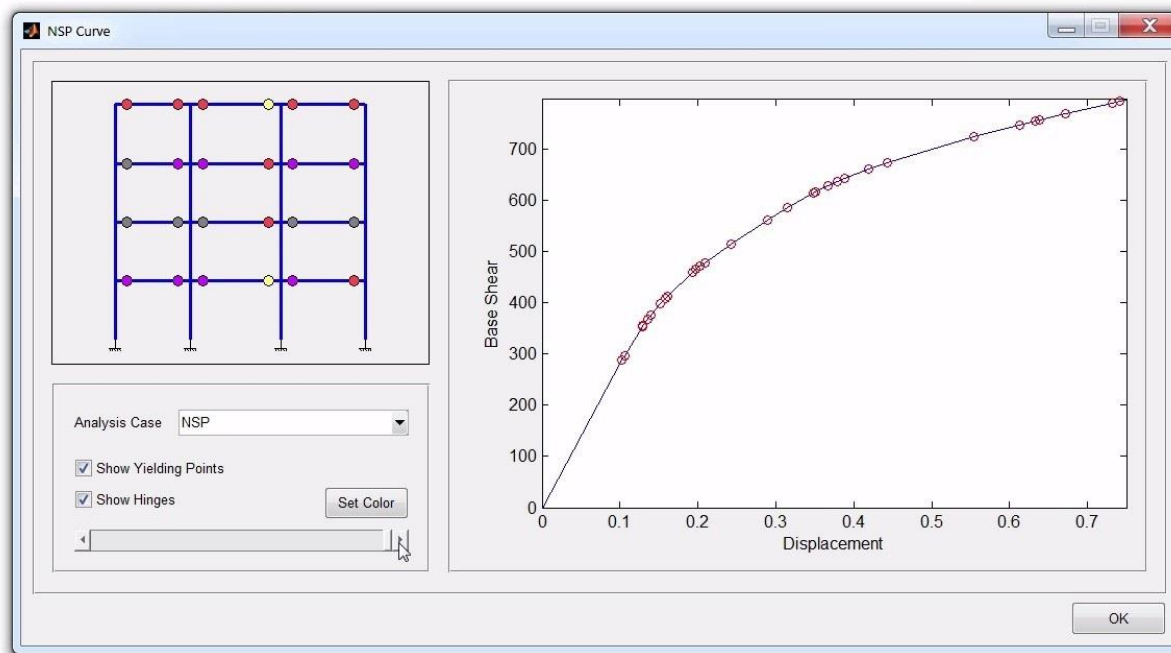
Play Live Simulation

# Pushover Analysis



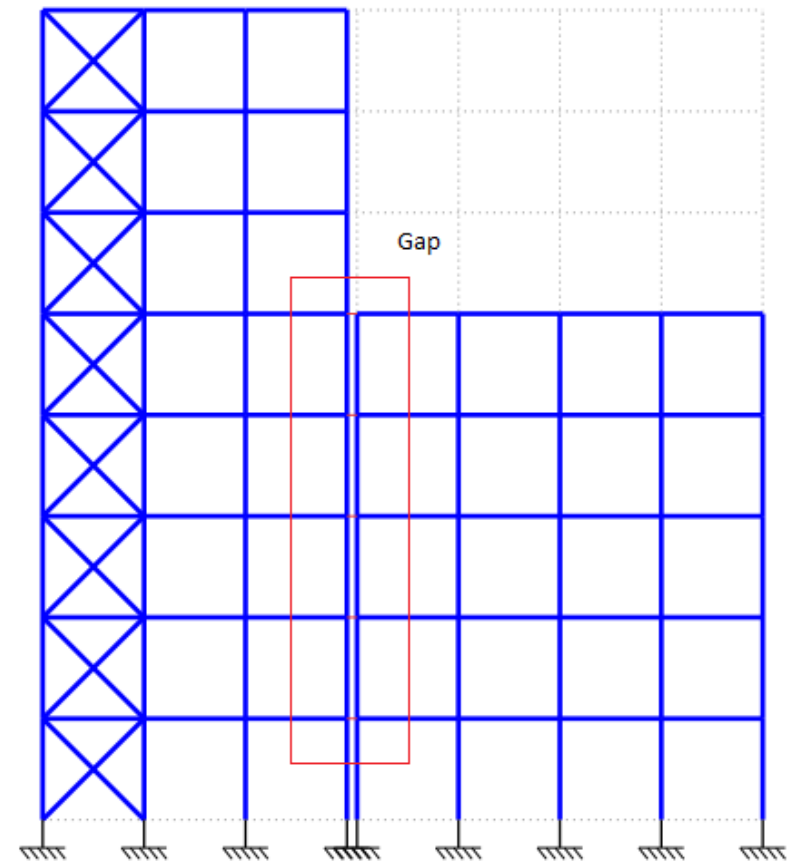
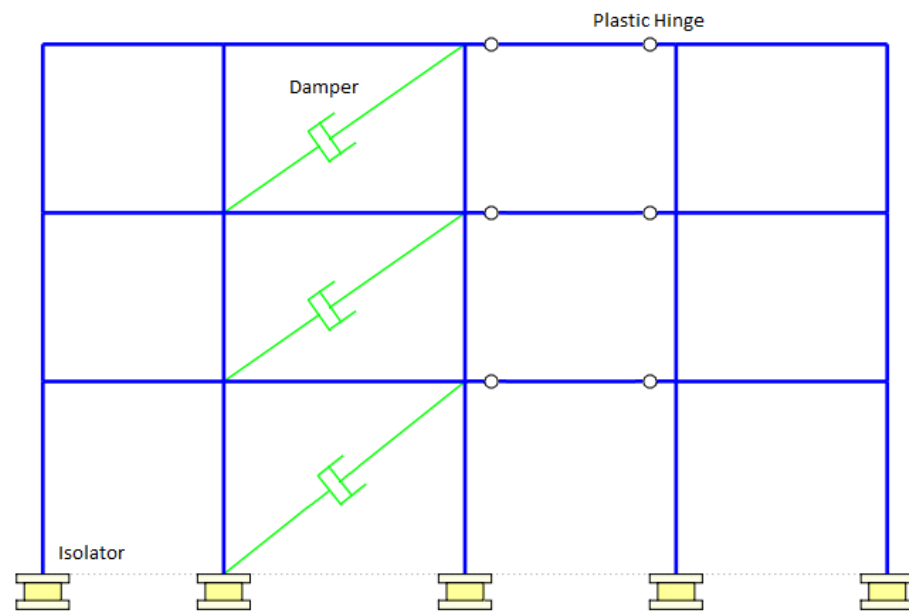
\* Assign concentrated plastic hinges to frame elements

\* Review hinges results

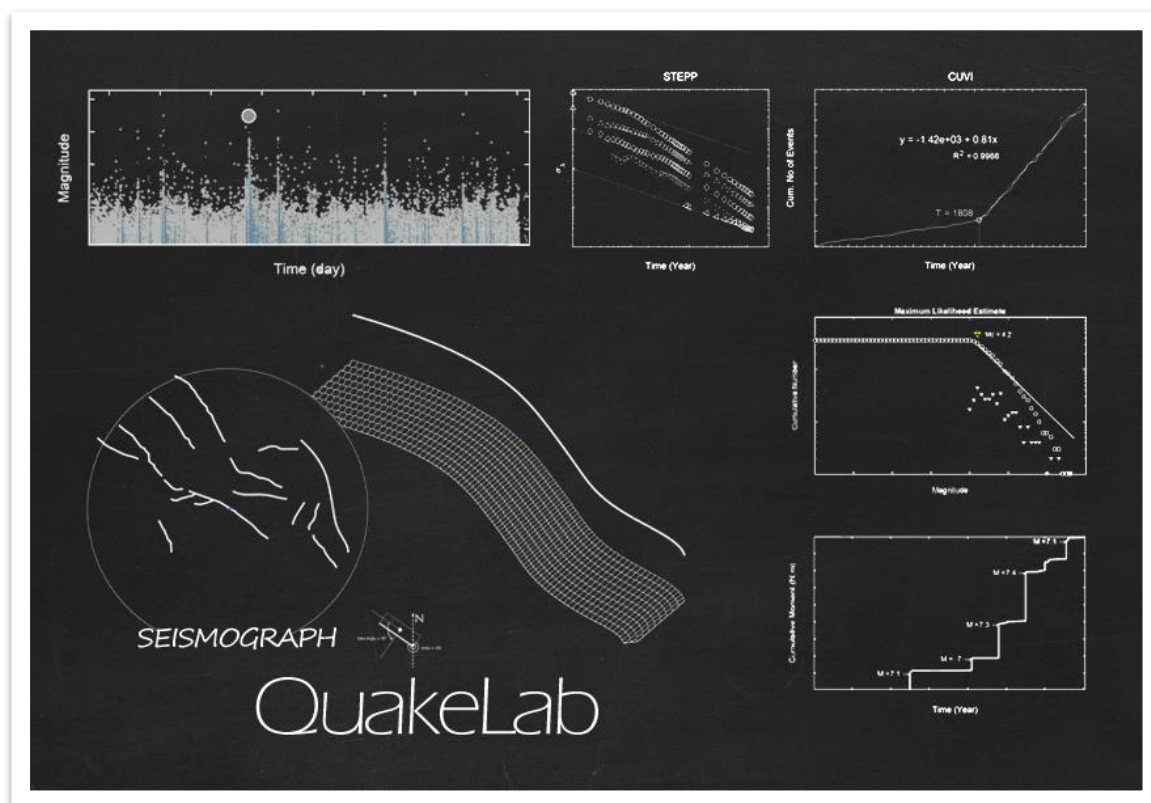


\* Display NSP Curve & hinges state for different stage of loading.

# Nonlinear Elements



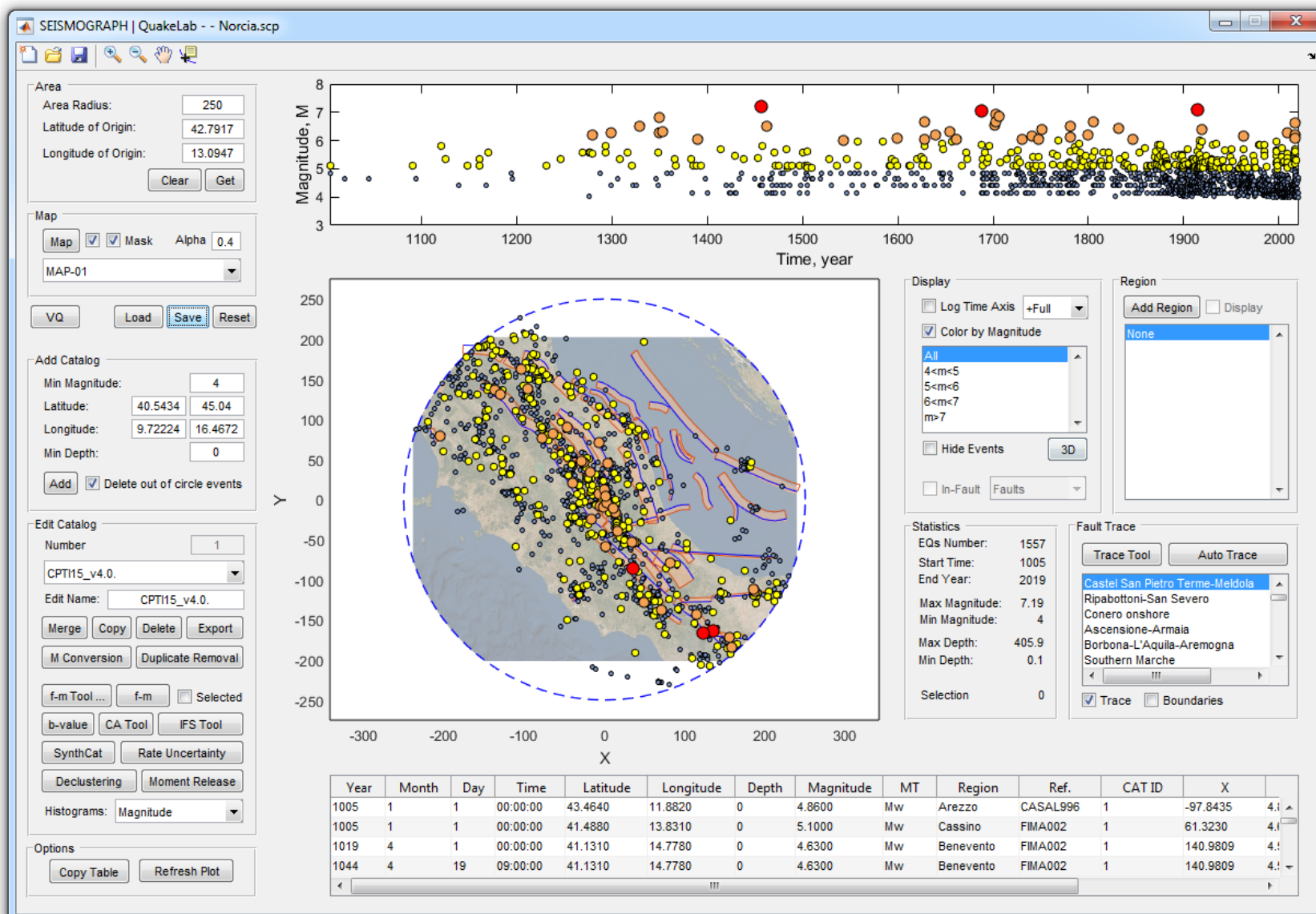
## Seismicity Analysis & Catalog Management



### QuakeLab: Powerful Seismicity Analysis Tool

- Create, Merge, Filter, Delete Catalogs / Statistic Reports / Catalog Visualization
- Duplicate Removal / Declustering Tool / Manual Event Removal
- Fault Trace Builder / Background Fault Generator
- Completeness Analysis / b-value Estimation / Frequency-Magnitude Analyzer Tool
- Synthetic Catalog Generation / Aftershock Generation (BASS/ETAS)
- Background Seismicity Editor (IFS Tool)

# Seismograph QuakeLab



## Fault Trace Builder Tool

The screenshot displays the Trace Builder software interface, which is used for constructing and analyzing fault traces. The central 3D view shows a fault trace (blue line) on a fault surface (blue shaded area) within a 3D coordinate system (X, Y, Z). The X-axis ranges from -125 to 0, and the Y-axis ranges from -10 to 0. The Z-axis ranges from 0 to -10. The fault trace is defined by a series of points, with a red circle highlighting a specific point on the trace.

The interface includes several panels and controls:

- Tools:** Contains icons for zooming, panning, and other navigation functions.
- Map:** Includes a 'Map' button, a scale of 0.4, and a dropdown menu for 'MAP-01'.
- Catalog:** A list of fault segments with checkboxes for 'Color by Mag.' and 'Hide Events', and a 'Display' button.
- Traces:** Checkboxes for 'Hide Traces', 'Display Boundary', 'Display Points', 'Hide Circle', and 'Fill Fault Surface', along with a 'Display Rate' button.
- Area:** Fields for 'Radius (km)' (250), 'Center Latitude' (42.7917), and 'Center Longitude' (13.0947).
- Coordinates:** 'Find Center' and 'Recalculate XY' buttons.
- Info:** Displays 'nEQs = 1557', 'nTrace = 46', 'Type = Thrust', 'L = 51.5707', 'A = 539.465', 'M max = 6.74732', and 'Grid size = 3000'. Includes an 'Override' button.
- Display Option:** 'Reset View' button, a '2D' button, and checkboxes for 'Lock current view', 'Frame', and 'Focus'. Includes a 'Disp...' button.
- Draw:** Radio buttons for 'Free', 'Spline X', 'Spline Y', 'Constrained', and 'Interpolated'. A 'dl = 3 km' field. 'Draw Fault' and 'Add Section' buttons.
- Panel:** A list of fault segments, with 'Castel San Pietro Terme-Meldola' selected. Includes 'BS', 'Merge', 'Delete', and 'Sort' buttons. A table showing X and Y coordinates for the selected segment:

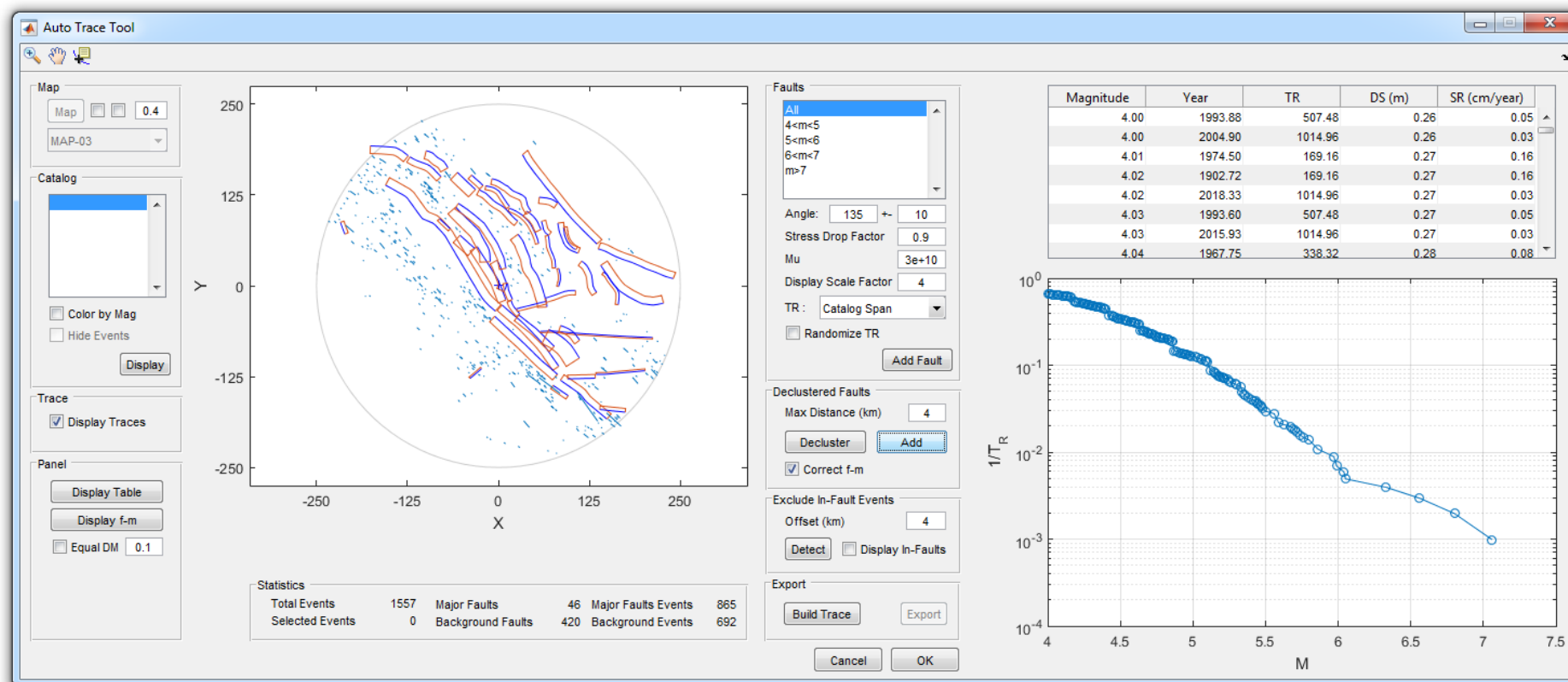
X	Y
-121.5239	177.4920
-117.1108	174.8231
-112.4808	172.5539

'Load Trace', 'Export', 'Export All', 'Load B.S.', 'Import', and 'Reset' buttons.
- Fault Trace:** Fields for 'latitude' (44.378), 'longitude' (11.5656), 'altitude' (-2000), 'depth\_along\_dip' (10460.7), 'slip\_rate' (0), 'aseismic' (0), 'rake' (90), 'dip' (35), 'lame\_mu' (3e+10), and 'lame\_lambda' (3.2e+10). Includes 'Display' and 'Set Slip' buttons.
- Fault Segment:** Fields for 'fault\_id' (1), 'sec\_id' (0), 'number\_of\_points' (11), and 'section\_name' (Castel San Pietro Terme-Meldola). Includes 'Set Slip' and 'Edit All Data' buttons.

Buttons for 'Cancel' and 'OK' are located at the bottom right of the interface.

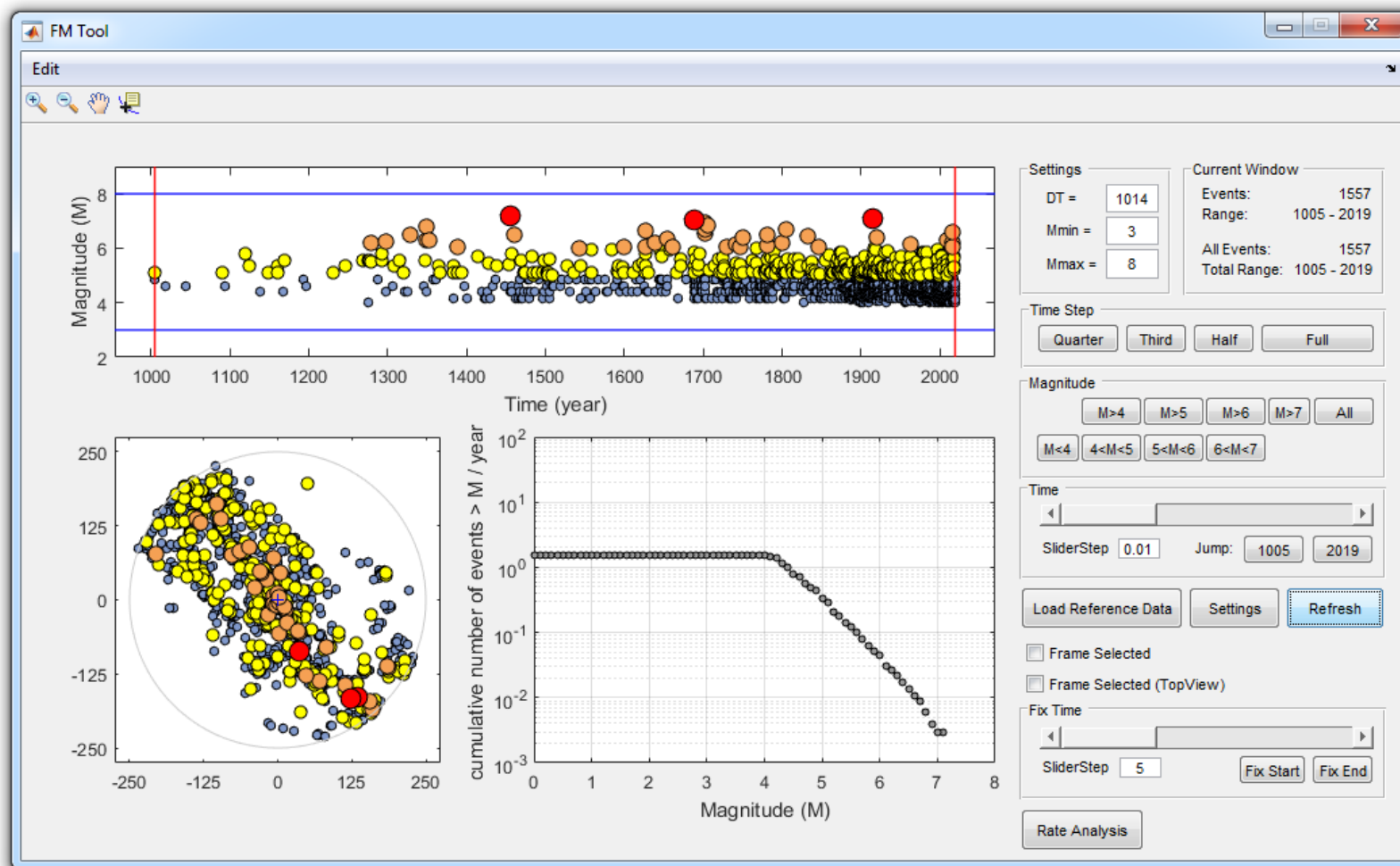
\* Advanced Trace Builder Tool

# Background Fault Generator



\* Background Fault Generator

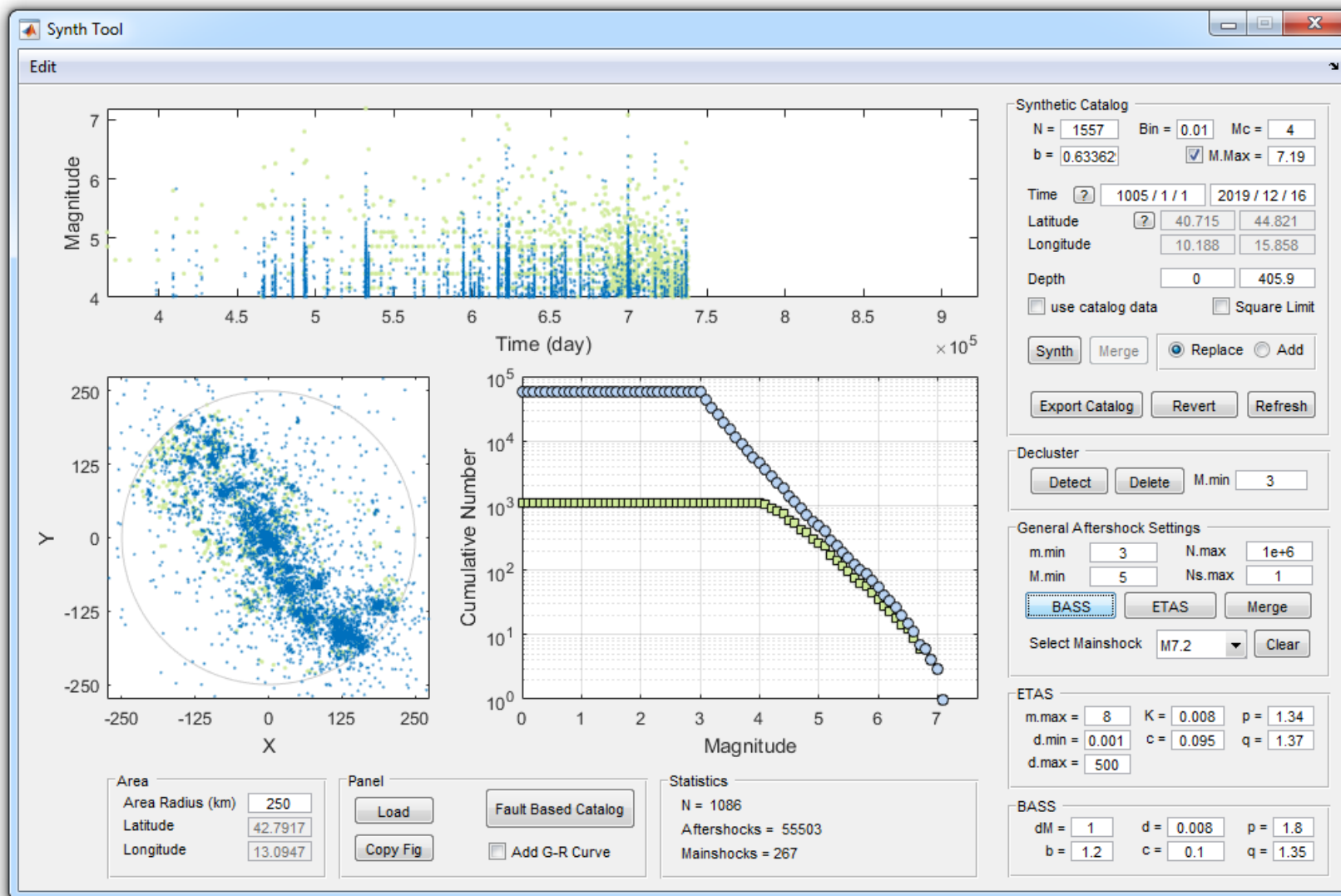
# Frequency-Magnitude Analyzer Tool



\* Frequency-Magnitude Analyzer

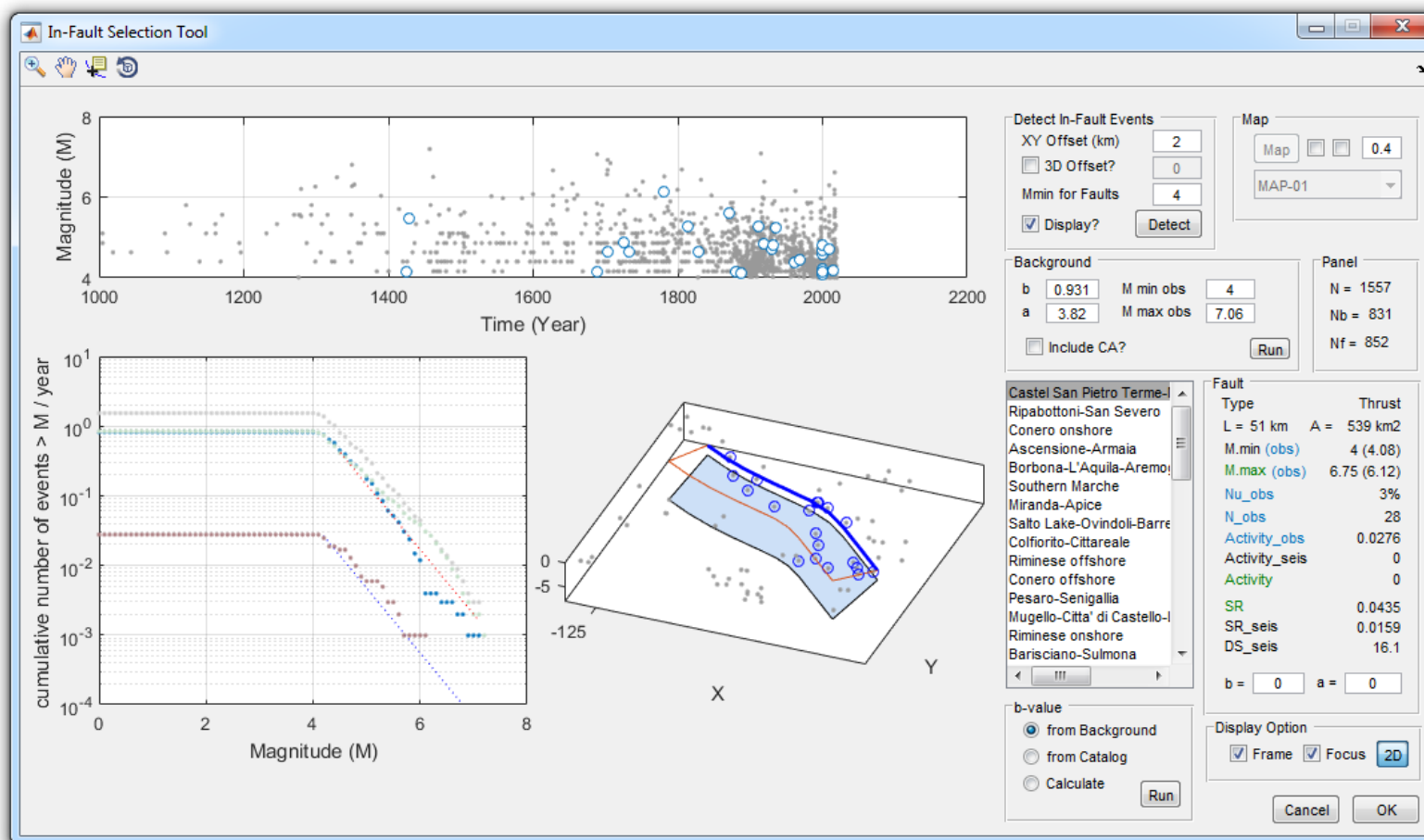


# Synthetic Catalog Generation



\* Synthetic Catalog + Aftershock Generator: BASS / ETAS

## Background Seismicity Editor (IFS Tool)



\* Fault Event Detector + Background Seismicity Editor

# Completeness Analysis Tool

Completeness Analysis Tool

Year	Month	Day	Time	Latitude	Longitude	Depth	Magnitude	MT	Region	Ref.	CatID	X (m)	Y (m)
2019	12	16	10:36:15	41.081	14.736	10.7	4.13	Mw	Benevent...	BSI020c	1	137.5719	4569.3372
2019	12	9	03:37:03	44.004	11.319	7.3	4.69	Mw	Mugello	BSI020c	1	-141.9973	4894.5162
2019	12	7	21:55:38	42.462	13.263	13.7	4	Mw	Aquilano	BSI020c	1	13.79972	4721.5727
2019	11	7	17:35:21	41.776	13.604	16.2	4.62	Mw	Val Roveto	BSI020c	1	42.22362	4645.4067
2019	9	1	00:02:39	42.797	13.13	10.3	4.17	Mw	Valnerina	BSI020c	1	2.877527	4758.8099

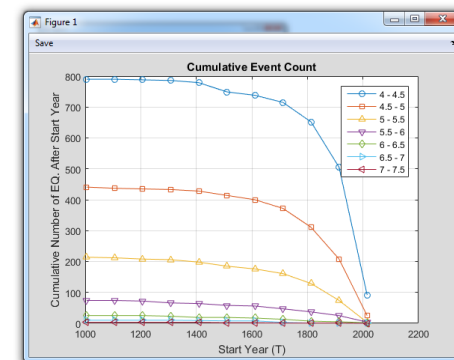
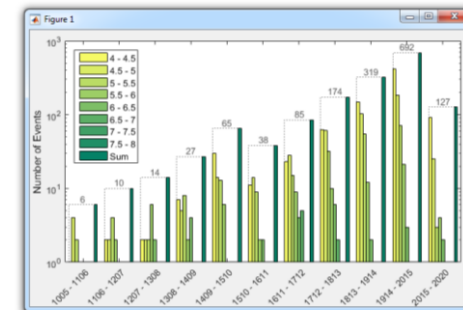
	4 - 4.5	4.5 - 5	5 - 5.5	5.5 - 6	6 - 6.5	6.5 - 7	7 - 7.5	7.5 - 8	Sum
1005 - 1106	0	4	2	0	0	0	0	0	6
1106 - 1207	2	2	4	2	0	0	0	0	10
1207 - 1308	2	2	2	6	2	0	0	0	14
1308 - 1409	7	5	8	2	4	1	0	0	27
1409 - 1510	30	14	13	6	0	1	1	0	65
1510 - 1611	11	14	9	2	2	0	0	0	38
1611 - 1712	23	28	15	9	4	5	1	0	85
1712 - 1813	63	61	32	10	6	2	0	0	174
1813 - 1914	147	103	55	12	2	0	0	0	319
1914 - 2015	413	183	71	21	3	0	1	0	692
2015 - 2020	92	25	3	4	2	1	0	0	127
Sum	790	441	214	74	25	10	3	0	1557

Basic Count  
 nEQ: 1557  
 Y Bin: 101  
 M Bin: 0.5  
 Auto divide  
  
 N > Mmax: 0  
 N < Mmin: 0  
 Keep last Y-bin

Cumulative Count  
  Reverse?  
 From: 4  
 To: 7.5  
 Log Y?  Log X?

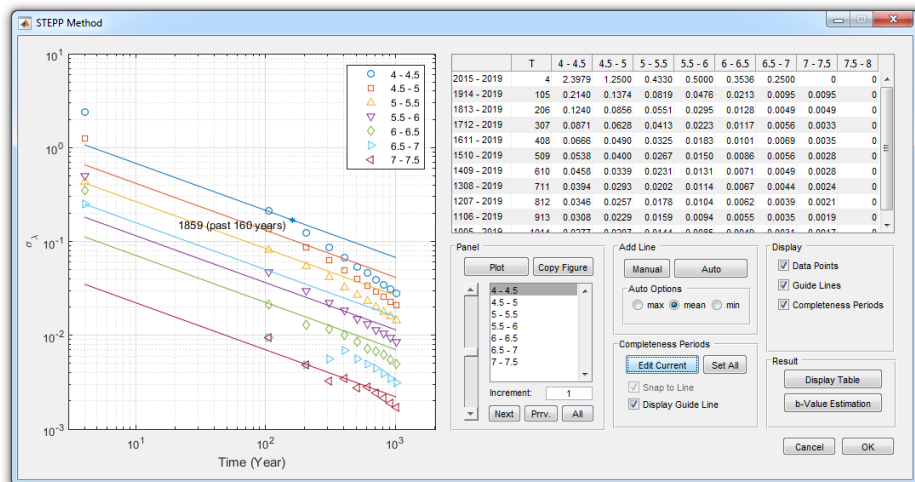
Tools  
  
 Log?

Results

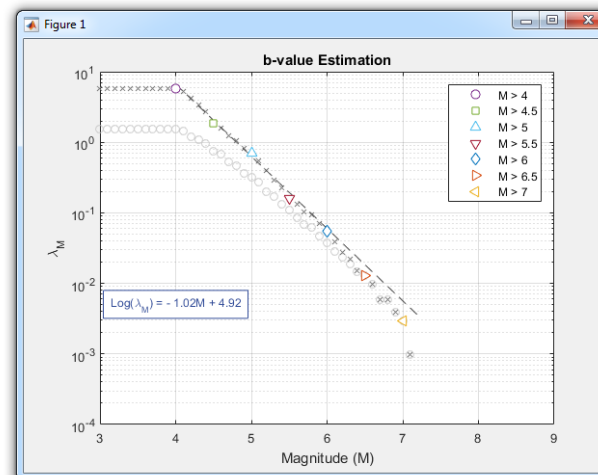


\* Completeness Analysis Tool

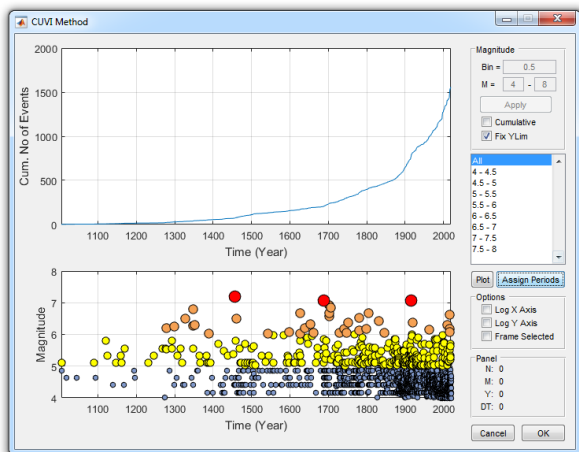
# CA Tool: CUVI / STEPP Method



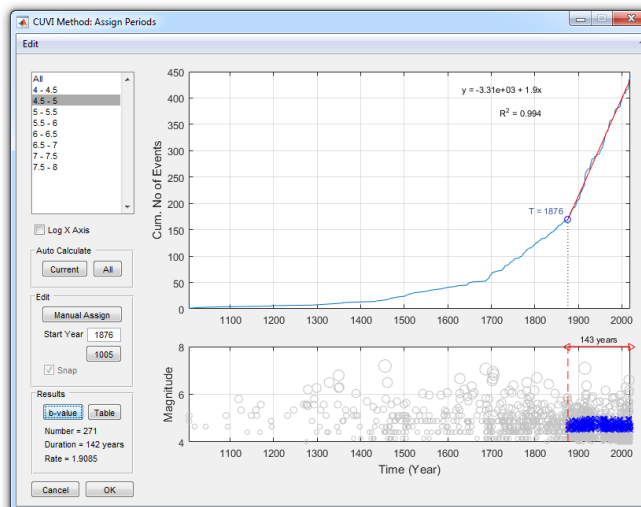
\* Stepp Method



\* CA Analysis result: Reconstructed f-m curve



\* Visual Cumulative Method

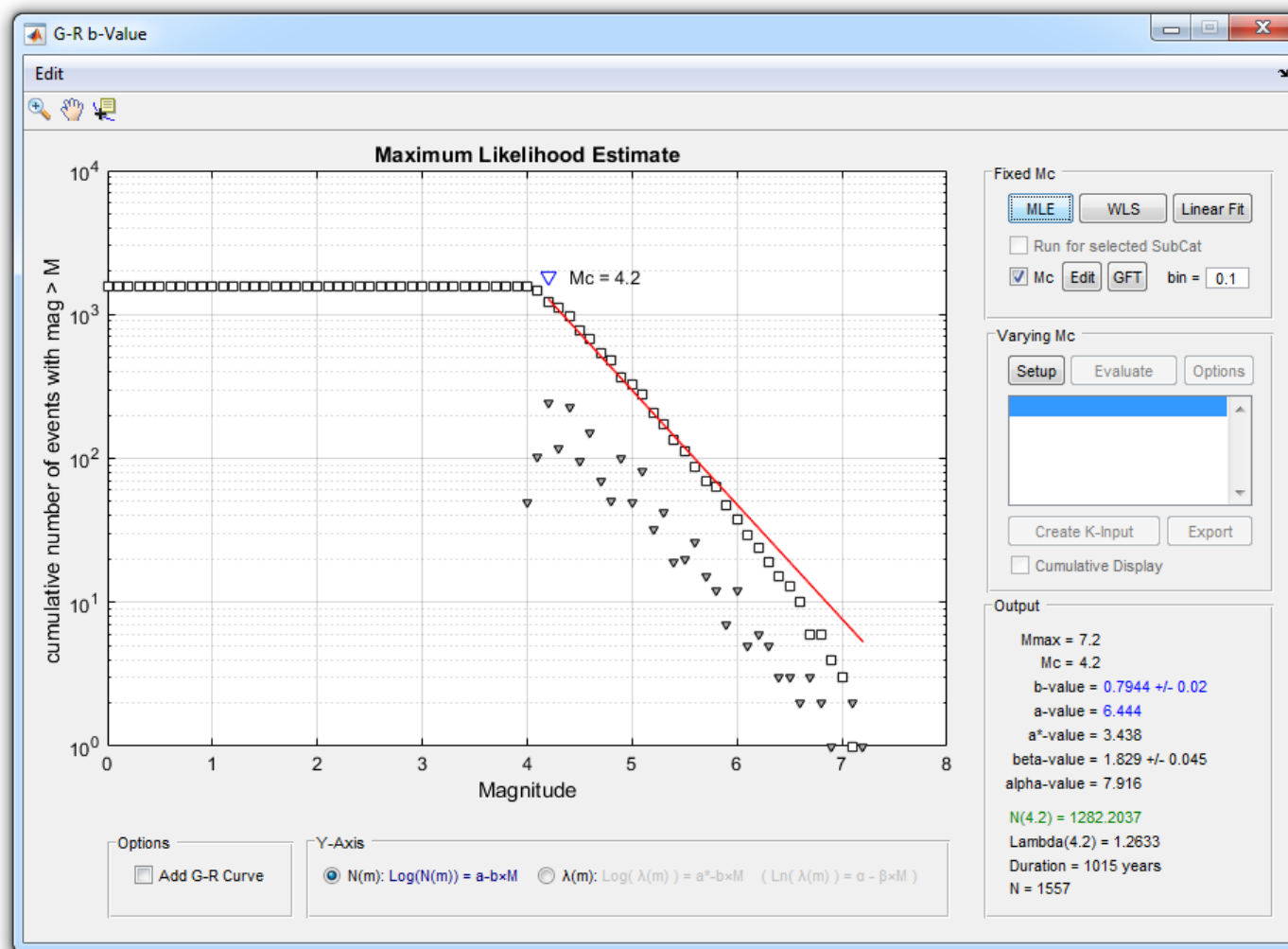


\* CUVI Method: Assign Periods Tool

Magnitude	Start Year	Years	Events	Rate
All	1991	28	383	13.6786
4-4.5	1886	133	610	4.5865
4.5-5	1876	143	272	1.9021
5-5.5	1861	158	117	0.7405
5.5-6	1781	238	43	0.1807
6-6.5	1279	740	25	0.0338
6.5-7	1005	1014	10	0.0099
7-7.5	1005	1014	3	0.0030
7.5-8				

\* CA Analysis result: Table Data

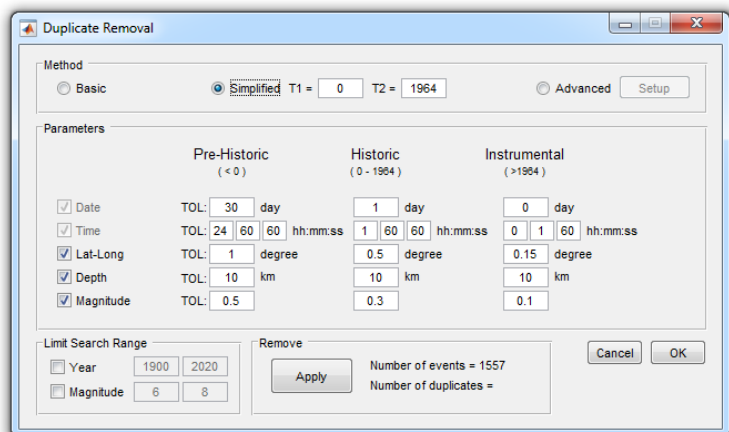
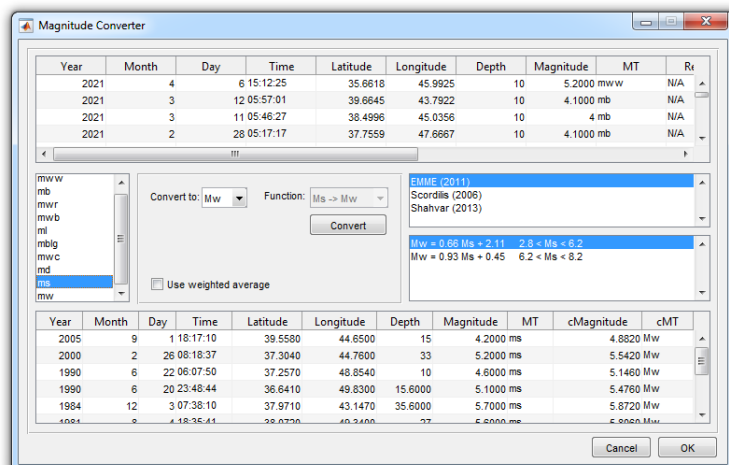
## b-value Estimation



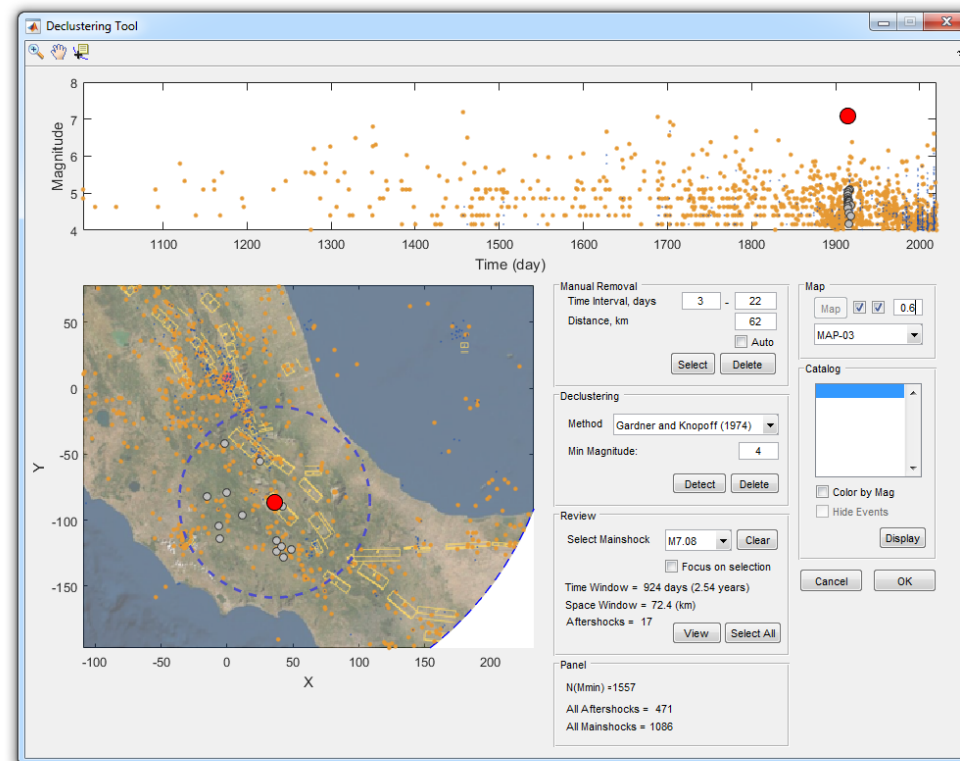
\* Maximum Likelihood Estimate / Weighted least squares / Linear regression

# Magnitude Conversion, Duplicate Removal & Declustering Tools

\* Magnitude Conversion Tool

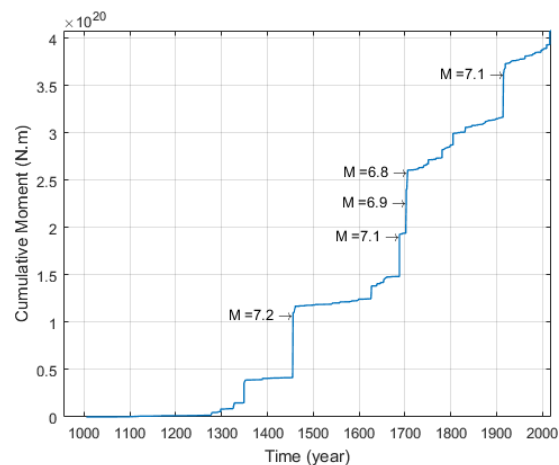


\* Duplicate Removal Tool

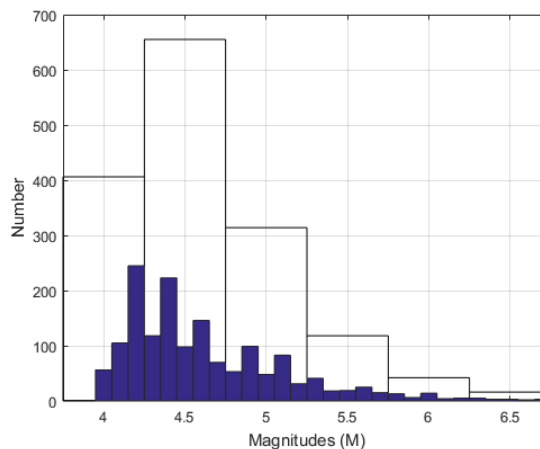


\* Declustering Tool: Manual Removal / Gardner Knopoff

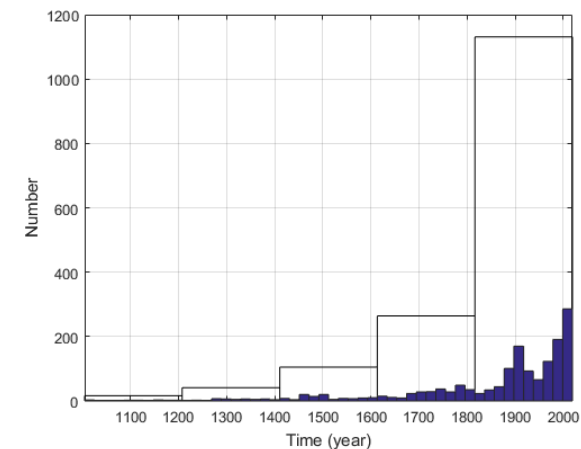
## Statistic Reports



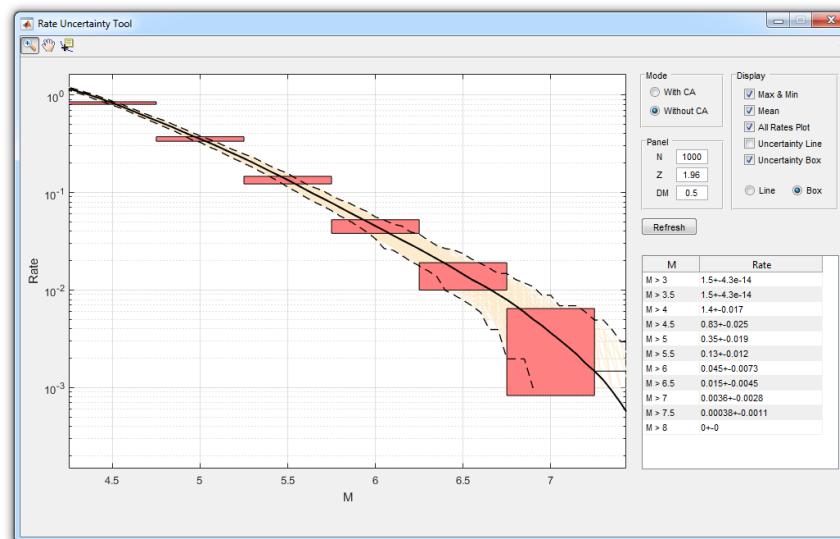
Moment Release Diagram



Magnitude Histogram



Time Histogram



\* Rate Uncertainty Calculator

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- Website:**  <https://seismograph.me/>
- YouTube:**  <https://www.youtube.com/seismograph>
- Aparat:**  <http://www.aparat.com/seismograph>
- LinkedIn:**  <https://www.linkedin.com/company/seismo-graph>
- Telegram:**  <https://t.me/SGees>
- Twitter:**  [https://twitter.com/seismograph\\_me](https://twitter.com/seismograph_me)
- Facebook:**  <https://www.facebook.com/Seismograph.me/>
- 

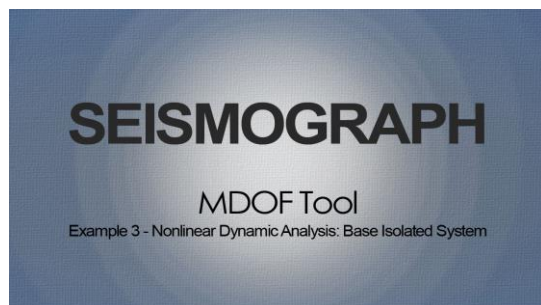
**Contact:** [info@seismograph.me](mailto:info@seismograph.me)



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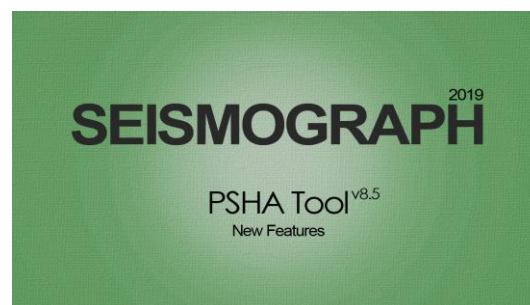
## Tutorial Videos

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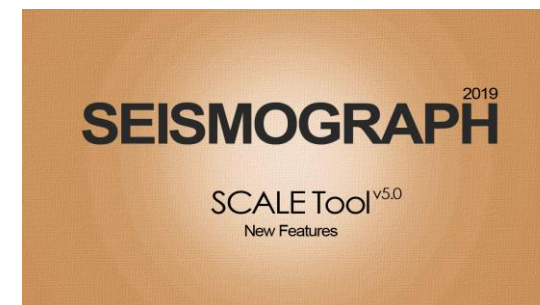
MDOF Tool

- [Seismic Isolation](#)
- [Pulse Load](#)
- [Nonlinear Elements](#)
- [Nonlinear Dynamic Analysis: Base Isolated System](#)
- [Nonlinear Dynamic Analysis: MDOF System](#)
- [Nonlinear Dynamic Analysis: SDOF System](#)



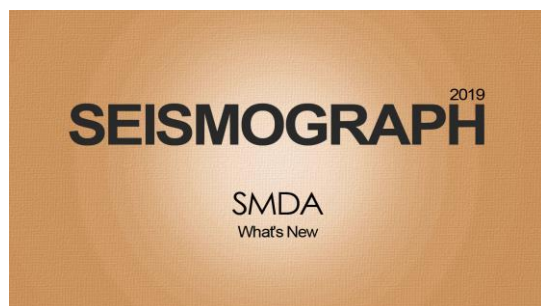
PSHA Tool

- [PSHA Tool v8.8: New Features](#) (2021)
- [PSHA Tool v8.5: New Features](#)
- [PSHA Tool: Tutorial](#) (2019)
- [PSHA Tool: What's New](#) (2019)
- [PSHA Tool: What's New](#) (2016)
- [PSHA - Advanced Source Editor](#)
- [Probabilistic Seismic Hazard Analysis](#)



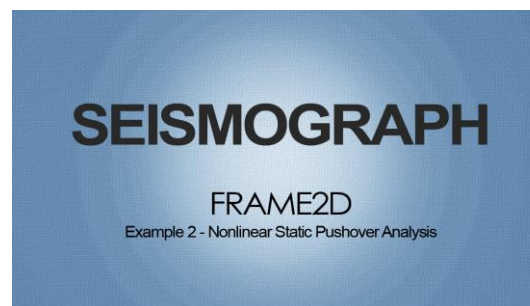
SCALE Tool

- [Scale Tool v5.5: New Features](#) (2021)
- [Scale Tool v5.0: New Features](#)
- [Scale Tool: Tutorial](#) (2019)
- [Scale Tool: What's New](#) (2016)
- [Scale Tool](#)



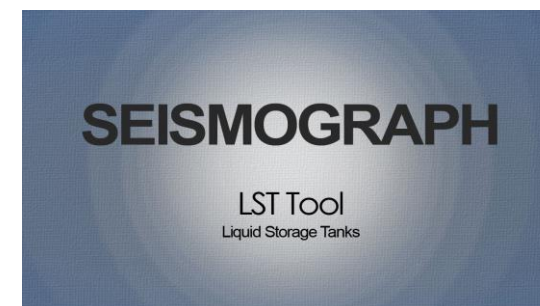
SMDA

- [SMDA: What's New](#) (2019)
- [SMDA: What's New](#) (2016)
- [SMDA Tool](#)



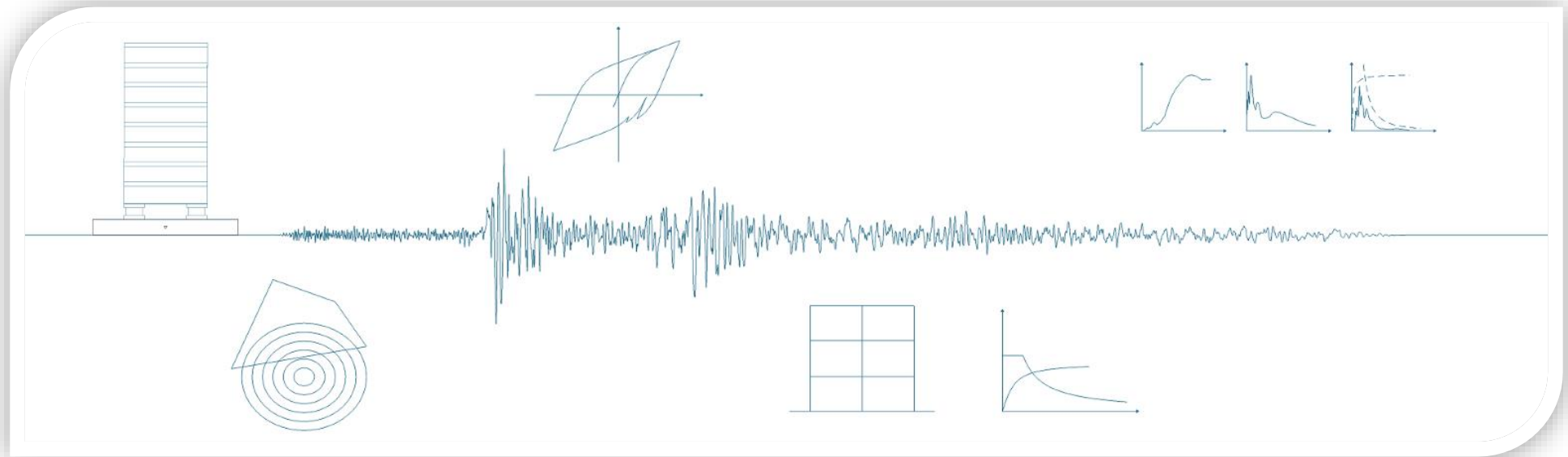
Frame2D

- [Linear Static Analysis](#)
- [Nonlinear Static Pushover Analysis](#)



LST Tool

- [Liquid Storage Tanks](#)



# SEISMOGRAPH

earthquake engineering software

<https://seismograph.me>