SEISMOGRAPH

Quick Start Guide (C)

PSHA Tool (v8.8)
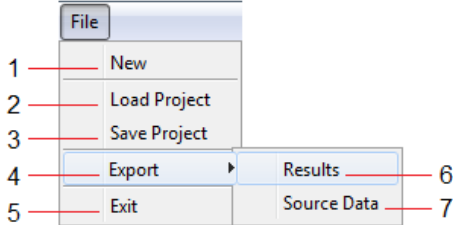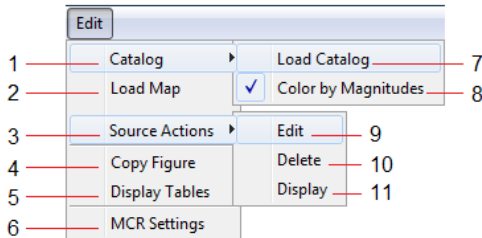
Table of Contents

1. Main Window

1. Radius of the study area (in kilometers)
2. Use this button to add (or edit) <u>map</u> file (*.JPG / *.PNG / *.TIF). You can display or hide the loaded map using the adjacent checkbox.
3. Use this button to add <u>catalog</u> file (*.cat). You can display or hide the loaded catalog data using the adjacent checkbox.
4. Use this section to define a new source zone. (Point, Line, Area or 3d Fault)
5. To display the probability distributions for any of the available seismic source zones, just select it from this list.
6. Use these buttons to display (highlight on map), edit, or delete the selected source.
7. Minimum acceleration level to calculate the seismic hazard curve.
8. Maximum acceleration level to calculate the seismic hazard curve.
9. Acceleration increment. Enable "<u>Log?</u>" checkbox to use equal logarithmic spacing for the acceleration array. In this case, you need to enter the number of points (Np) at which the hazard curve is evaluated.
10. Use this button to define (or edit) the analysis cases.
11. Use this button to perform the hazard analysis.

12. Select the desired analysis cases to display its results. (The hazard analysis must have been done.)

13. Use this popup menu to select the Spectral Ordinates – when the <u>Spectral Acceleration</u> is selected as the Intensity Measure Parameter for the attenuation model – or the Maximum Magnitude Set – when a logic tree case is selected.

14. Select the attenuation relationship of analysis case to display its results.

15. If the <u>Source</u> checkbox is enabled, the results can be displayed by sources. To highlight the hazard curve for each source, select it from this menu.

16. Use this button to display the selected hazard curve data (that is previously determined in steps No. **12** through **15**) in a table. By displaying the table, its data will be automatically copied to the clipboard. (**Auto Copy** feature)

17. Use this button to copy each of the four diagrams on the main window into a new figure. (select the chart you want to copy from the adjacent menu)

2. Menu Bar

File

1. Create a new project
2. Load a project from file (*.ssp)
3. Save the current project as a new file (*.ssp)
4. Export the outputs
5. Exit the program

Export

6. Export the Analysis Results (* .xlsx)
7. Export the source zones data (* .xlsx)

Edit

1. Catalog option, includes:

   7) Load Catalog: to load catalog (*.cat) file
   8) Color by Magnitude: to color the catalog data based on magnitude
2. Load Map: to add or edit a map file
3. Source Actions option, includes: 9) Editing the selected source, 10) Deleting the selected source, and 11) Displaying: to mark the selected source.
4. Display the analysis results for the selected case in a table.
5. Copy current axes to a new figure
6. Access to the MATLAB Runtime settings

Add Source	
1. Add Line Source 2. Add Area Source 3. Add Point Source 4. Add 3D Fault	Add Source 1 —— Line Source 2 —— Area Source 3 —— Point Source 4 —— 3D Fault

Run	
1. Add (or edit) the analysis cases 2. To perform the Seismic Hazard Analysis	Run 1 —— Add Analysis Case 2 —— Run

Display	
1. Display results of the analysis (hazard curve)	Display 1 —— Hazard Curves

Tools	
1. To access the Source Editor Tool 2. To access the Attenuation Plotter Tool (to view and plot all available attenuation relationships)	Tools 1 —— Source Editor 2 —— Attenuation Plotter

| Help	
1. Visit the product page on the SEISMOGRAPH website 2. Create a Log file for bug report 3. View description of the current version of the software	
Create Log file	Help 1 —— Seismograph Website 2 —— Create Log File ► Start Log —— 4 3 —— About... End Log —— 5
2. Start writing the Log file 3. Stop writing the Log file (it is saved the in the software's installation folder.	

3. Load Map
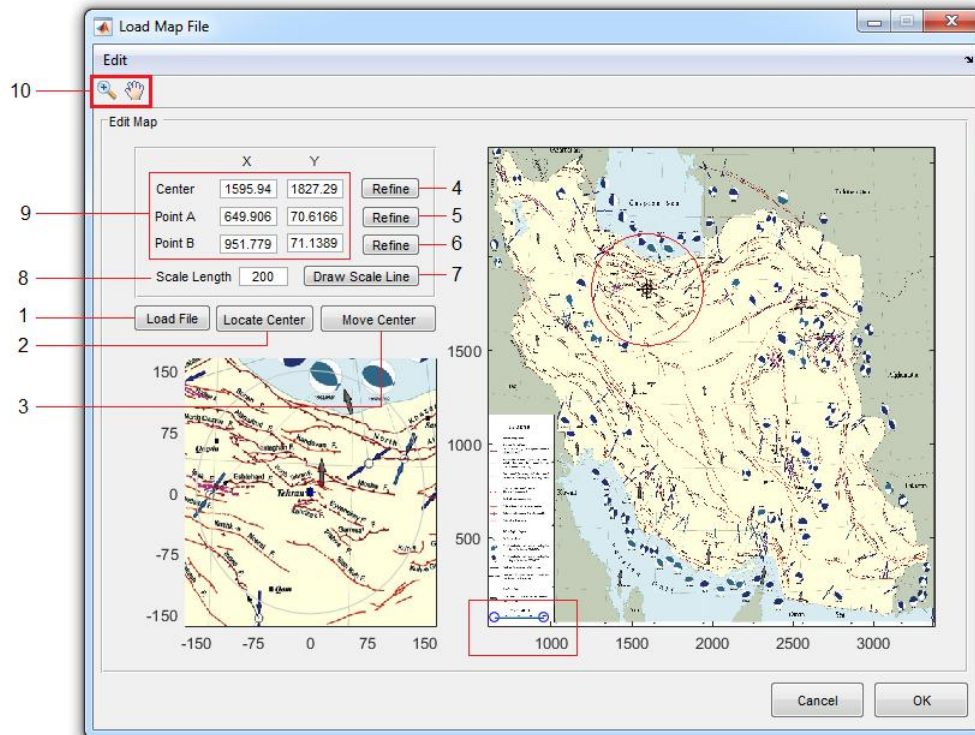
1. Use this button to load the fault map image. (*.JPG / *.PNG / *.TIF)
2. Use this button to specify the location of the Site on the map. (You can use the zoom and pan tools from the main toolbar (**10**) if necessary)
3. If location of the Site is not printed on the map, you can select a reference point (with known latitude and longitude) and then move it to the Site location.
4. Use this button to accurately select the center point again.
5. Use this button to accurately select the first point of the scale line again.
6. Use this button to accurately select the second point of the scale line again.
7. Use this button to draw the scale line on the map. (make sure that the length of the scale line is correctly entered in the section **8**)
8. Enter the length of the scale line in this textbox. (In kilometers)
9. The coordinates of the center point and the points on the scale line are displayed here.
10. The main toolbar, including zoom and pan tools.

3.1 Move Center
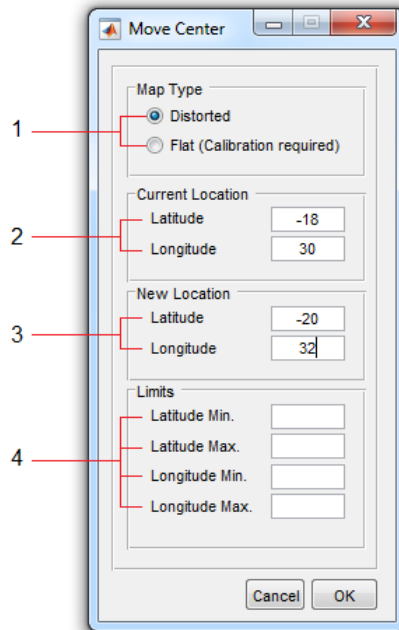
1. Select the map type from here. If the map is of a <u>distorted</u> type, you should accordingly enter the minimum and maximum latitude and longitude in "Limits" group (refer to No.4). If the map is <u>flat</u>, you need to perform the <u>calibration</u> in order to determine the aspect ratio.
2. Enter the latitude and longitude of the currently selected point here. (Select a point with known coordinates – e.g. the intersection of latitude and longitude lines – as the reference point.)
3. Enter the latitude and longitude of the Site here.
4. For distorted-type maps, you need to enter the minimum and maximum latitude and longitude map here. (Calibration is not possible)

Note: The latitude and longitude of the points located respectively in <u>southern</u> and <u>western</u> hemisphere must be negative.

3.2 Map Calibration
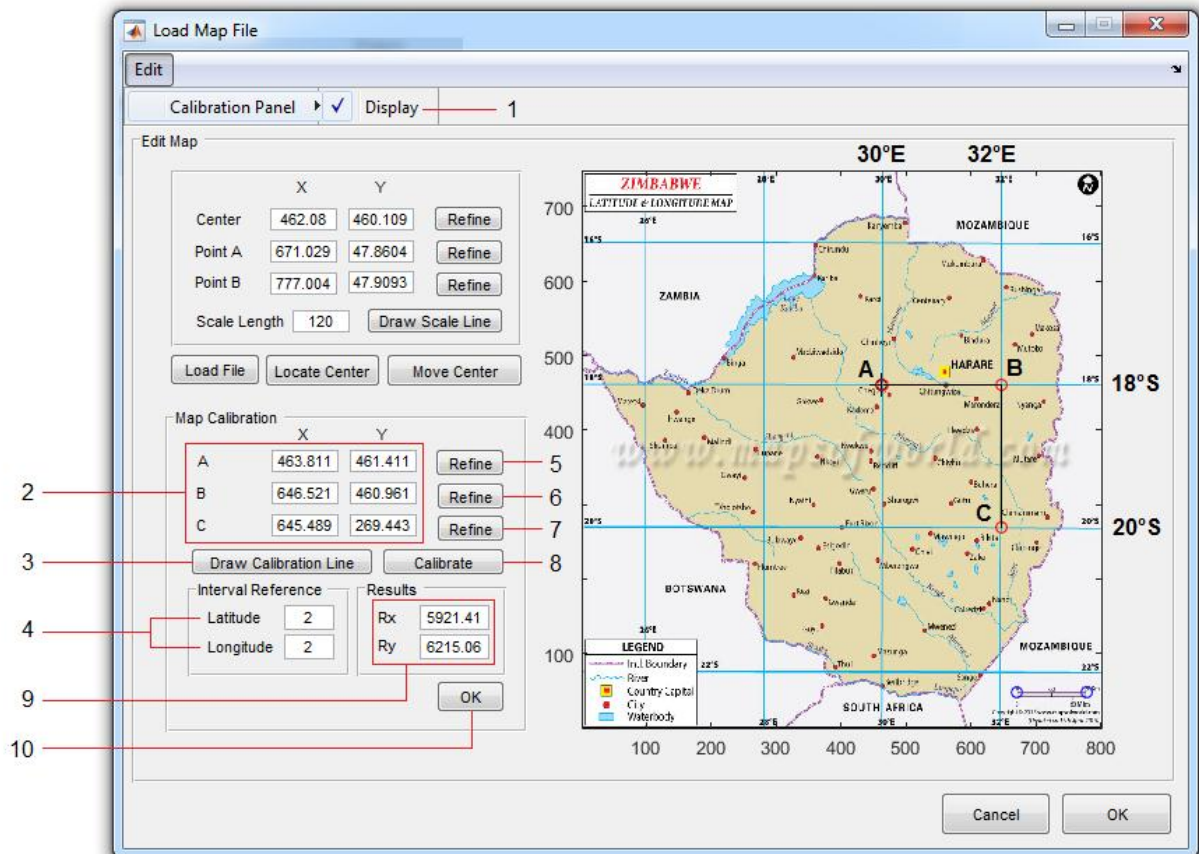
1. Enable this option to display the calibration panel.
2. Coordinates of the points on the calibration line are displayed here.
3. Use this button to draw the calibration line. This line has to be drawn by selecting 3 points - A, B and C – respectively, as shown in the above figure. The points should be selected in such a way that the Site location is covered by the resultant rectangle. Furthermore, the length of AB and BC lines should be specified in degree. (For example, the lengths of the both aforementioned lines are 2 degrees in shown map.)
4. Enter the horizontal distance between the points A and B and the vertical distance between the points B and C in "longitude" and " Latitude" textbox, respectively (both in degree).

Note: In the version 8.2.1 labels of the latitude and longitude are incorrect. (The updated version can be downloaded from the Site)

5. Use this button to re-select <u>point A</u> more accurately.
6. Use this button to re-select <u>point B</u> more accurately.
7. Use this button to re-select <u>point C</u> more accurately.
8. Use this button to perform the calibration.
9. The calibration result is displayed here.
10. Once the calibration is finished, click "Ok" to close the Calibration Panel.
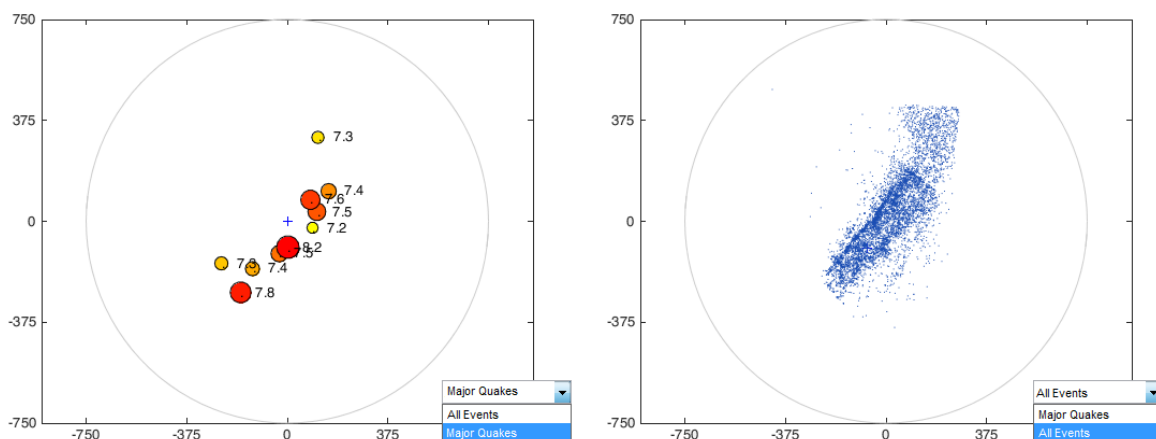
4. Add Point Source
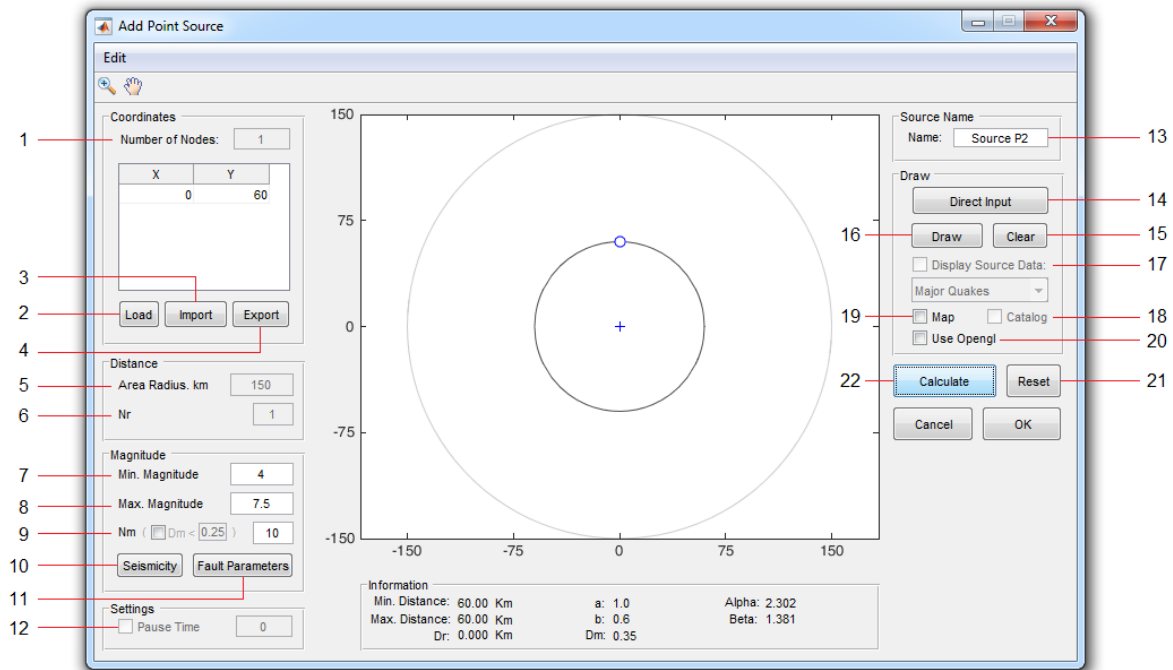
1. The number of points defining the source geometry is displayed here. (for the point source it is equal to 1)
2. Use this button to load the source geometry data. (relative X-Y data in *.txt or *.xyd formats)
3. Use this button to import source geometry data. (Latitude and Longitude data in: *.txt, *. lld or *.lld2 formats)

Note: To convert latitude and longitude to relative X-Y coordinates, the geographic limits of area and Site coordinates must be specified. This information will be stored in the new *.lld2 file format. To export in *.lld2 file format, you need to provide geographic coordinates (unless you've loaded the catalog data which already contains this geographic information)
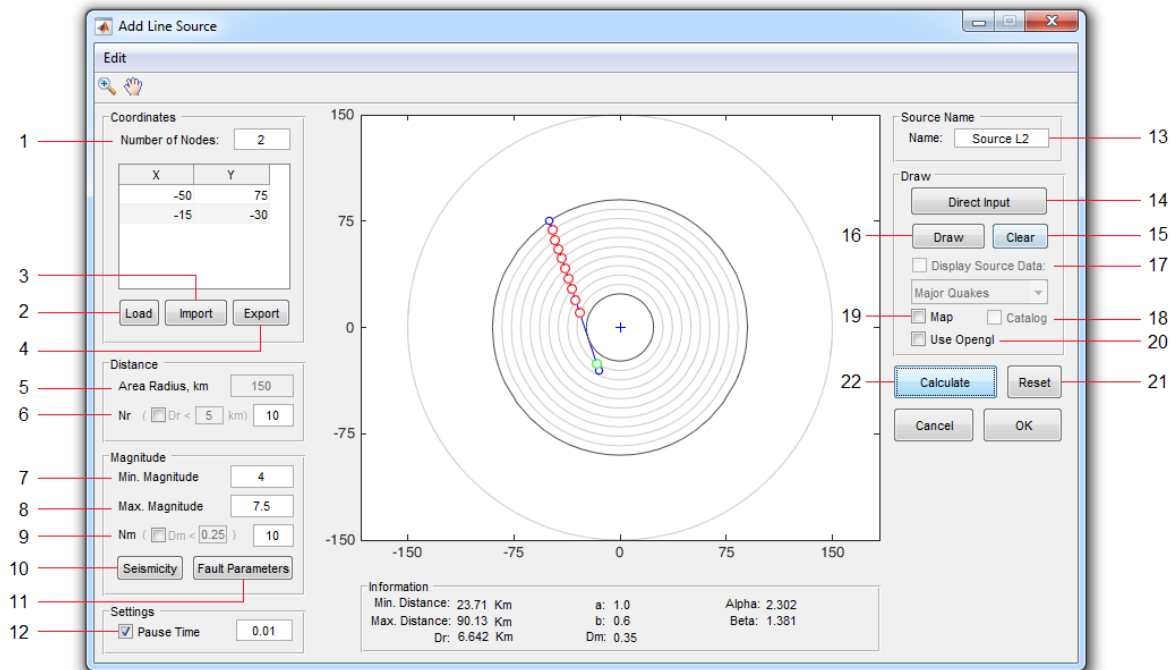
4. Use this button to export source geometry data. (relative X-Y data in: *.xyd format or Lat-Long data in: *.lld2 formats)
5. The radius of the study area. (not editable)
6. The number of divisions corresponding to the distance probability distribution function. (for the point source it is equal to 1)
7. Minimum source magnitude
8. Maximum source magnitude

9. The number of divisions corresponding to the magnitude probability distribution function (or maximum ΔM value) can be determined from this section.

10. Use this button to define the parameters of the Gutenberg-Richter recurrence law. (a-value and b-value)

11. Use this button to define the optional parameters of the source zone. (as required by some attenuation relationships)

12. The drawing pause time to visualize distance calculations. (Disabled for the point source)

13. Enter a unique name for the point source in this textbox.

14. Use this button to draw the point source directly on the map.

15. Use this button to clear the source. (Its coordinates remains in the table)

16. Use this button to redraw the current source. Source coordinates are taken from the table. You can also change them from the table.

17. Use this checkbox to display source seismicity data on the map (if have loaded this data from Section **10**). You can then display all of these events or only the major events. (by magnitude)

18. Use this checkbox to display catalog data on a map. (You must have previously loaded this data)

19. Use this checkbox to display the map file. (You must have previously loaded the map file)

20. Use this checkbox to change the Renderer of the current window from Painters to OpenGL.

21. Use this button to reset all changes.

22. Use this button to perform the calculations.

5. Add Line Source

1. The number of points defining the source geometry is displayed here.
2. Use this button to load the source geometry data. (relative X-Y data: *.txt / *.xyd)
3. Use this button to import source geometry data. (Latitude and Longitude data: *.txt / *.lld / *.lld2)
4. Use this button to export source geometry data. (*.xyd / *.lld2)
5. The radius of the study area. (not editable)
6. The number of divisions corresponding to the distance probability distribution function (or maximum Δr value) can be determined from this section.
7. Minimum source magnitude
8. Maximum source magnitude
9. The number of divisions corresponding to the magnitude probability distribution function (or maximum ΔM value) can be determined from this section.
10. Use this button to define the Gutenberg-Richter parameters.
11. Use this button to define the optional parameters of the source zone. (as required by some attenuation relationships)
12. The drawing pause time to visualize distance calculations.
13. Enter a unique name for the line source in this textbox.
14. Use this button to draw the line source directly on the map. Use the left-click to draw each point and for the last point use the right-click.

15. Use this button to clear the source. (Its coordinates will remain in the table)
16. Use this button to redraw the current source whose coordinates are currently available in the table.
17. Use this checkbox to display source seismicity data on the map. (You must have loaded this data from Section **10**)
18. Use this checkbox to display catalog data on a map. (You must have previously loaded this data)
19. Use this checkbox to display the map. (You must have previously loaded the map file)
20. Use this checkbox to change the Renderer of the current window from Painters to OpenGL.
21. Use this button to reset all changes.
22. Use this button to perform calculations.

6. Add Area Source
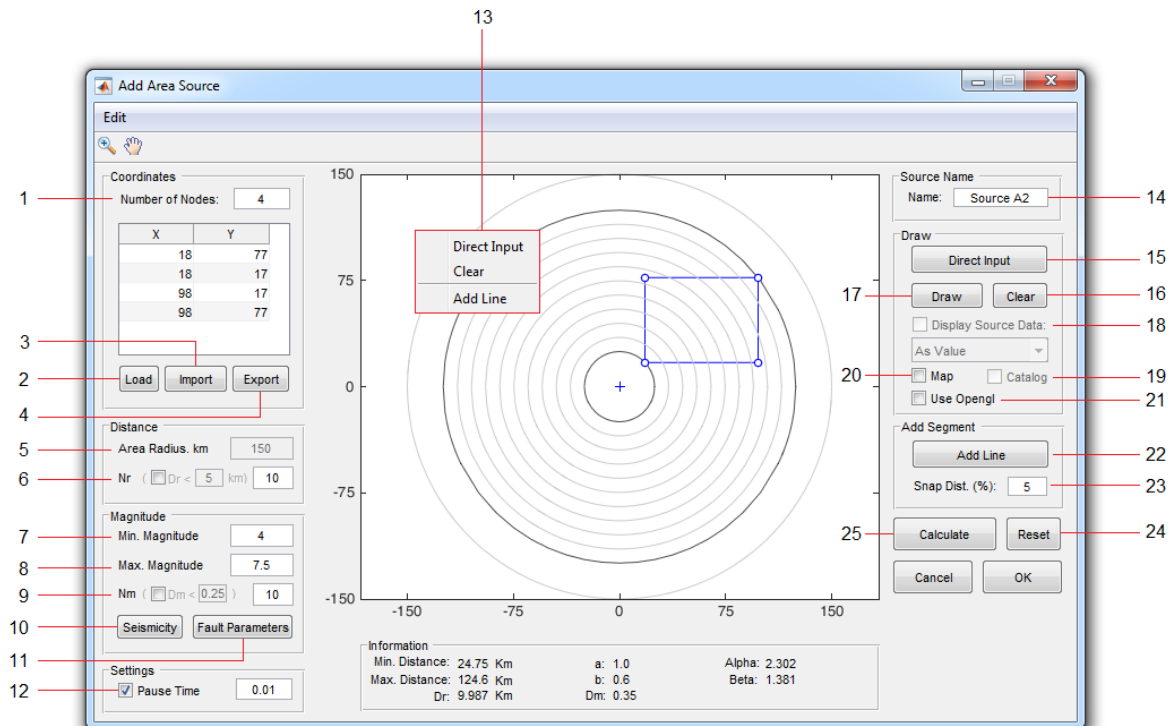
1. The number of points defining the source geometry.
2. Load the source geometry data. (relative X-Y data: *.txt / *.xyd)
3. Import source geometry data. (Lat-Long data: *.txt / *.lld / *.lld2)
4. Export source geometry data. (*.xyd / *.lld2)
5. The radius of the study area.
6. The number of divisions corresponding to the distance probability distribution function. (or maximum Δr value)
7. Minimum source magnitude.
8. Maximum source magnitude.
9. The number of divisions corresponding to the magnitude probability distribution function. (or maximum ΔM value)
10. Use this button to define the Gutenberg-Richter parameters.
11. Use this button to define the optional parameters of the source zone. (as required by some attenuation relationships)
12. The drawing pause time to visualize distance calculations.
13. Use the right-click menu to: 1) Draw the source geometry directly on the map, 2) Clear the source geometry, and 3) Add a line to divide the source.
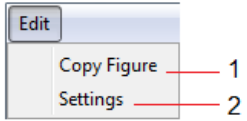
14. Enter a unique name for the area source in this textbox.
15. Use this button to draw the area source directly on the map. Use the left-click to draw each point and for the last point use the right-click.
16. Use this button to clear the source.
17. Use this button to redraw the current source.
18. Use this checkbox to display source seismicity data on the map.
19. Use this checkbox to display catalog data on the map.
20. Use this checkbox to display the map file.
21. Use this checkbox to change the Renderer from Painters to OpenGL.
22. To perform distance calculations, the area source must be convex relative to the center point (Site location). Otherwise, you must divide it into simple geometric shapes by adding new lines.
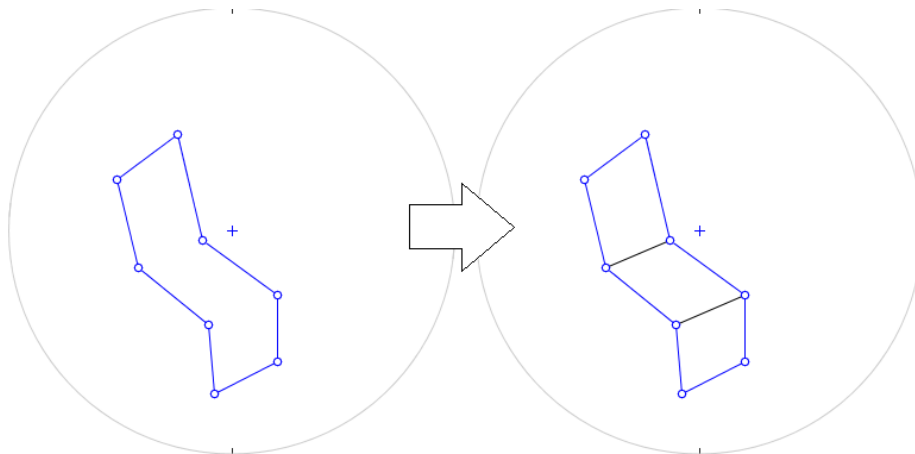

Note: Starting from version 8.8, it is possible to draw area sources that contain the site coordinate (0, 0). In this case, the area is automatically divided into two upper and lower sections (you may need to check for convexity of each section).
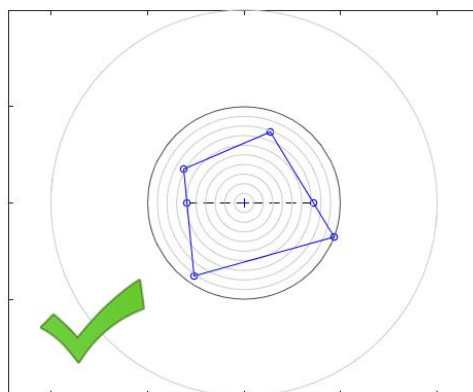
23. Use this option to decrease or increase the effective area around the point, where the intended point is selected by clicking. (Change the accuracy of the <u>Snap to Point</u> property).

24. Use this button to reset all changes.

25. Use this button to perform calculations.

Edit
1. Copy current axes to a new figure 2. Access the map settings
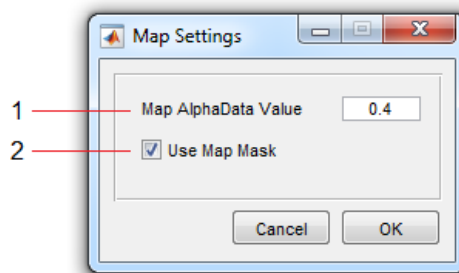
1. Enter a value less than or equal to 1, to change the transparency of the map. (Max 1)

2. Enable this checkbox to cover the out of study area of the map.

7. Add Fault
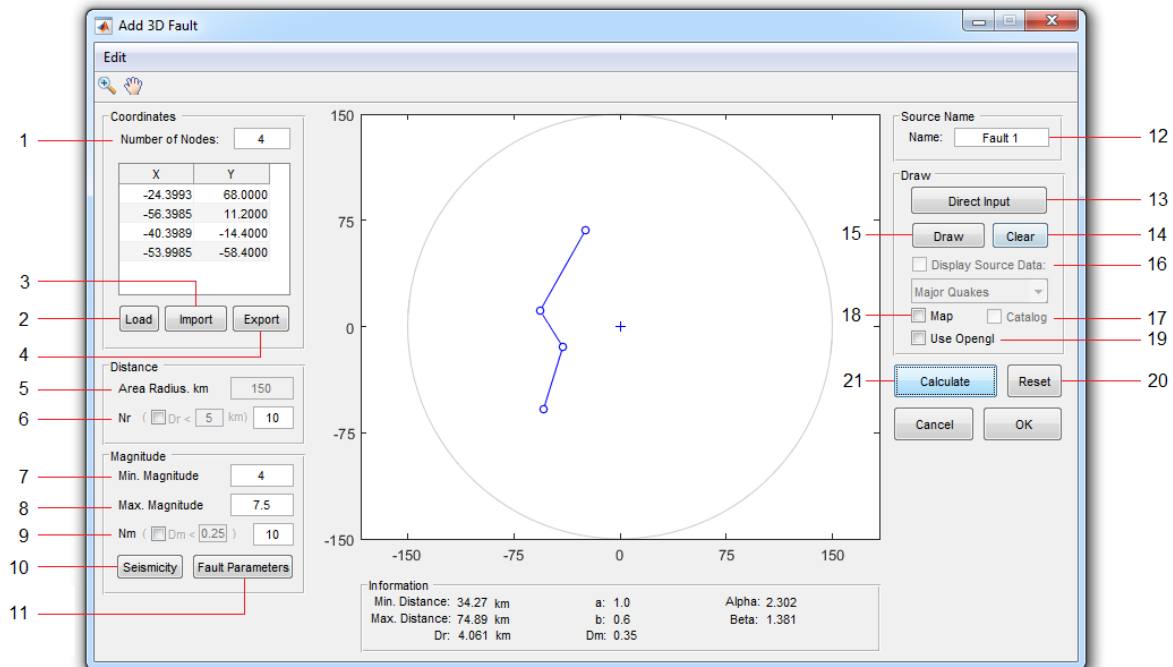
1. The number of points defining the source geometry.
2. Load the source geometry data. (relative X-Y data: *.txt / *.xyd)
3. Import source geometry data. (Lat-Long data: *.txt / *.lld)
4. Export source geometry data. (*.xyd / *.lld)
5. The radius of the study area.
6. The number of divisions corresponding to the distance probability distribution function. (or maximum Δr value)
7. Minimum source magnitude.
8. Maximum source magnitude.
9. The number of divisions corresponding to the magnitude probability distribution function. (or maximum ΔM value)
10. Use this button to define the Gutenberg-Richter parameters.
11. Use this button to define the optional parameters of the fault. (as required by some attenuation relationships)
12. Enter a unique name for the fault in this textbox.
13. Use this button to directly draw the fault trace on the map. Use the left-click to draw each point and for the last point use the right-click.
14. Use this button to clear the trace line.
15. Use this button to redraw the trace line.

16. Use this checkbox to display seismicity data on the map.
17. Use this checkbox to display catalog data on a map.
18. Use this checkbox to display the map file.
19. Use this checkbox to change the Renderer from Painters to OpenGL.
20. Use this button to reset all changes.
21. Use this button to access the 3D Fault Builder Tool.

7.1 Fault Builder
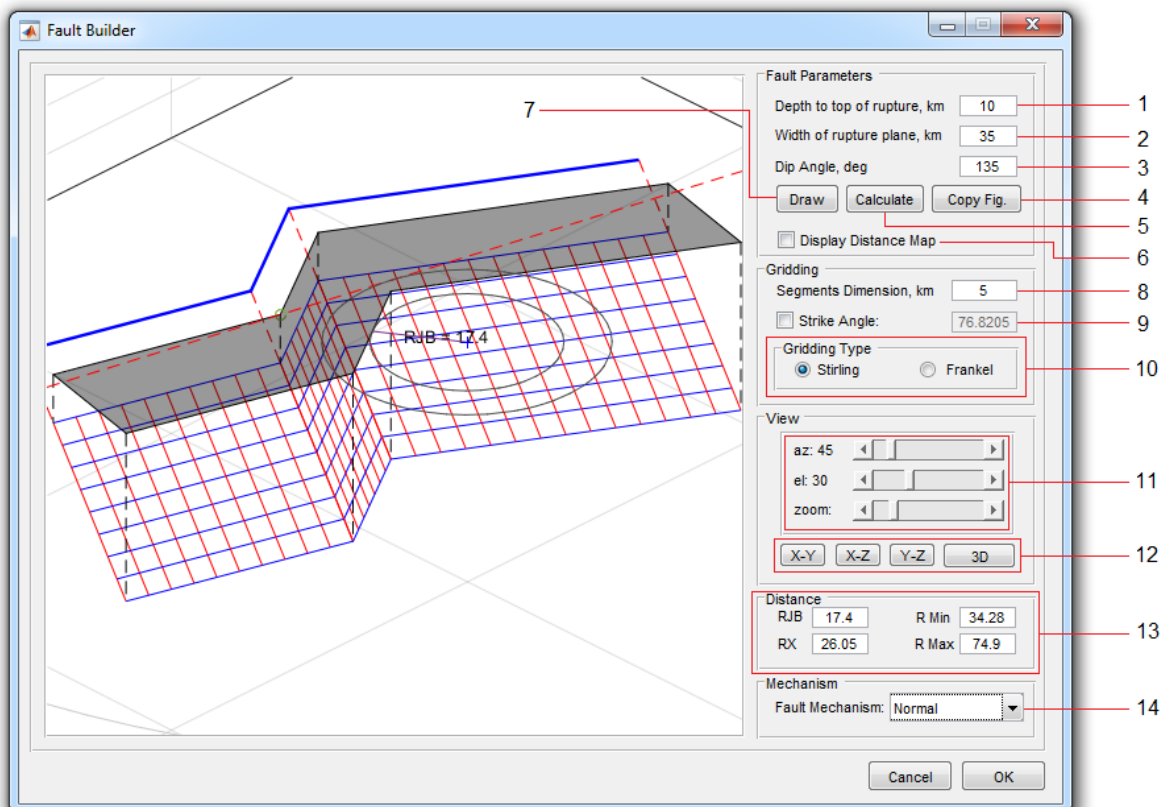
1. Minimum depth of ruptures on the fault.
2. Down dip width (The average width of the fault surface measured in the down-dip direction)
3. Average fault dip angle. (the angle between the fault and a horizontal plane, 0° to 180°)
4. Use this button to make a copy of the current axes in a new figure.
5. Use this button to calculate the probability distributions.

6. Enable this checkbox to display the distance map. (distance of each fault segment from the Site)
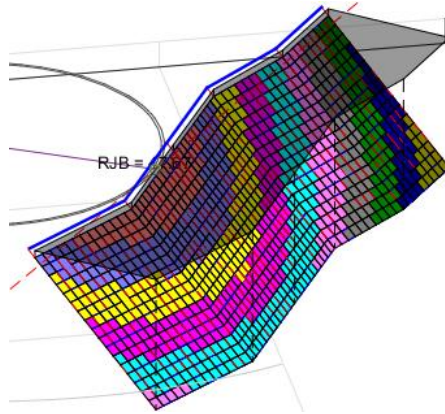
7. Use this button to draw the geometric shape of the fault.
8. Enter the maximum dimension of fault divisions. (**Warning:** as the segment dimension decreases, the calculation time increases drastically)
9. To override the average strike angle determined by the program, enable this checkbox and enter the desired value. (in degree)
10. Use this section to change the type of surface gridding.
11. Use these tools to change the camera views.
12. Use these buttons to quickly access to the standard camera views. (3D, Top, Front and Side)
13. Once the calculation is finished, the minimum and maximum distances from Site to source, RX distance and RJB distance are reported in this section.
14. Set the fault mechanism from this list. (it is required by some attenuation relationships)

8. Seismicity Parameters
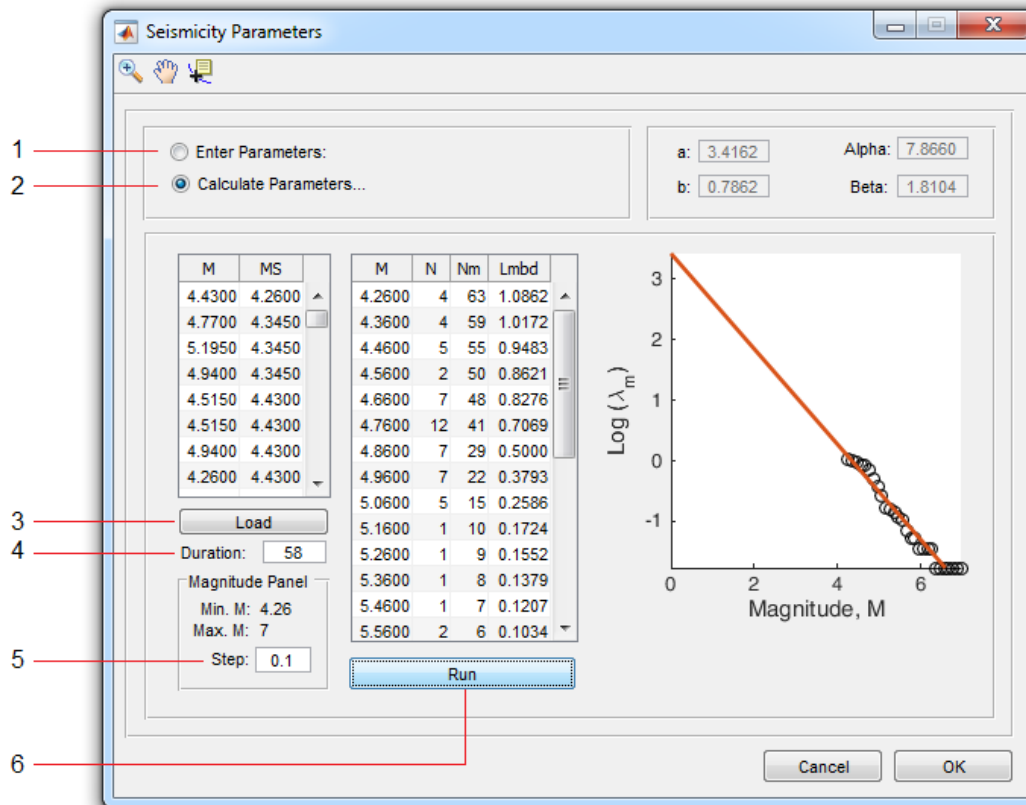
1. Select this option to directly enter the parameters of the Gutenberg–Richter recurrence law. (a-value and b-value)
2. Select this option to calculate parameters using the seismicity data.

    Note: This method <u>does not</u> consider the catalog incompleteness.

3. Use this option to load the seismicity data for the source zone (*.ssd format). This data can be prepared using the Source Editor tool.
4. The catalog duration is displayed here on a yearly basis.
5. Enter the magnitude increment here.
6. Use this button to determine the regression coefficients. (a and b)

9. Fault Parameters
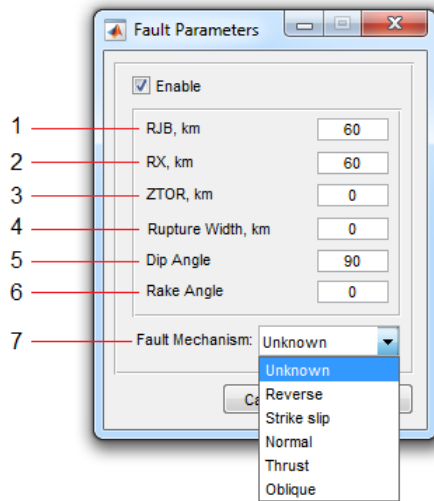
1. Joyner-Boore distance (shortest distance from Site to the surface projection of the rupture surface)
2. Distance X (The shortest horizontal distance from Site to a line defined by extending the fault trace to infinity in both directions)
3. Depth to Top of Rupture
4. Width of the rupture along the Dip (W)
5. Dip Angle
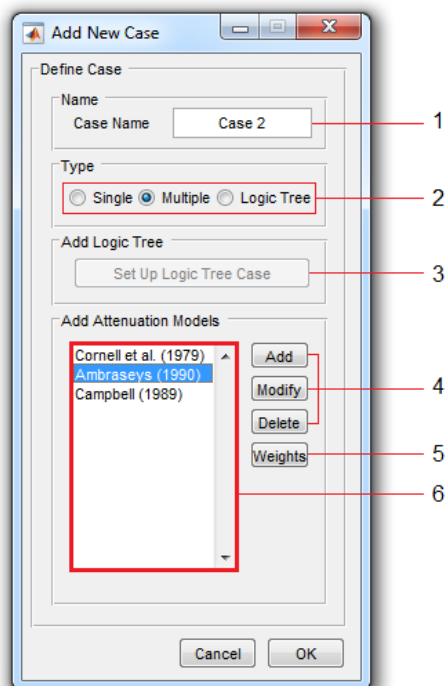6. Rake angle
7. Fault mechanism
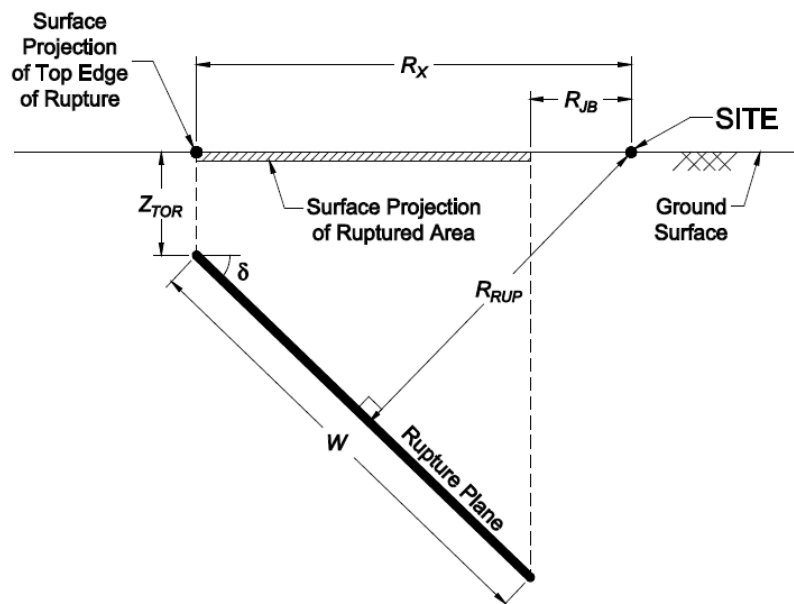
10. Define Analysis Case
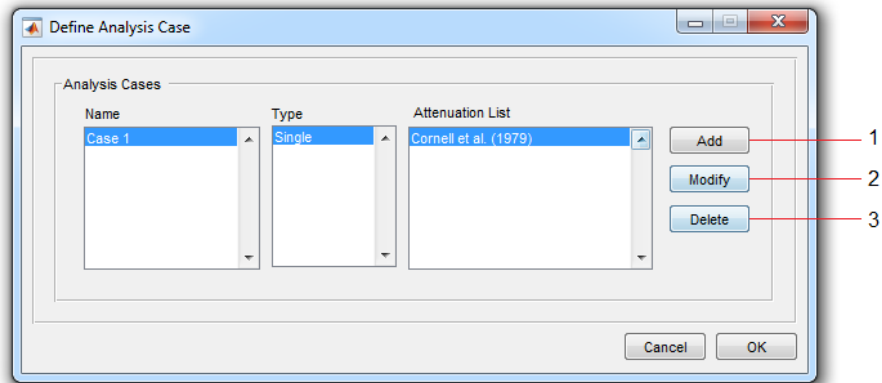
1. Add a new analysis case.
2. Modify the selected analysis case.
3. Delete the selected analysis case.

10.1 Add New Case

1. Enter a unique name for the analysis case in this field.
2. Select the type of case from three different options available in "Type" section. If the number of attenuation relationships increases to more than one, the <u>Single</u> analysis case will turn into a <u>Multiple</u> one. To create a <u>Logic Tree</u> case, select the Logic Tree option.
3. Use this button to access Logic Tree settings.
4. Use these buttons to add, modify, or delete attenuation relationships.
5. Use this button to change the weight assigned to each relationship in the multiple analysis case. (By default, it is the same for all relationships.)
6. The selected attenuation relationships for the current analysis case are displayed in this list.
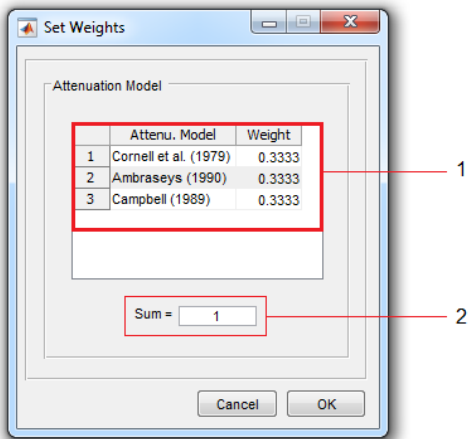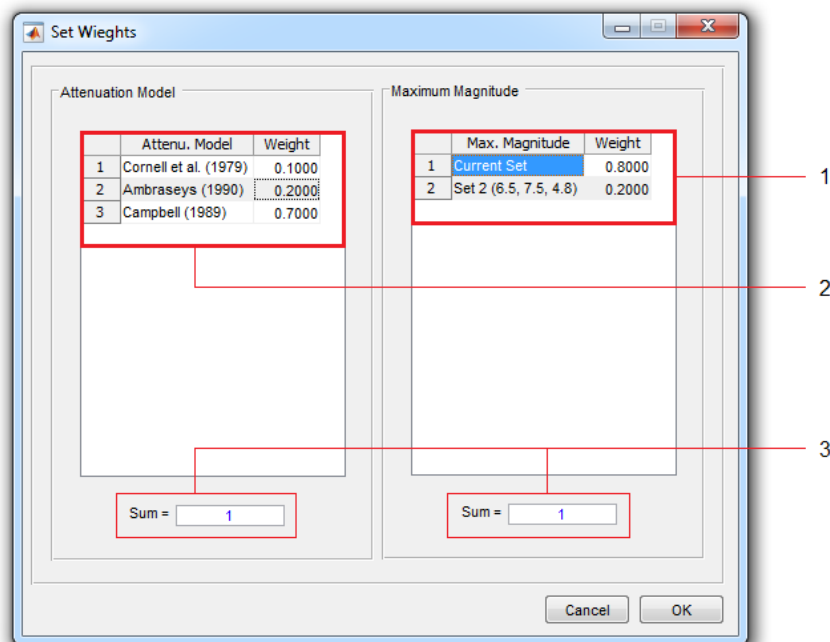
1. Use this table to assign the required weights to each attenuation relationship.
2. The sum total of the assigned weights which must be equal to one.

10.2 Logic Tree
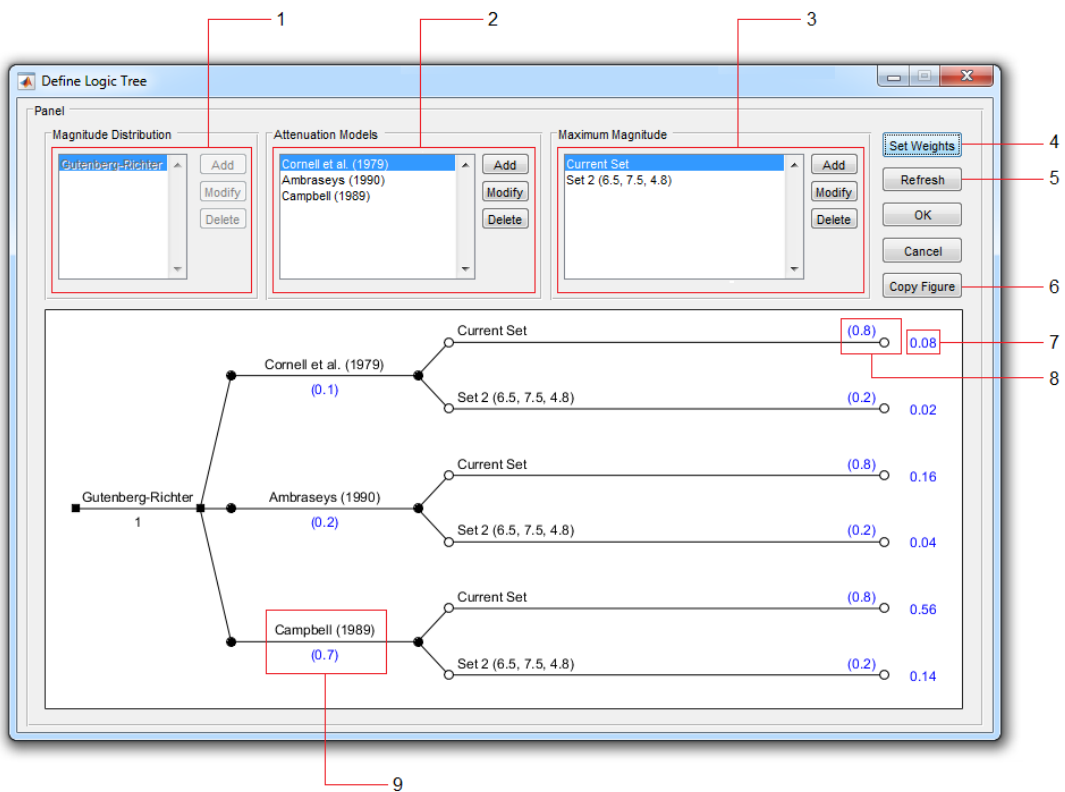
1. Select the type of the magnitude distribution from the list contained in this box. (Currently the Gutenberg-Richter distribution is available)
2. Use this section to add, modify, or delete the attenuation relationships.
3. Use this section to add, modify, or delete the Maximum Magnitude Sets.

4. Click this button to change the weight of the branches in the Logic Tree. (By default, an identical weight is assigned to all attenuation relationships and all Maximum Magnitude Sets)
5. Re-draw the Logic Tree diagram.
6. Use this button to make a copy of the current axes in a new figure.
7. Ultimate weight of each terminal branch
8. The weight assigned to each set of maximum magnitude
9. The weight assigned to each attenuation relationship

1. Enter the desired weight for each set of maximum magnitudes
2. Enter the desired weight for each attenuation relationships
3. The sum of the assigned weights is displayed here. (must be equal to 1)
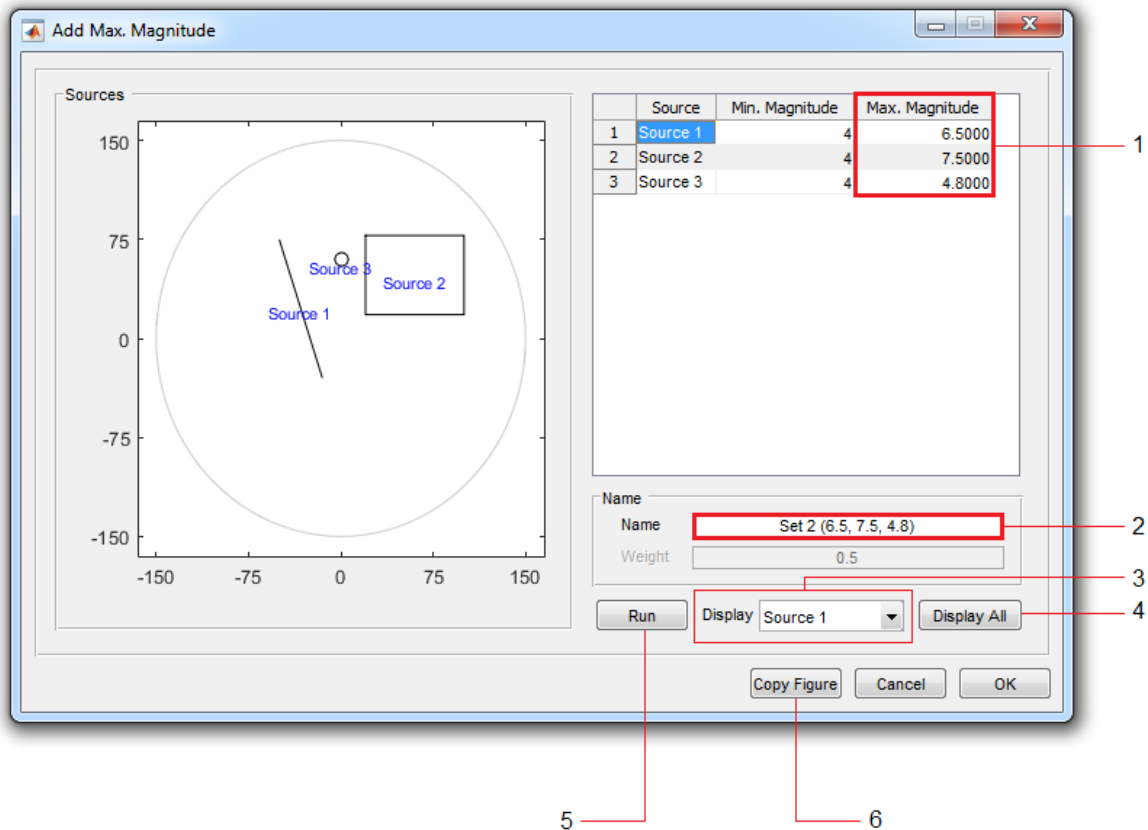
1. Use this table to assign a new maximum magnitude to each source zone.
2. The default name for the new set of maximum magnitude. (if required, type a new name)
3. Select a source from the drop-down list, for which the probability distribution of the magnitude for a new set is compared to those of previous ones.
4. Use this button to display the magnitude probability distribution comparison for all sources.
5. After editing the maximum magnitudes (using the table **1**) you need to use this button to recalculate the probability distribution.
6. Use this button to make a copy of the current axes in a new figure.
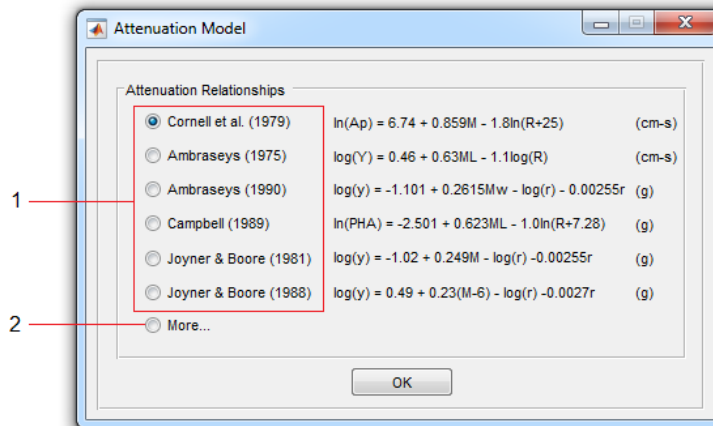
1. A number of simple attenuation relationships are available in this window.
2. Select this option to gain access to further attenuation relationships.
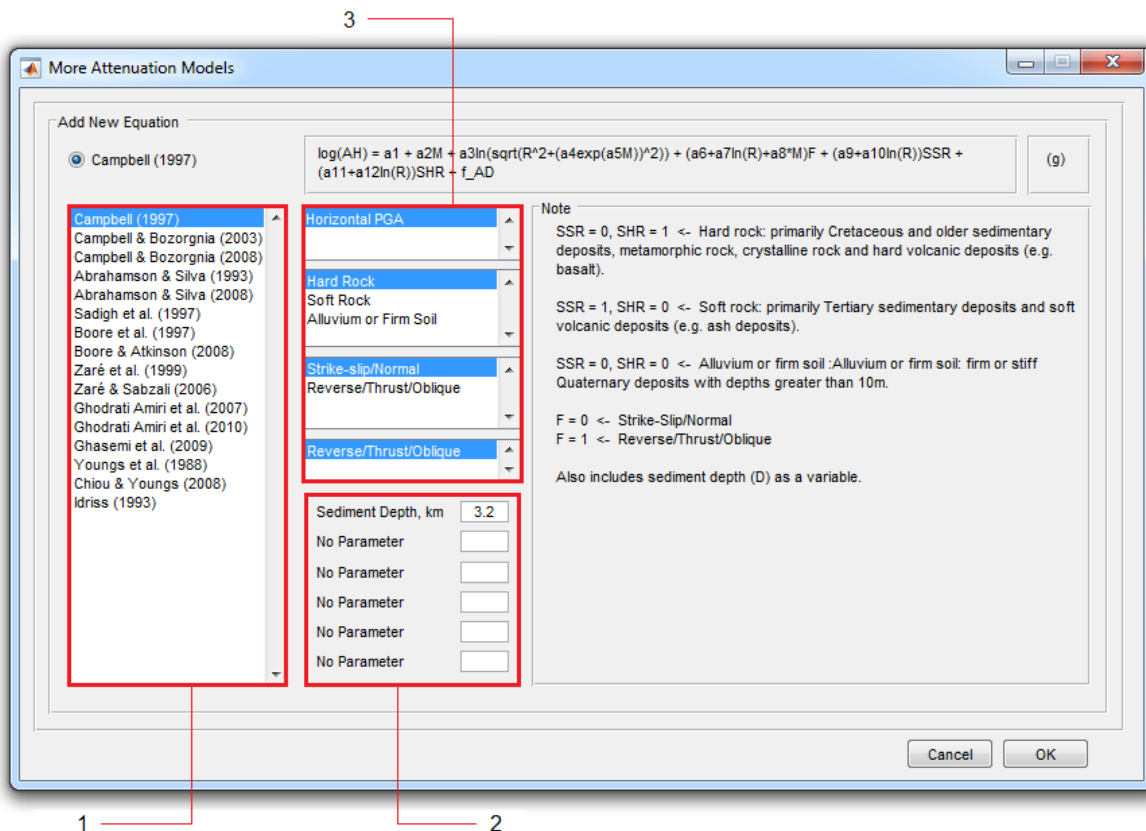
1. Select the desired attenuation relationship from this list.
2. Depending on the selected attenuation relationship, its numerical inputs will be displayed here.
3. Depending on the selected attenuation relationship, its general parameters will be displayed here.

11. Attenuation Plotter
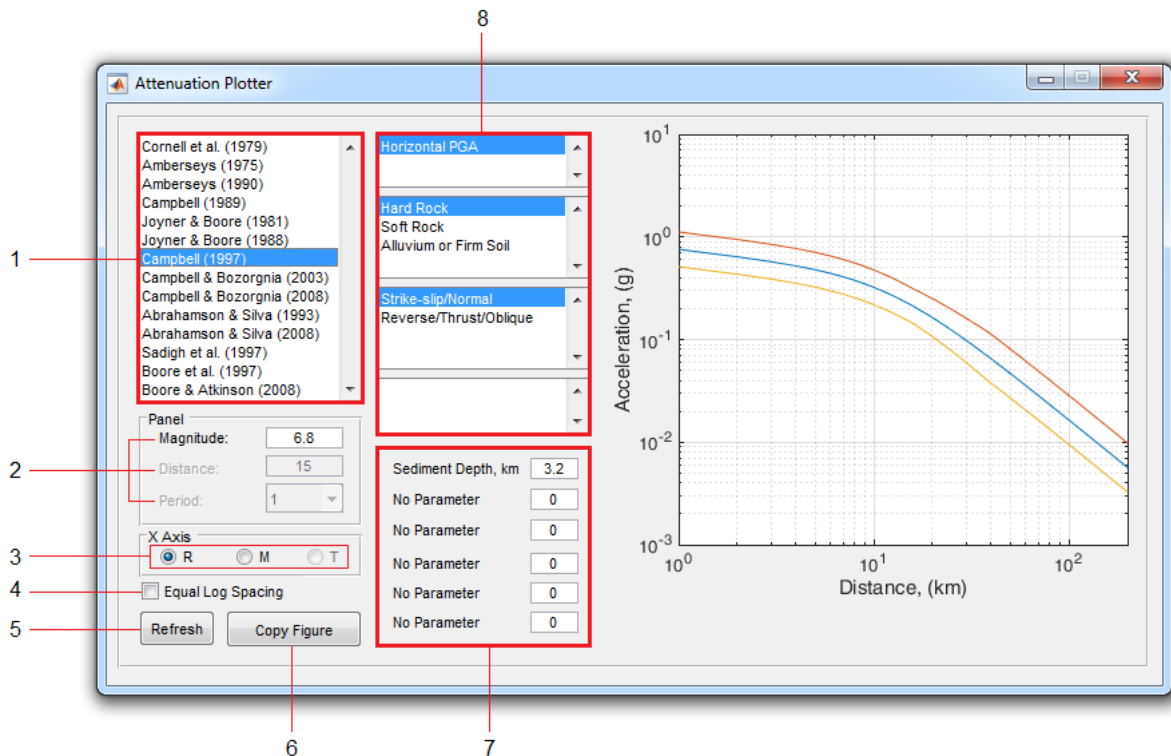
1. To plot each of the attenuation relationships on graph, select it from this listbox.
2. Depending on the selected horizontal axis (from section **3**), you can change the magnitude, distance, or spectral period from here.
3. Select the horizontal axis quantity (magnitude, distance, or spectral period) for the chosen attenuation relationship.
4. Enable this checkbox to use an equal logarithmic spacing to determine horizontal axis data (R, M or T).
5. Click this button to update the drawn graph using new input.
6. Use this button to make a copy of the current axes in a new figure.
7. Depending on the selected attenuation relationship, its numerical inputs can be adjusted from here.
8. Depending on the selected attenuation relationship, its general parameters can be set from here.

12. Hazard Curve
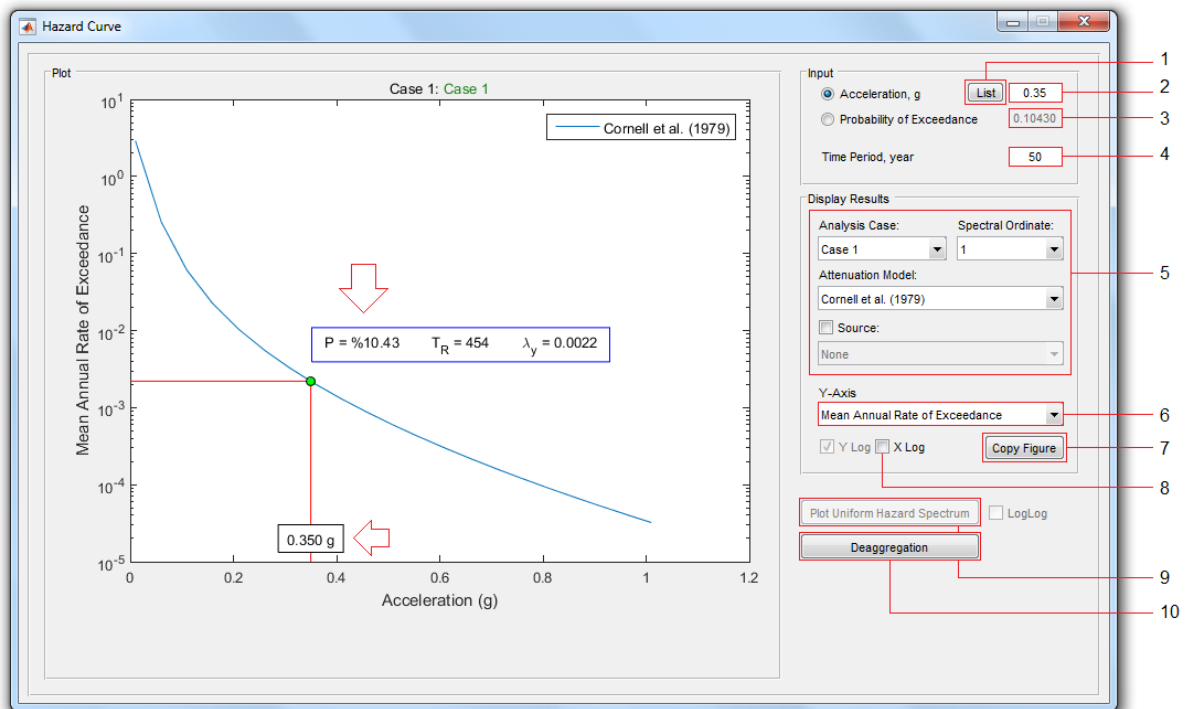
2. **Method 1**: To calculate the probability of exceedance for an Intensity Measure Level, enable this option and enter the acceleration level into the textbox. You can select the accelerations for which the hazard curve is calculated from the list (button **1**). For any acceleration value other than this list, interpolation will be performed.
3. **Method 2**: Use this option to calculate the acceleration level corresponding to the specified probability of exceedance.
4. The time period over which the probability of exceedance is calculated.
5. To display the hazard curve, select the analysis case, the attenuation relationship, the spectral period (or magnitude set), and the source zone from this section.
6. Use this menu to change the vertical axis of the chart from "Mean Annual Rate of Exceedance" to "Return Period".
7. Use this button to make a copy of the current axes in a new figure.
8. Enable this checkbox to use a logarithmic scale for the horizontal axis of the chart.
9. Use this button to display the Uniform Hazard Spectrum. (only available if the Spectral Acceleration is selected as the Intensity Measure Parameter for the attenuation model)

10. Use this button to access the Deaggregation Tool. If you have calculated the probability of exceedance for the desired Intensity Measure level, deaggregation is performed for the selected level of IM (Method 1). Otherwise, deaggregation will be performed for the corresponding Return Period (Method 2). Please note that in this case it is not possible to breakdown the results by specific source, or attenuation relationship (if multiple GMPEs are defined).
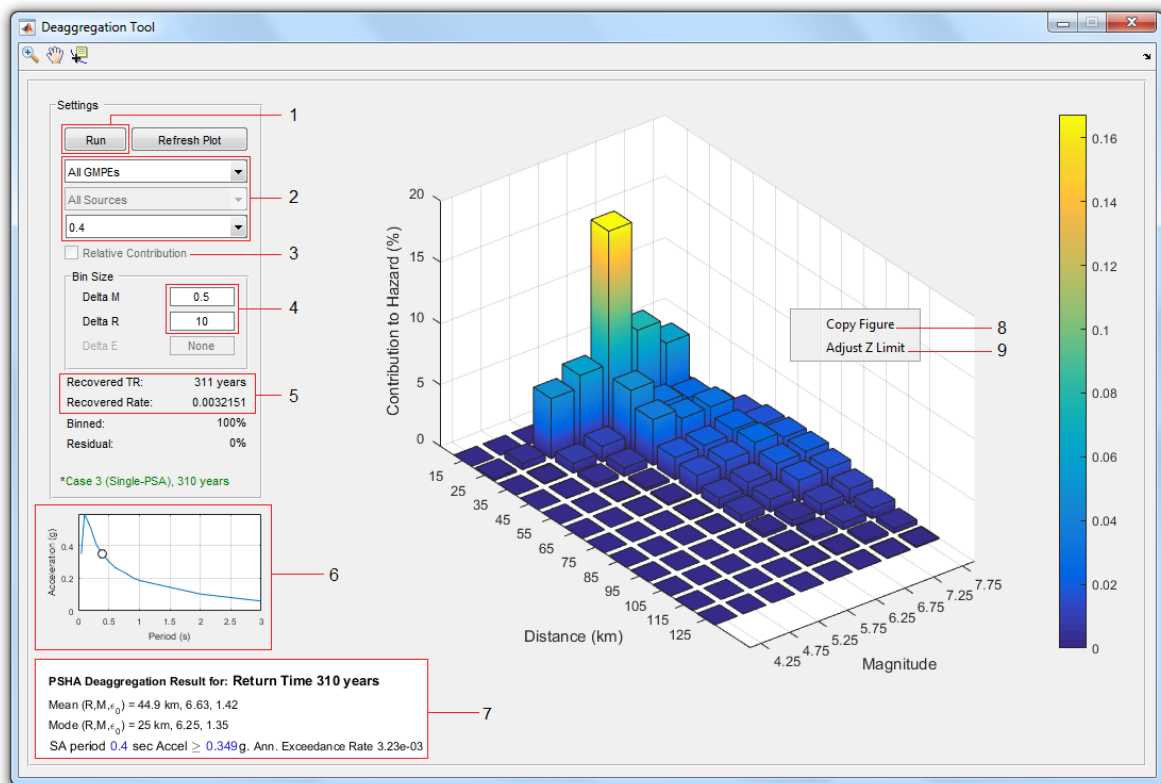
PSHA Deaggregation Result for: PGA ≥ 0.35g

Mean (R,M,ϵ_0) = 34.1 km, 6.55, 1.35
Mode (R,M,ϵ_0) = 25 km, 6.25, 1.35
Ann. Exceedance Rate 2.19e-03, Mean Return Time 456 years

Method 1

PSHA Deaggregation Result for: Return Time 454 years

Mean (R,M,ϵ_0) = 34.1 km, 6.55, 1.35
Mode (R,M,ϵ_0) = 25 km, 6.25, 1.35
Peak Ground Acceleration ≥ 0.35g. Ann. Exceedance Rate 2.20e-03

Method 2

12.1 Deaggregation Tool

1. Use this button to perform the deaggregation analysis.
2. To breakdown the deaggregation results, the attenuation relationship, the source zone, and the spectral periods (or magnitude set) can be selected from this **section**.

3. If this checkbox is enabled, the contribution is calculated by dividing current rates (e.g. rates of selected source or GMPE) by the Total Rate. (Otherwise, it is divided by the sum of its bins.)

4. Using these textboxes, you can change the binning size for the magnitude and distance. (**Note:** Minimum bin size is limited to 0.1 and 1km)

5. Recovered values are calculated by summing the rates over all bins. Note that in cases the acceleration level is calculated by interpolation, there will be some difference between the recovered values and target values. To decrease the effect of interpolation, you need to evaluate hazard curve in more acceleration points.

6. When the Spectral Acceleration is selected as the Intensity Measure Parameter for the attenuation model and the deaggregation is performed for Return Period, the Uniform Hazard Spectrum will be displayed in this section. You can switch between different periods using the last popup menu of **section 2.**

7. Summary of deaggregation results is displayed here, including: Mean and Modal values, IM level (and period), annual exceedance rate and return period.

8. Use this button to make a copy of the current axes in a new figure.

9. Using this option, you can adjust the Z axis limit to the maximum value of bar chart.

13. Source Editor (v2.0)
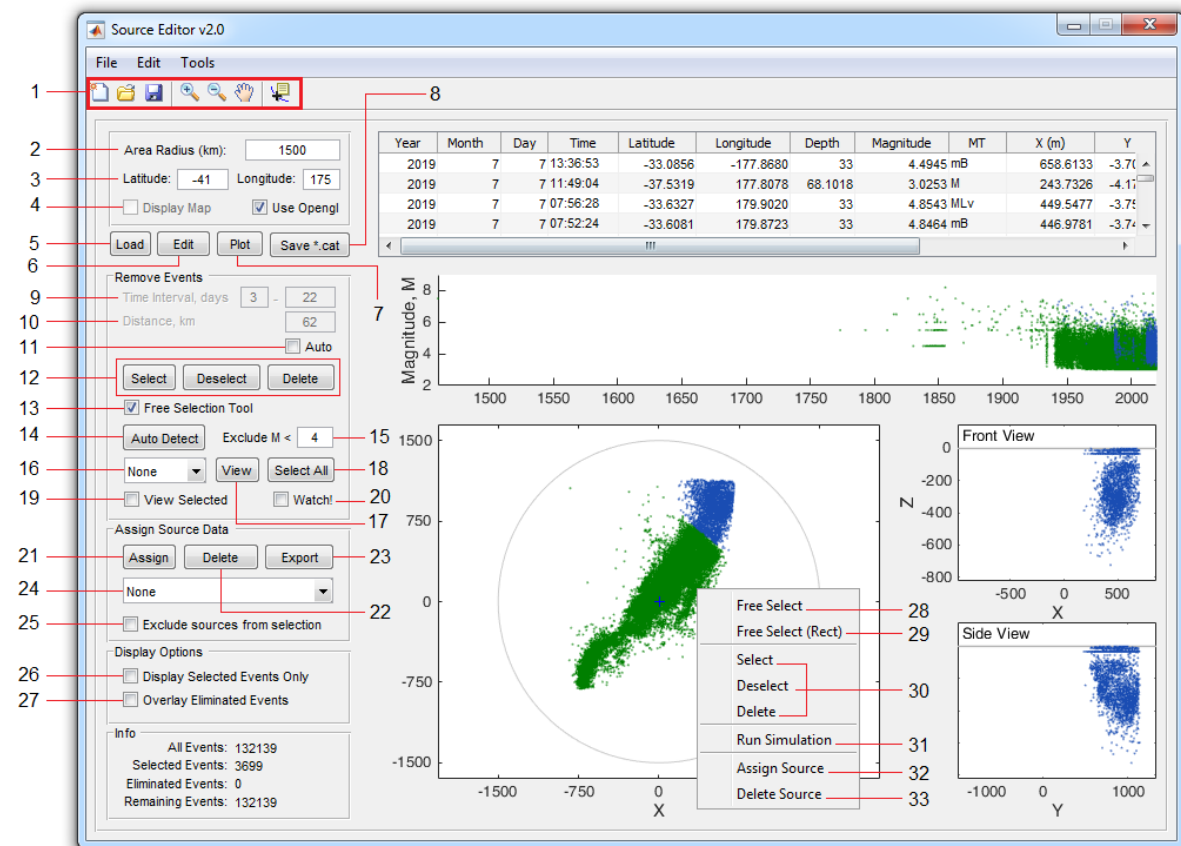
1. The main toolbar, including the following tools:
   1. **New**: to create a new project. (Reset all settings)
   2. **Open**: to load Earthquake Data File (*.csv / *.txt / *.cat)
   3. **Save**: to save the Catalog file: *.cat (note that the relative distances from the Site must have been calculated using button No. **7**)
   4. **Zoom in**
   5. **Zoom out**
   6. **Pan**
   7. **Datacursormode** (to select any point on the graph and display its coordinates)
2. Radius of the study area (in kilometers)
3. Latitude and Longitude of the Site (If left blank, the application will calculate the center of the catalog data as the Site location when loading the earthquake data file)

4. Use this option to display the map. (if the map file is available)
5. Load Earthquake Data File. (*.csv / *.txt / *.cat)
6. Access to the Magnitude Conversion Tool.
7. Use this button to calculate the relative distances from the Site and plot the earthquake data.
8. Use this button to save the catalog file in *.cat format. (You must have already calculated relative distances using the button **7**)
9. If checkbox **13** is disabled, you can specify the <u>time</u> interval for the aftershocks and foreshocks.
10. If checkbox **13** is disabled, you can specify the <u>distance</u> interval for the aftershocks and foreshocks.
11. If enabled, program will automatically determine the <u>time-space windows</u> (options **9** and **10**) using the GARDNER-KNOPOFF method for the magnitude of the largest event in the current selection. (**Note:** checkbox **13** must be disabled)
12. Use these buttons to:
    1. Select events on the map,
    2. Remove some events from the current selection, and
    3. Delete the currently selected events.
13. Enable this option to freely select events as displayed on the charts. Otherwise, events are selected using the desired time and space constraints of the options **9** and **10**.

Note: when you click on the select (or de-select) button, the current chart is highlighted by a blue border. To change the current chart and select events from other charts, click on the desired chart to make it highlighted and then select the events.

14. Use this option to automatically determine aftershocks based on the GARDNER-KNOPOFF method.
15. Determine the minimum magnitude of earthquakes that their aftershocks need to be identified.
16. Identified Mainshocks (using button **14**) are displayed in this menu. By selecting each item, the mainshock and its aftershocks will be displayed on the map. The time and space windows (calculated for the magnitude of the mainshock) are also displayed in options **9** and **10**.

17. Use this button to review the de-clustering result in a table. Blue and red colors represent the identified mainshocks and the associated aftershocks, respectively. Use "Export All Data" button to save the data (format: * .xlsx). Use the left menu to view the data for each mainshock separately.

To save the table data, set the color theme by choosing one of the following options: 1) No color, 2) Just mainshocks, 3) Mainshocks and aftershocks (default mode), and 4) Full color. Note that the export time increases from 1 to 4, respectively.
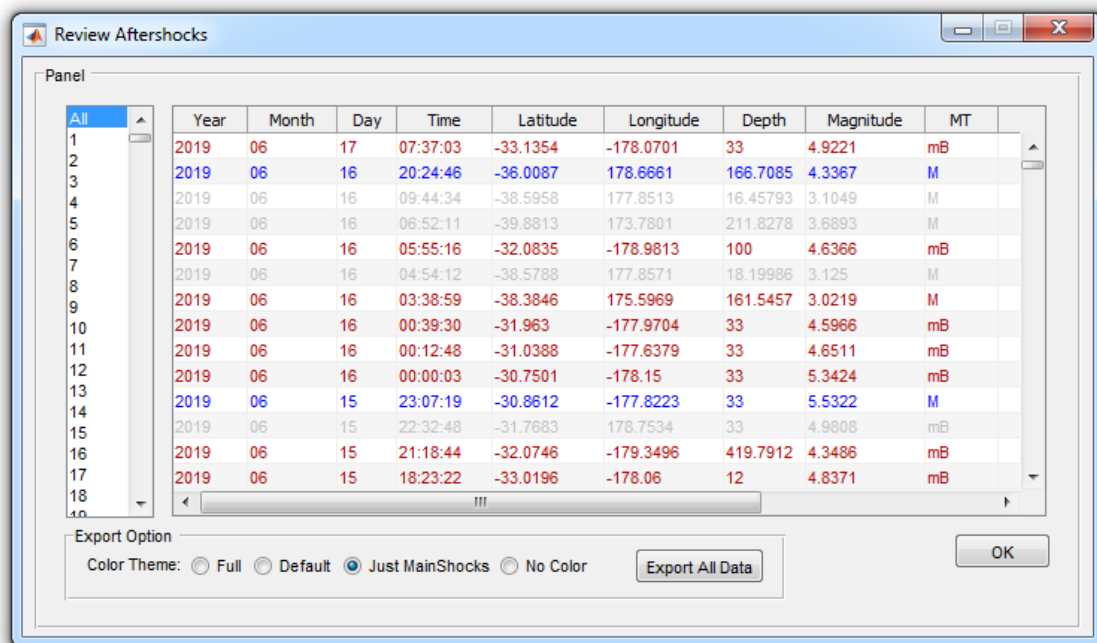
18. Use this option to select all identified aftershocks. Once selected, you can delete them using the <u>Delete</u> button from the section **12**.
19. Enable this option to display the selected events in more detail. To return to Full View (all-events display mode), simply disable it.
20. If enabled, the de-clustering procedure will be visualized. (not available if there are <u>more than 1000</u> events in the catalog)
21. To create a new source data, select its events and then click on this button.
22. Use this button to remove the source data that is currently selected. (from menu **24**)
23. This button is used to export the source data (format: *.ssd). These data can be used to calculate the Gutenberg-Richter parameters.
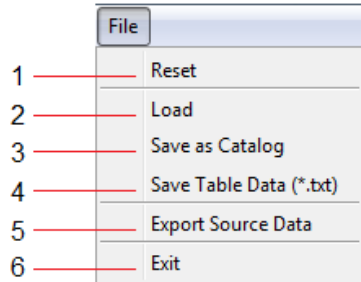24. The created sources data are displayed in this menu. (by default names)

25. If enabled, the events assigned to existing sources are excluded from the next selection.
26. Enable this checkbox to display (only) the selected events.
27. If this checkbox is enabled, deleted events are also displayed on the charts in light gray color.
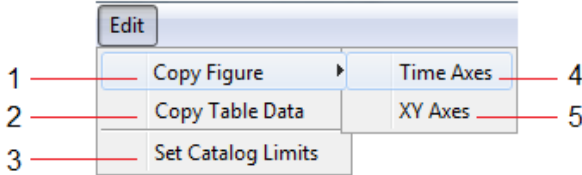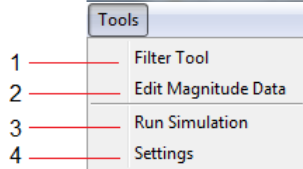
Right-Click Menu

28. Free Selection tool (Lasso), lets you create an <u>unconstrained</u> selection by drawing free-hand shape with the pointer.
29. Rectangular Selection tool, used to select rectangular regions. (<u>no constraint applied</u>)
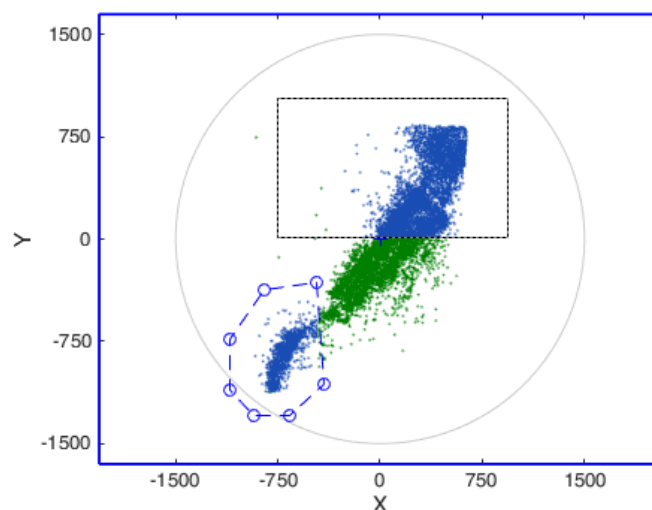

30. Use these options in order to: 1) select events by <u>time and space constraints</u>, 2) exclude some events from the current selection, and 3) delete the current selection.
31. Use this option to run a simulation of the spatial distribution of the <u>selected events</u> on the map over the catalog's time span. Use the <u>Esc</u> key to cancel.
32. Assign the selected events to a new source data (similar to button **21**)
33. Delete the currently selected source data (similar to button **22**)

File
1. Create a new project (Reset settings to default) 2. Load earthquake data file (*.csv / *.txt / *.cat) 3. Save catalog file (*.cat) 4. Save table data (*.txt) 5. Export Source data 6. Exit the Source Editor tool

| Edit |
| --- |
| 1. Copy current axes to a new figure
2. Copy table data to the clipboard
3. Access to the Catalog Limits settings
4. Copy Time-Magnitude Axes (Time View) to a new figure
5. Copy X-Y Axes (Top View) to a new figure |

| Tools |
| --- |
| 1. Access to Filter Tool
2. Access to Magnitude Conversion Tool
3. Run a simulation just to see the spatial distribution of events on the map over time. (the intended events must have been selected.)
4. Access to the simulation settings |
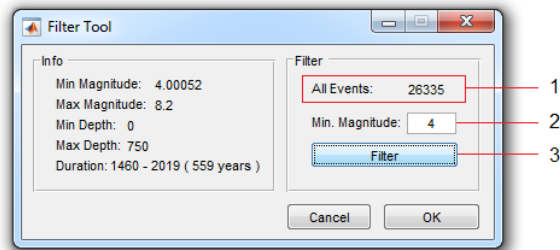
1. The total number of events is displayed here.
2. Specify the minimum magnitude to filter the catalog data.
3. Click this button to filter the events out based on the minimum magnitude entered in text box **2**. Once the filtering process is completed, the total number of remaining events is reported in section **1**.

Note: Perform the catalog filtering immediately after loading the data. It is not possible to filter the catalog if you have deleted events or assigned source data.

Note: The current version is optimized to process approximately 100,000 events (on a computer with average processor speed). If the number of remaining events exceeds 100,000, a message will be displayed warning that there could be performance issues. If you are running SEISMOGRAPH on a computer with fast processor and high RAM capacity, you can ignore this message.
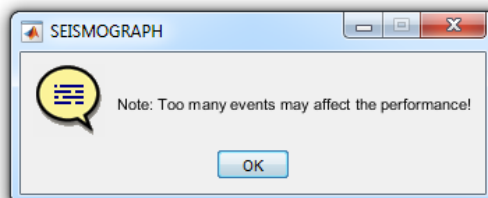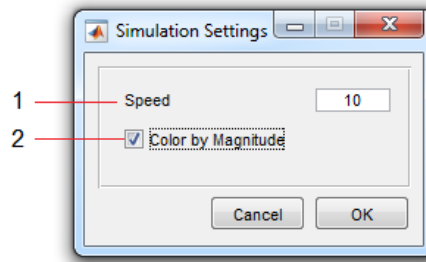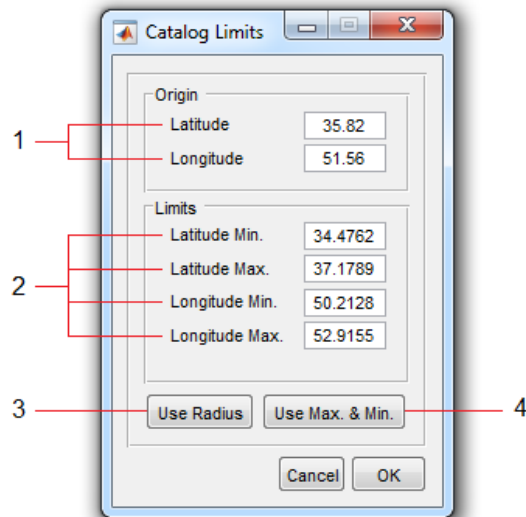
1. Set the speed of the simulation. (1 to 10)
2. If enabled, the color of events is determined in terms of the magnitude (Figure 1). Otherwise, it is specified in accordance with the time of occurrence which denotes to the stress level in the region at the beginning of the catalog time span (Figure 2).
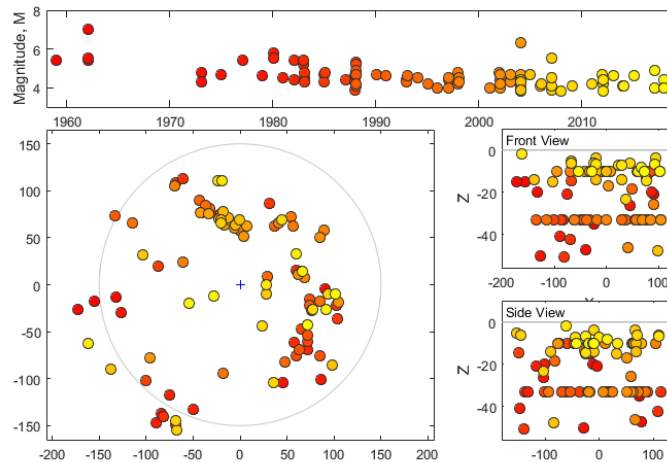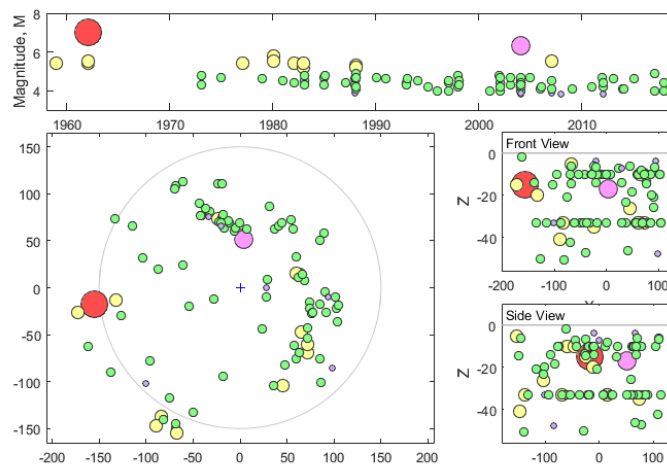
13.1 Catalog Limits

10. Latitude and longitude of the Site.
11. Maximum/minimum latitudes and longitudes to define geographic limits of the catalog.
12. Use this button to determine the geographic limits of the catalog by the <u>center coordinates</u> (Site location) <u>and the radius</u> of the study area.
13. Using this button, the geographical limits are calculated using the <u>coordinates of the earthquakes</u> in the catalog.

13.2 Magnitude Converter
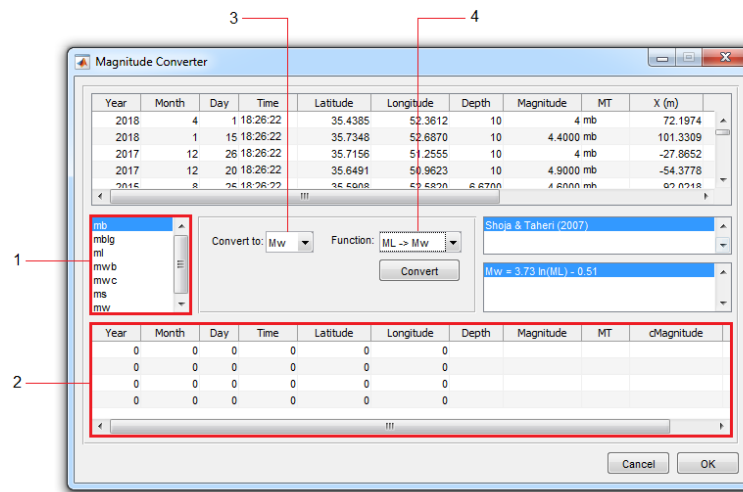
1. All available magnitude types are automatically extracted from the catalog and listed in this listbox.
2. This table displays all earthquake information corresponding to the selected type of magnitude (from List **1**), as well as the corrected magnitudes (after conversion).
3. Use this drop-down menu to select the target magnitude type (to which all magnitudes will be converted). Currently, only Ms and Mw are available.
4. The type of conversion (e.g. converting ML to Mw) is automatically detected according to the selected items from lists **1** and **3** and displayed here (keep the default type). Depending on the conversion type, the available conversion functions are contained in the next listboxes. To select the conversion function, click on the desired function from the adjacent listboxes. Make sure that you have selected the appropriate functions for all of the magnitude types available in the listbox **1**, and then click the Convert button to operate the conversion process. When the operation is completed, the conversion result will be displayed in a new figure.
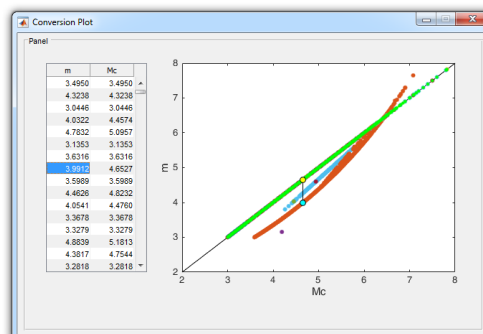
14. MCR Settings
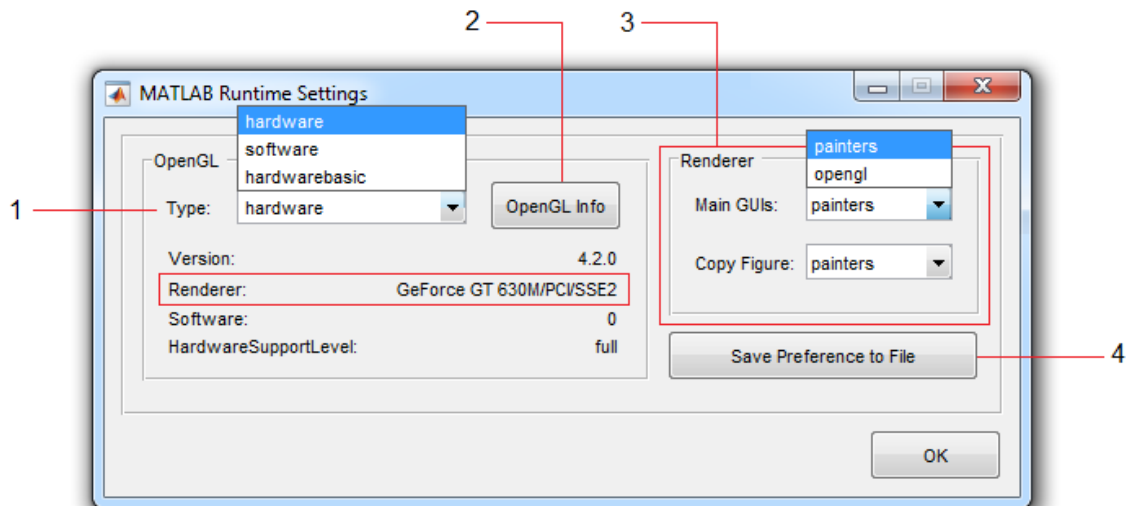
1. Select OpenGL Type. By default, _hardware_ is used. If the graphics card driver is not updated there will be some graphic issues. In this case, switch to using _software_ OpenGL to render graphics in the current session.
2. Display information about the OpenGL® implementation currently in use by the software, such as the version, renderer, and other features. If you don't see your graphics card in the renderer field, you will need to change the preferred graphics processor for the software. (See: MCR Settings for more information)
3. Select Default renderer for: Main software's GUIs as well as the Copied Figures.
4. Save current settings to an output file (which will be used next time when the software launches)

Note: if there is graphics card driver issue, you can lunch program with the _software_ version of OpenGL. You just need to download the preferences file (pref.xml) from the website and place it into the installation folder.

SEISMOGRAPH

earthquake engineering software