

# Tsunami Damage Analysis

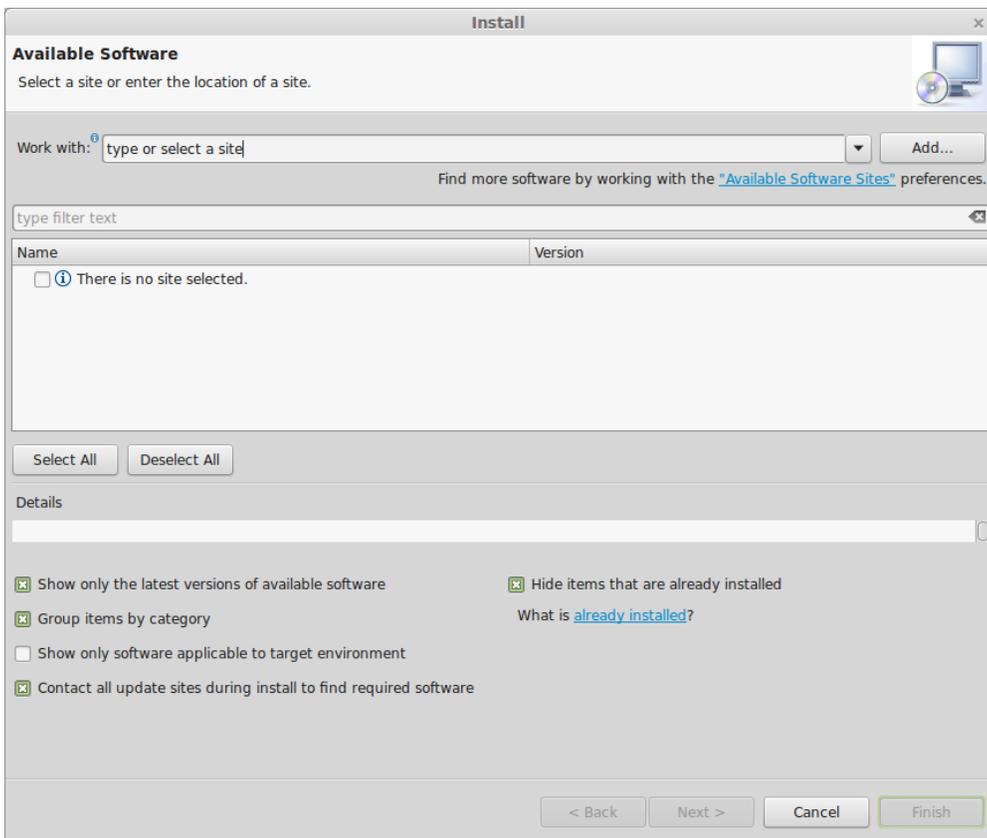
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## Introduction

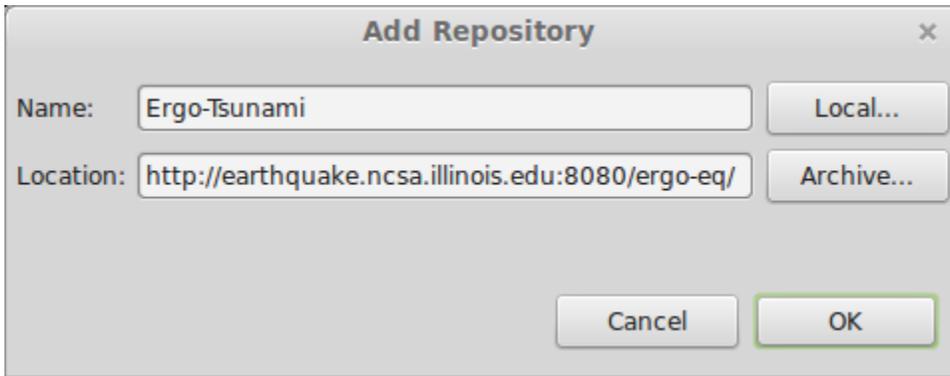
We can add additional functionality to an Ergo EQ installation through the use of Eclipse Update sites. The next few sections will go through the process of adding the new capability and then show a complete example of importing the data required to run the analysis. This tutorial assumes you have access to the required datasets. Since we cannot make these datasets available to the public yet, please email [ergo-dev](mailto:ergo-dev) for more information if you are interested in this analysis.

## Add Tsunami Damage Feature

In order to add the Tsunami damage analysis capability to Ergo, we must add an Eclipse Update site containing the new functionality so it can be installed into Ergo. Launch Ergo EQ and locate the Help menu. Under Help, select Install New Software... which will bring up the List of available update sites. You should see an image similar to the one below:



Locate the Add... button and click it. This will open a dialog box that says Add Repository. In the dialog that opens, where it says Name, enter a descriptive name for the update site (e.g. Ergo-Tsunami). Where it says location, enter the update site URL: <http://earthquake.ncsa.illinois.edu:8080/ergo-eq/> After doing this, click OK. See the image below for an example of what the Add Repository dialog box should look like.



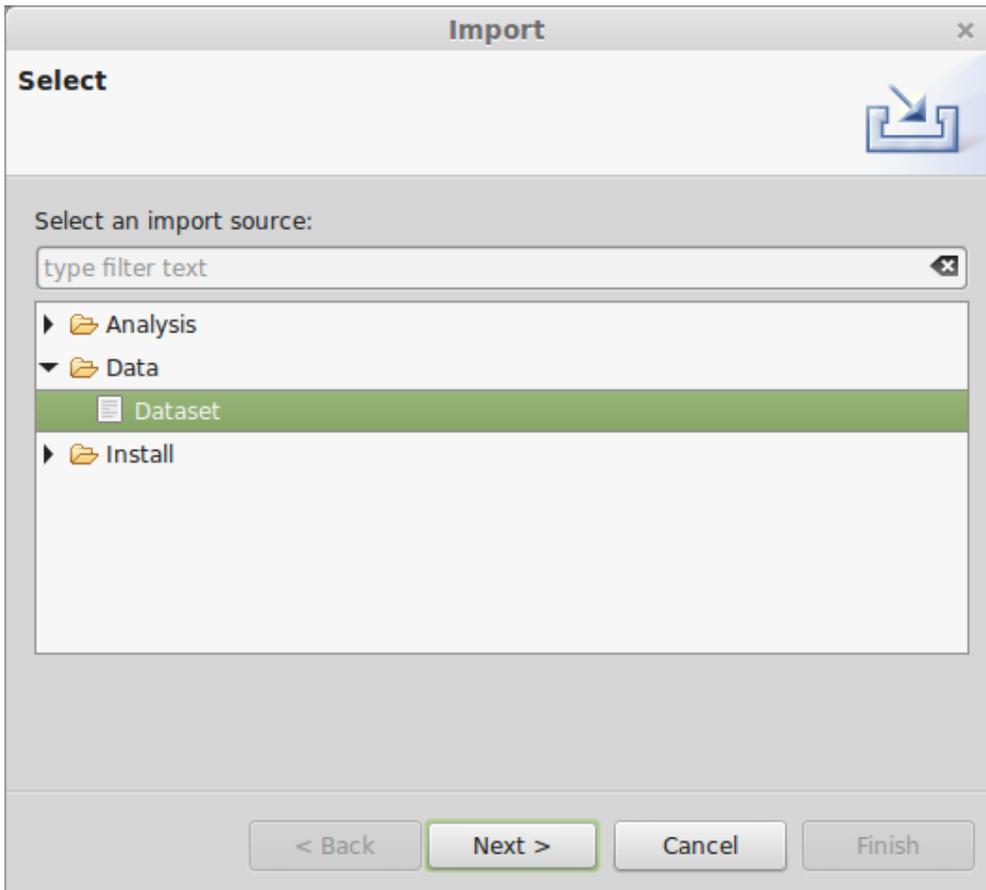
After adding the repository, you should now be back at the original wizard page as seen in the first figure. Locate where it says Work with and from the drop-down menu, select your new repository (e.g. Ergo-Tsunami). Check the box next to Ergo Tsunami Tools and click Next. Click Next again. Accept the License and click Finish. A security warning will popup that the content is unsigned, click OK to continue the installation. When prompted, restart Ergo to complete the installation.

## Import Sample Data

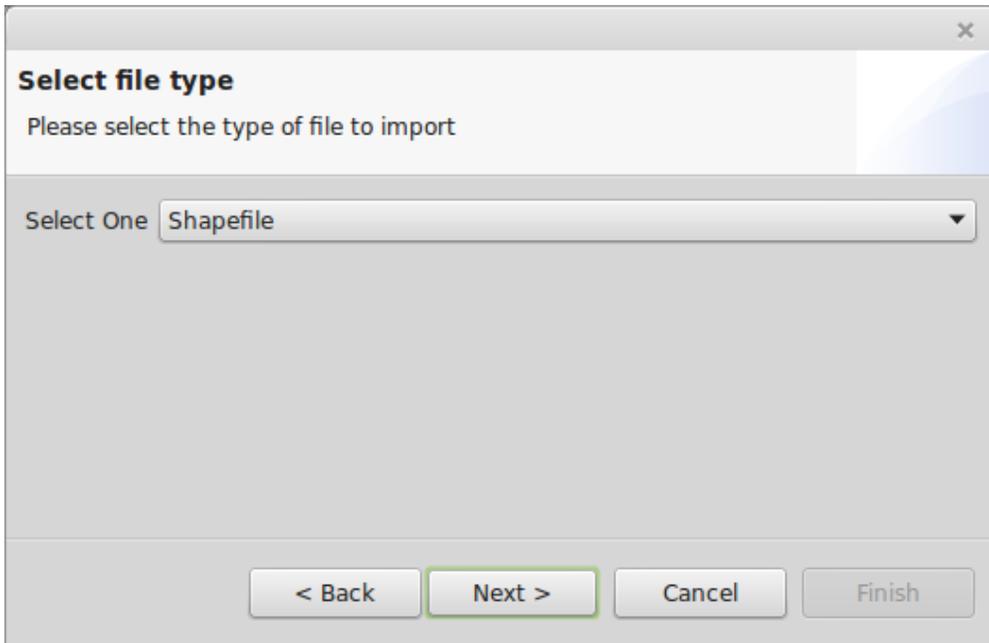
For this example analysis, we have put together a set of sample datasets that need to be imported before we can run the analysis. The next few sections will guide you through adding the sample data.

### Import Buildings

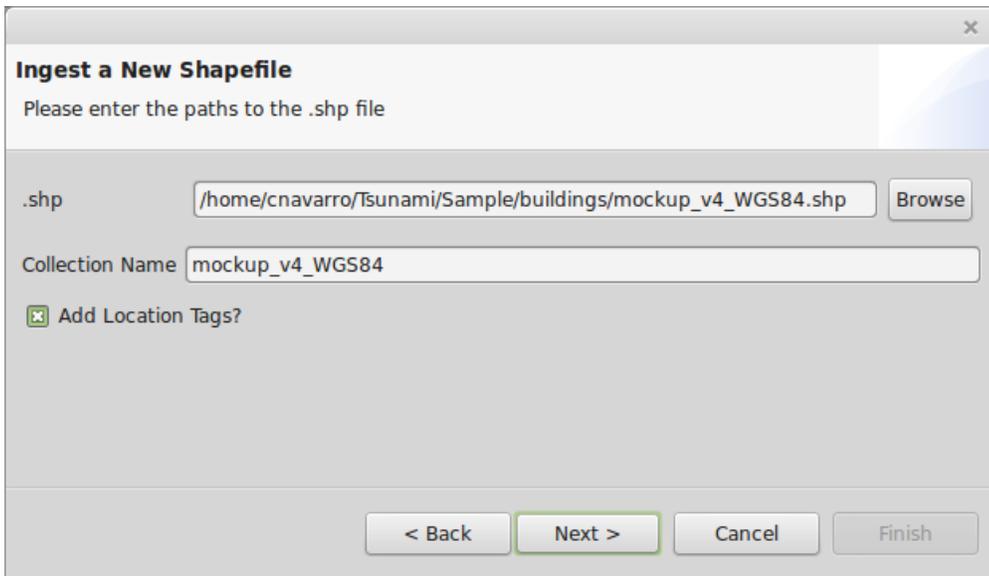
For this example analysis, we have created a small building dataset representing buildings within the region of the inundation data we'll ingest in the next section. Locate the folder containing the files mockup\_v4\_WGS84 and do the following to import the data. First, locate the File and select Import. This should bring up the dialog seen below:



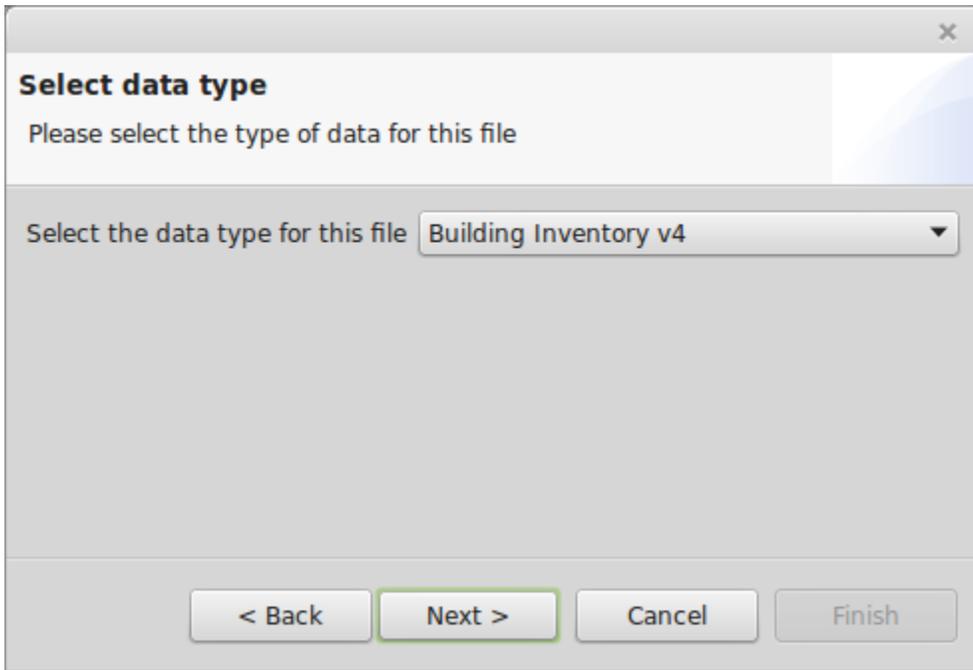
From the dialog box, expand the Data selection and select Dataset. Click Next. You should see a dialog similar to the one below:



From the dialog drop down menu, select Shapefile and click Next. You should see a dialog similar to the one below:

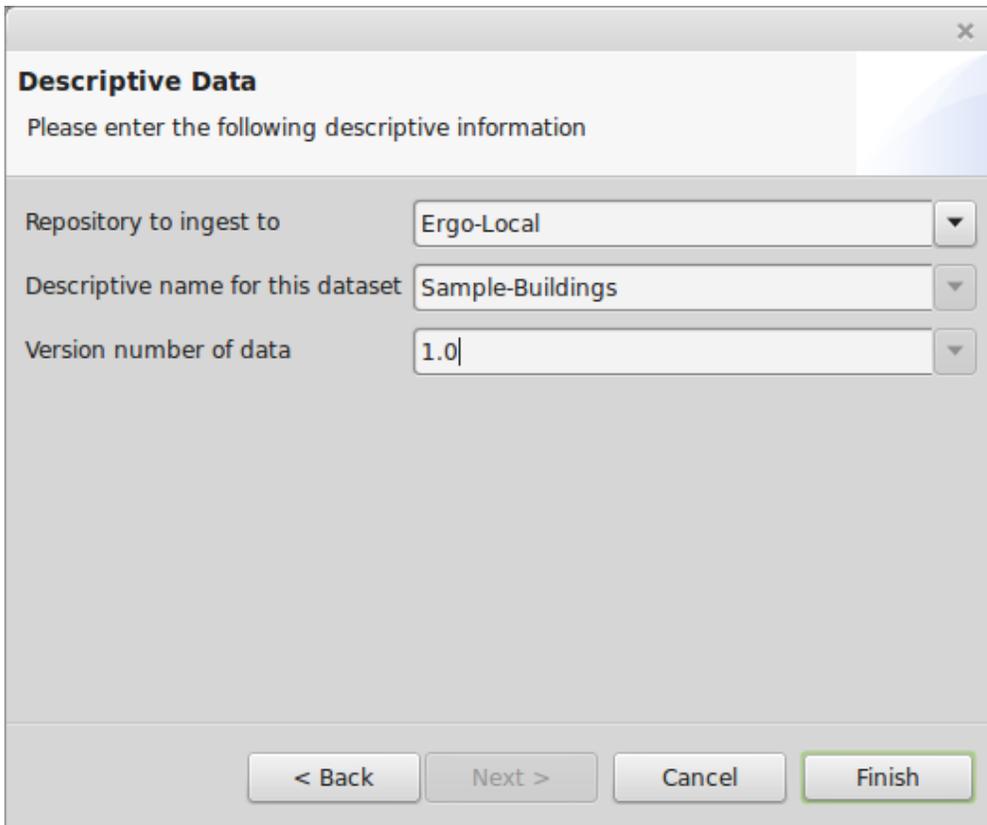


From the dialog, click the Browse button and locate the example building shapefile dataset you want to ingest. Optionally, you can select to add location tags. Click Next. You should see a dialog similar to the one below:



The screenshot shows a dialog box titled "Select data type" with a close button (X) in the top right corner. Below the title, it says "Please select the type of data for this file". There is a dropdown menu with the text "Select the data type for this file" and "Building Inventory v4" selected. At the bottom, there are four buttons: "< Back", "Next >" (highlighted with a green border), "Cancel", and "Finish".

From the dialog drop down menu, select Building Inventory v4 and click Next. Click Next again. Click Next again. The pages we skipped are explained in more detail in the section [Ingest Building Data into Ergo](#). You should see a dialog similar to the one below:

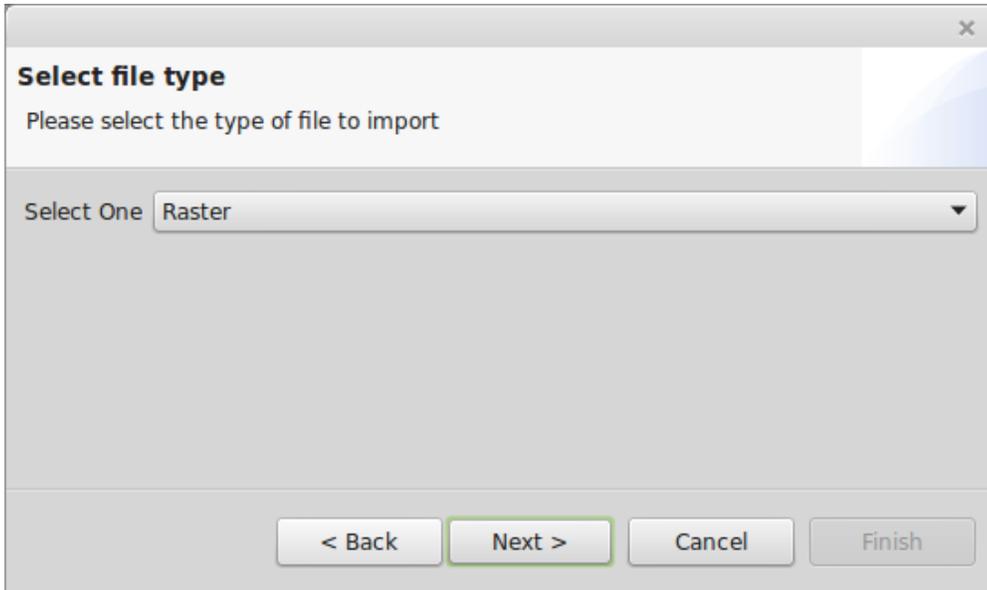


The screenshot shows a dialog box titled "Descriptive Data" with a close button (X) in the top right corner. Below the title, it says "Please enter the following descriptive information". There are three input fields, each with a dropdown arrow on the right: "Repository to ingest to" with "Ergo-Local" selected, "Descriptive name for this dataset" with "Sample-Buildings" selected, and "Version number of data" with "1.0|" entered. At the bottom, there are four buttons: "< Back", "Next >", "Cancel", and "Finish" (highlighted with a green border).

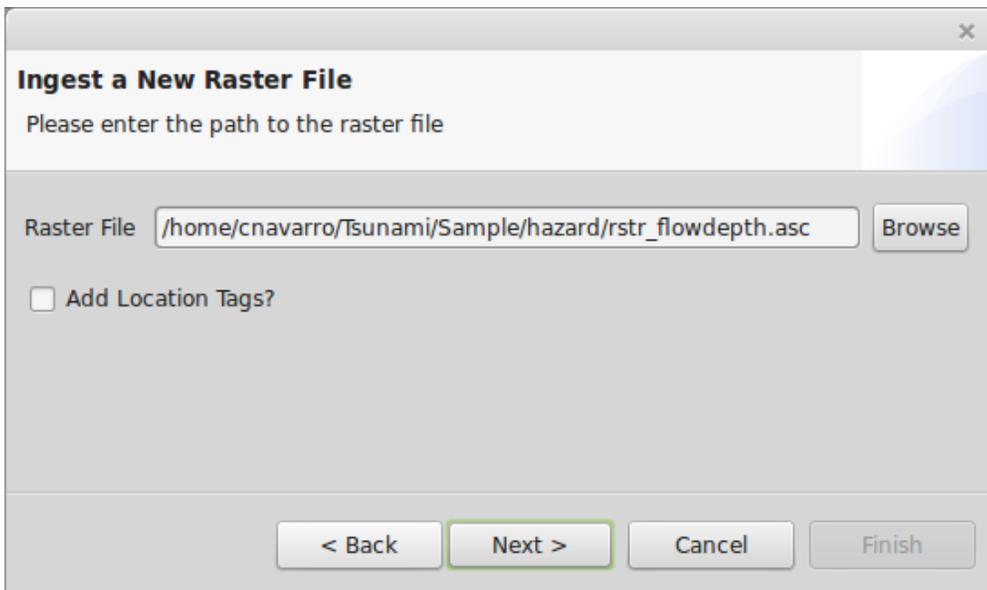
From this dialog, you can select the repository to ingest the dataset to, provide a descriptive name for the dataset and provide the version number. Select the repository we created in the previous section and enter the information seen above. Click Finish. You should see the new dataset in the repository you selected to ingest it to. Continue to the next section to import the hazard data.

## Import Tsunami Hazard Data

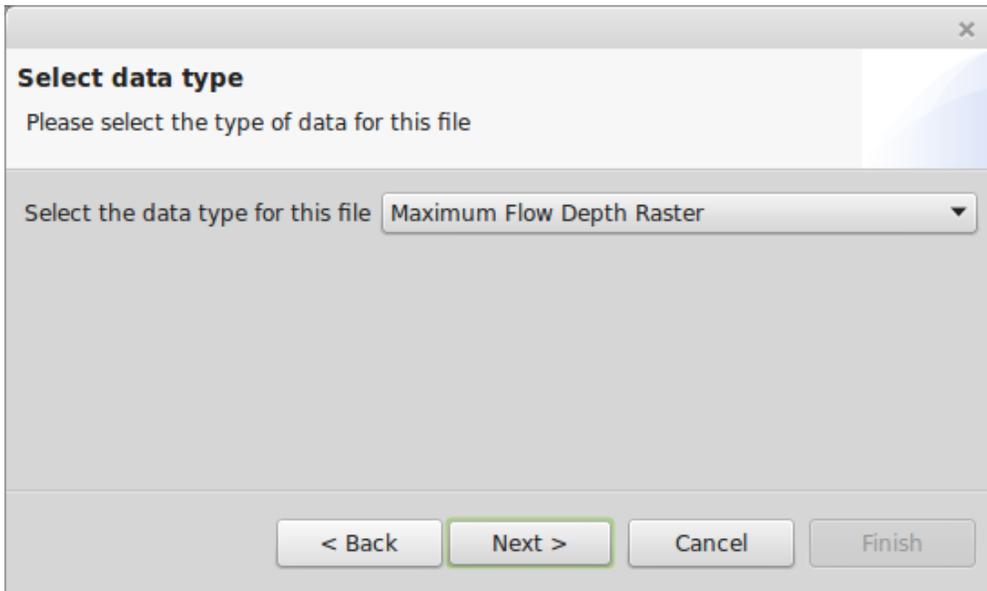
As in the previous section, we need to import some data. Go to File > Import > Data > Dataset and click Next. You should see a dialog similar to the one below:



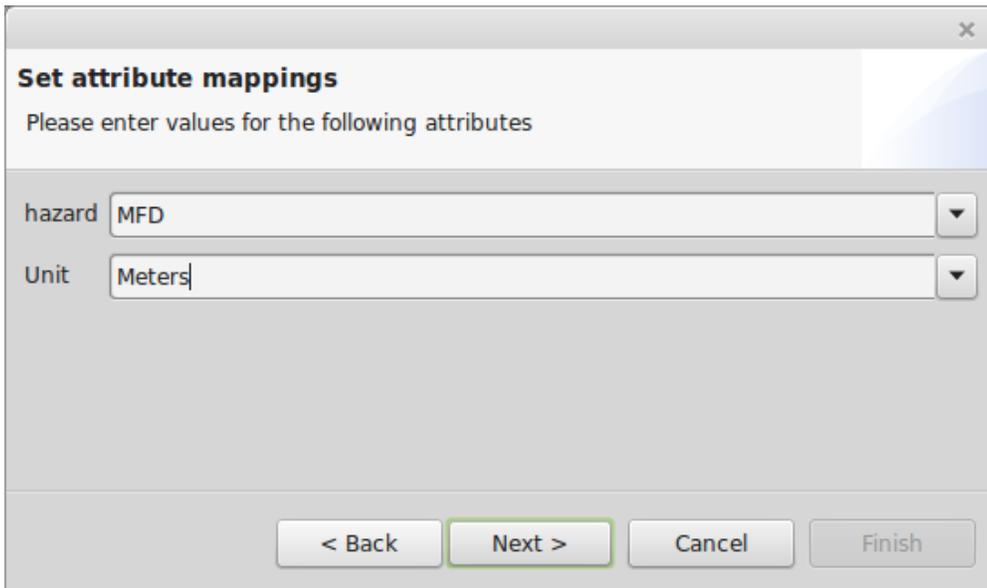
From the dialog drop down menu, select Raster and click Next. You should see a dialog similar to the one below:



From the dialog, click the Browse button and locate the example hazard raster dataset you want to ingest (e.g. rstr\_flowdepth.asc). You can ignore the add location tags for this dataset and Click Next. You should now see a dialog similar to the one below:



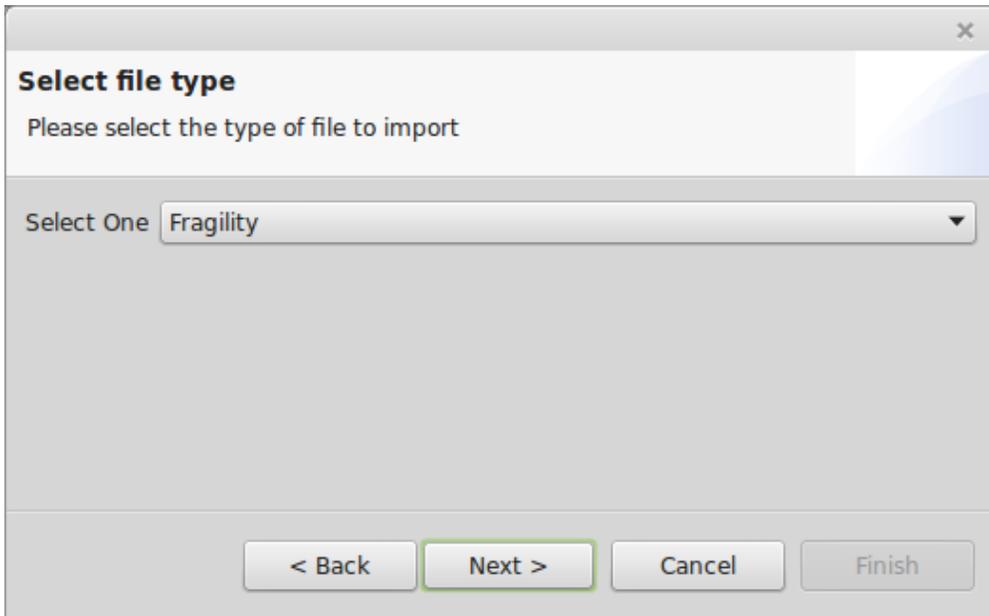
From the dialog drop down menu, select Maximum Flow Depth Raster and click Next. You should see an image similar to the one below:



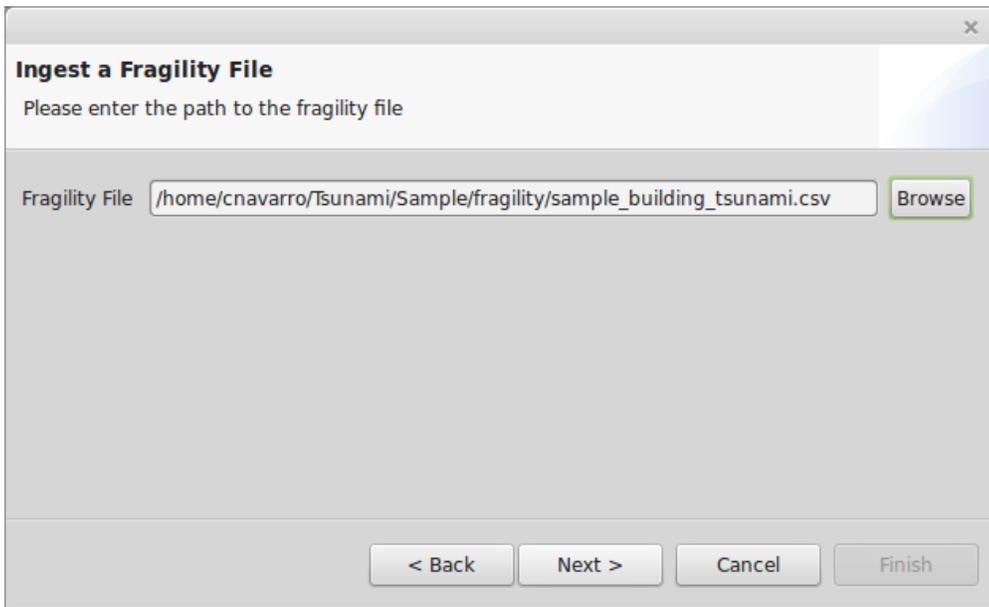
From the dialog, enter MFD (maximum flow depth) for hazard and for units, select Meters. Click Next. As you did in the previous section, select a repository to ingest the dataset to, a descriptive name (e.g. Sample Hazard) and a version (e.g. 1.0) and click Finish. You should see the new dataset in the repository you selected to ingest it to. Continue to the next section to import the fragility data.

## Import Fragility

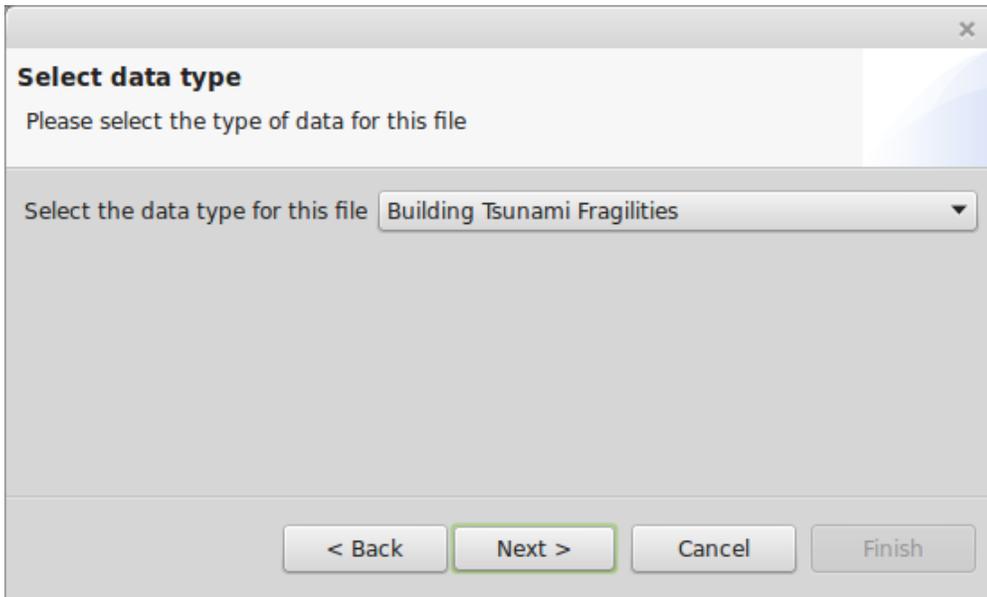
To import the sample fragility dataset, go to File > Import > Data > Dataset and click Next. You should see a dialog similar to the one below:



From the dialog, select Fragility and click Next. You should see a dialog similar to the one below:



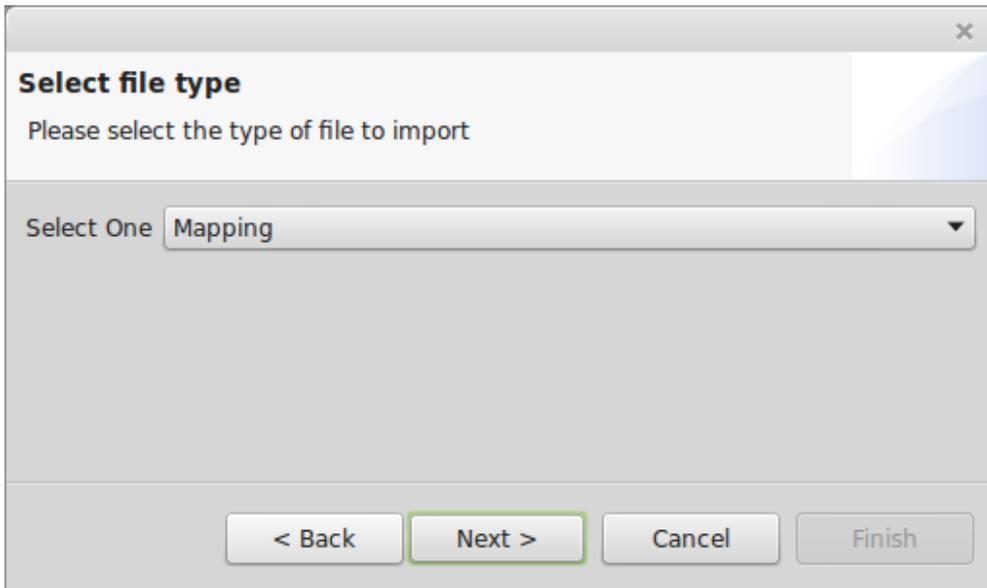
From the dialog, click the Browse button and locate the example fragility dataset you want to ingest (sample\_building\_tsunami.csv). Click Next. You should see a dialog similar to the one below:



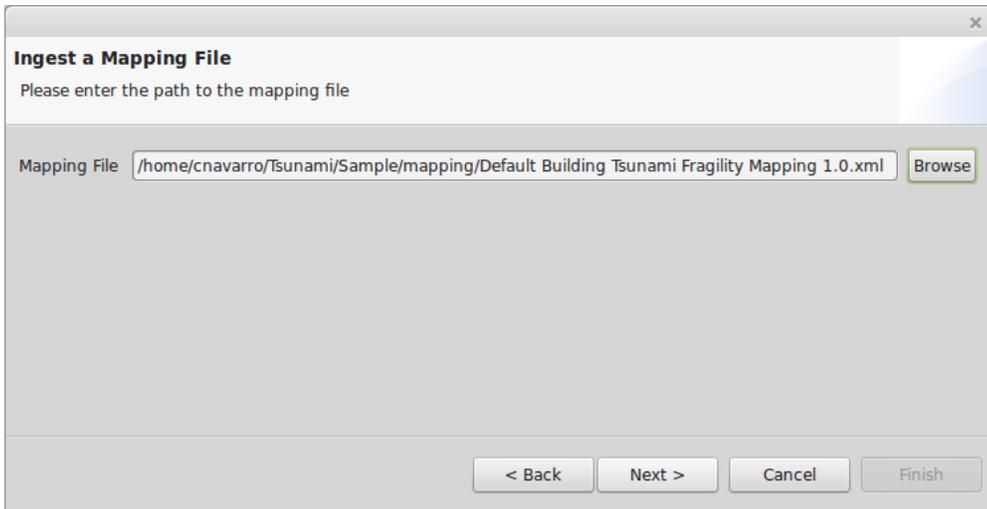
From the dialog, select Building Tsunami Fragilities and Click Next. Click Next again. Click Next again. The pages we skipped are similar to the building pages we skipped where column names from the file can be mapped to the column names Ergo expects. On the last page, select a repository to ingest the dataset to, a descriptive name (e.g. Sample Fragilities) and a version number (e.g. 1.0). Click Finish. You should see the new dataset in the repository you selected to ingest it to. Continue to the next section to import the fragility mapping data.

## Import Fragility Mapping

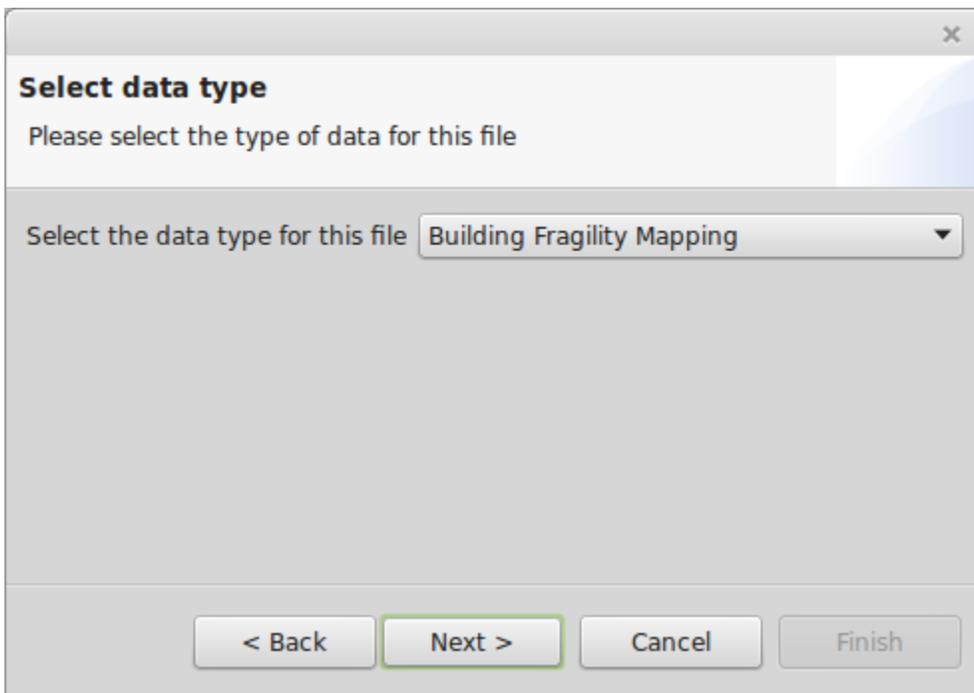
To import the sample fragility mapping, go to File > Import > Data > Dataset and click Next. You should see a dialog similar to the one below:



From the dialog drop down menu, select Mapping and click Next. You should see a dialog similar to the one below:



From the dialog, click the Browse button and locate the example fragility mapping dataset you want to ingest (Default Building Tsunami Fragility Mapping 1.0.xml). Click Next. You should see a dialog similar to the one below:



From the dialog, select Building Fragility Mapping and click Next. As in the previous sections, select a repository to ingest the dataset to, a descriptive name (e.g. Sample Mapping) and a version number (e.g. 1.0). Click Finish. You should see the new dataset in the repository you selected to ingest it to.

Now that we have all of the required datasets, imported into the system, please continue to the next section for configuring and running the new analysis.

## Execute Tsunami Damage Analysis

To begin, we need to create a new scenario. A scenario is similar to a project and is a way to organize.

### Create New Scenario

To create a new scenario, go to the File menu again and select File > New Scenario. You should see a dialog similar to the one below:

**Create Scenario**

Please enter a name and description for this scenario...

Name

Author, Institution, or other Description

Options

Use Region of Interest

View on Completion

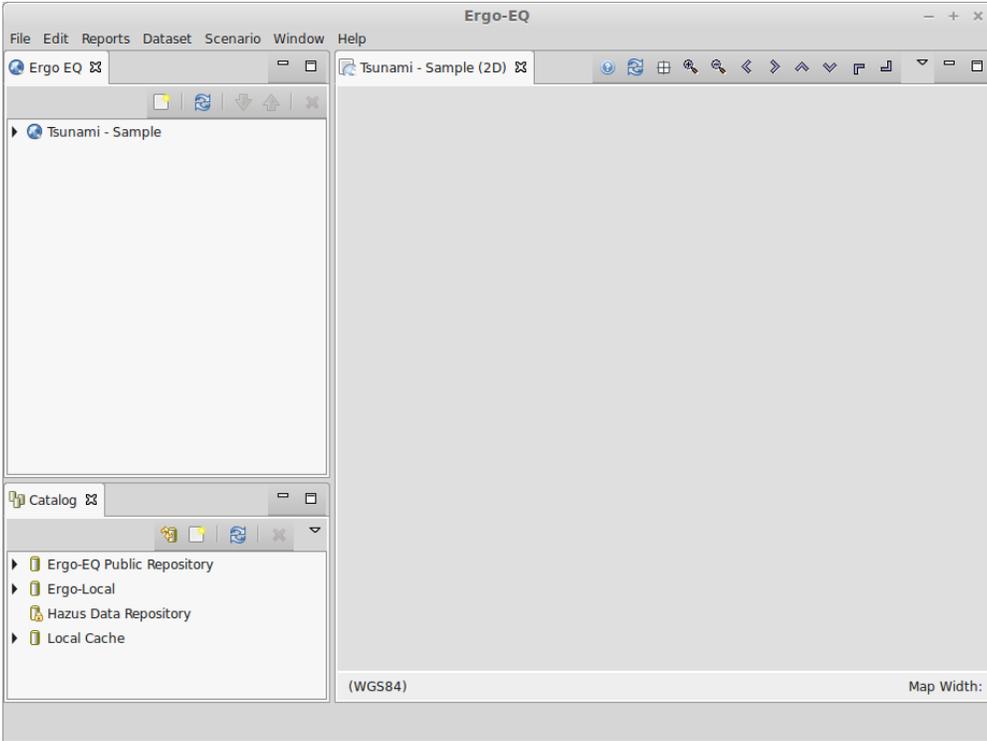
Enter a name for the new scenario (e.g. Tsunami - Sample) and uncheck the box next to Use Region of Interest. Click Next. You should see a dialog similar to the one below:

**Select Analysis Defaults**

Select a default parameter set to use with this scenario. This will minimize user selections for required analysis input parameters.

Select Default Analysis Parameter Set:

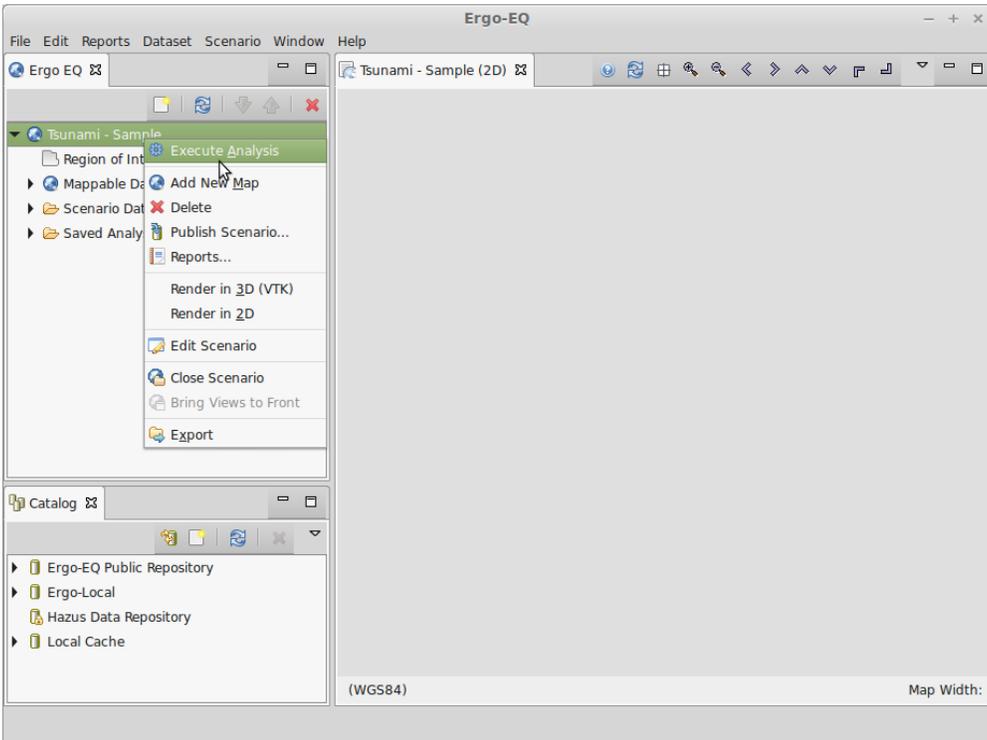
Where it says Select Default Analysis Parameter Set, select Ergo 4.0.0 Beta 1. Click Finish. This should create a new scenario with the information we provided and you should see something similar to the image below:



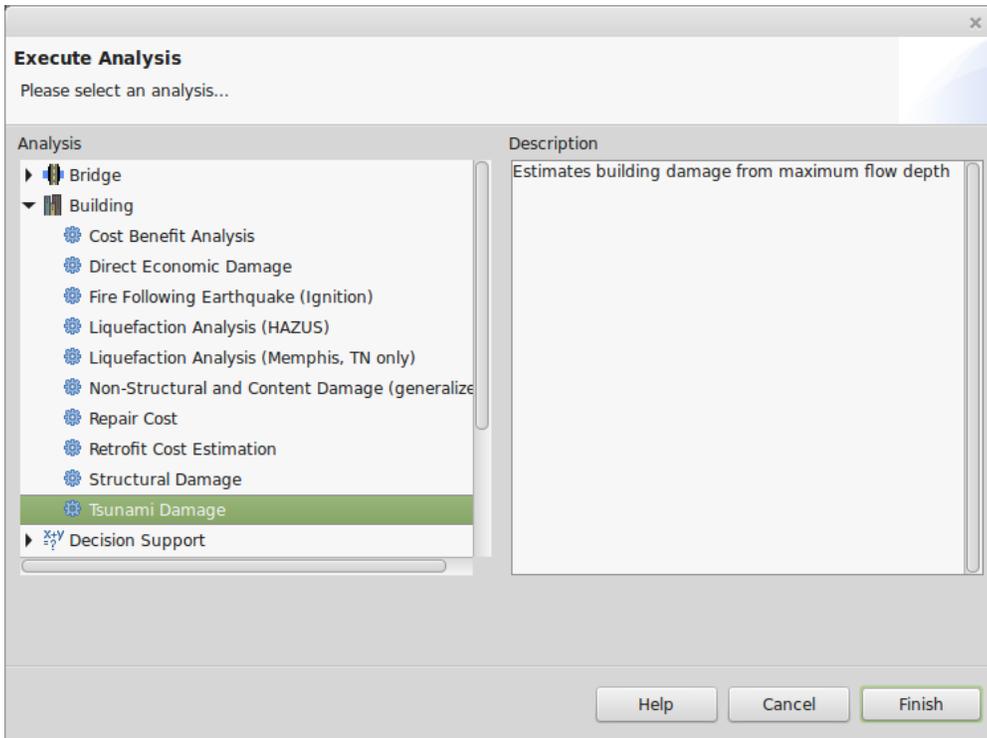
We now have a scenario to start working with and an empty window which will display the results after we run the analysis.

## Setup Analysis for Execution

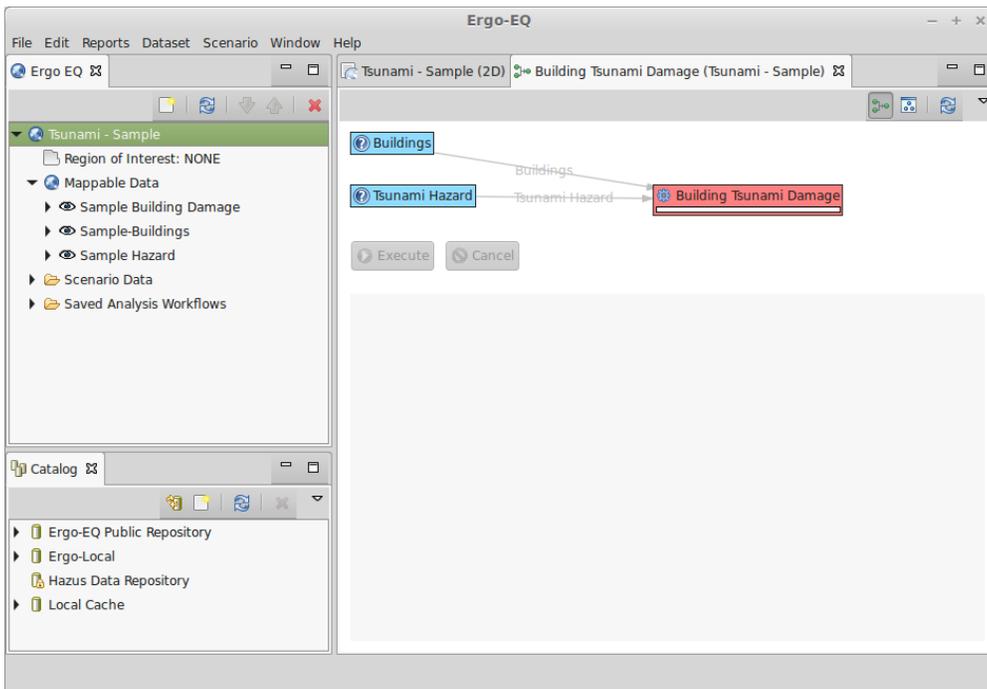
The next step is to setup and run the Tsunami damage analysis. To get started, in the view tab that is called Ergo EQ, right click on the new scenario we created to bring up a menu of options and select Execute Analysis. See the image below for an example:



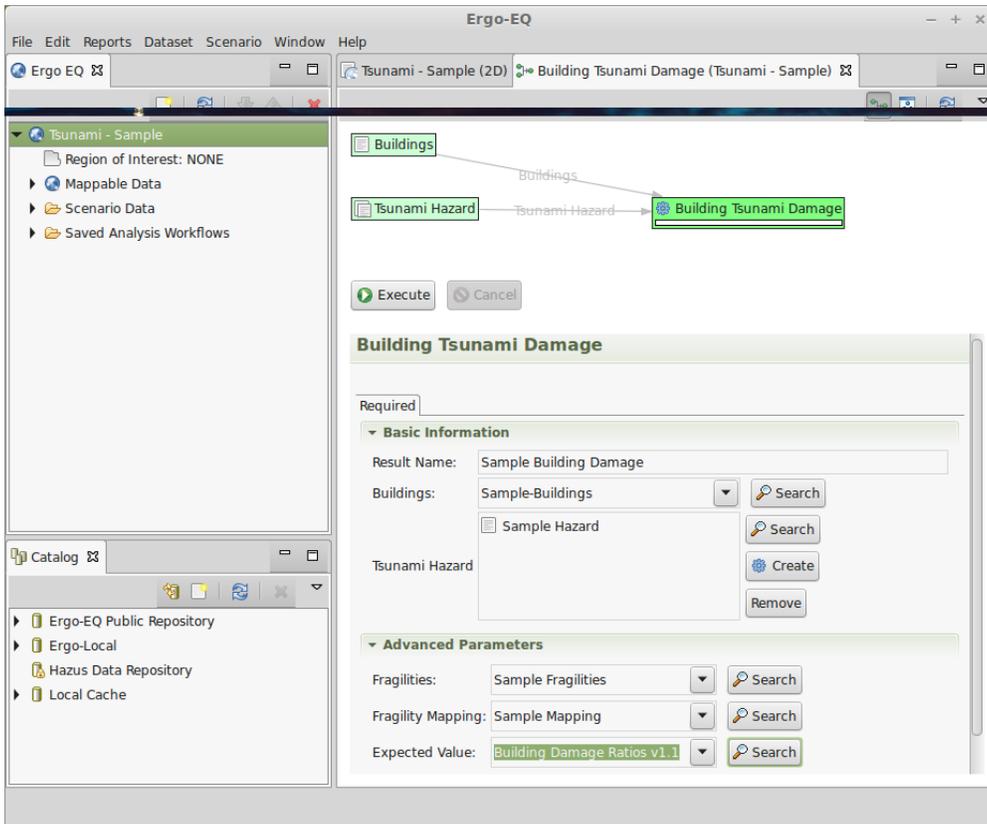
If you select Execute Analysis from the menu in the image above, you should see a dialog similar to the one below open:



Find the Tsunami Damage analysis under the Building category and click Finish. You should see a dialog open similar to the one below:



This opens the Building Tsunami Damage analysis. You should see a red box around the Analysis name which indicates it is not ready to execute. Also notice the Execute button is disabled. To setup the analysis, click on the red box. This should open a page similar to the one below that shows all of the required fields for the analysis:



For the required fields, do the following

1. For Result Name, enter a descriptive name (e.g. Sample Building Damage)
2. For the Buildings field, click the Search button and locate the Sample-Buildings dataset we ingested.
3. For the Tsunami Hazard field, click the Search button and locate the Sample-Hazard we ingested.

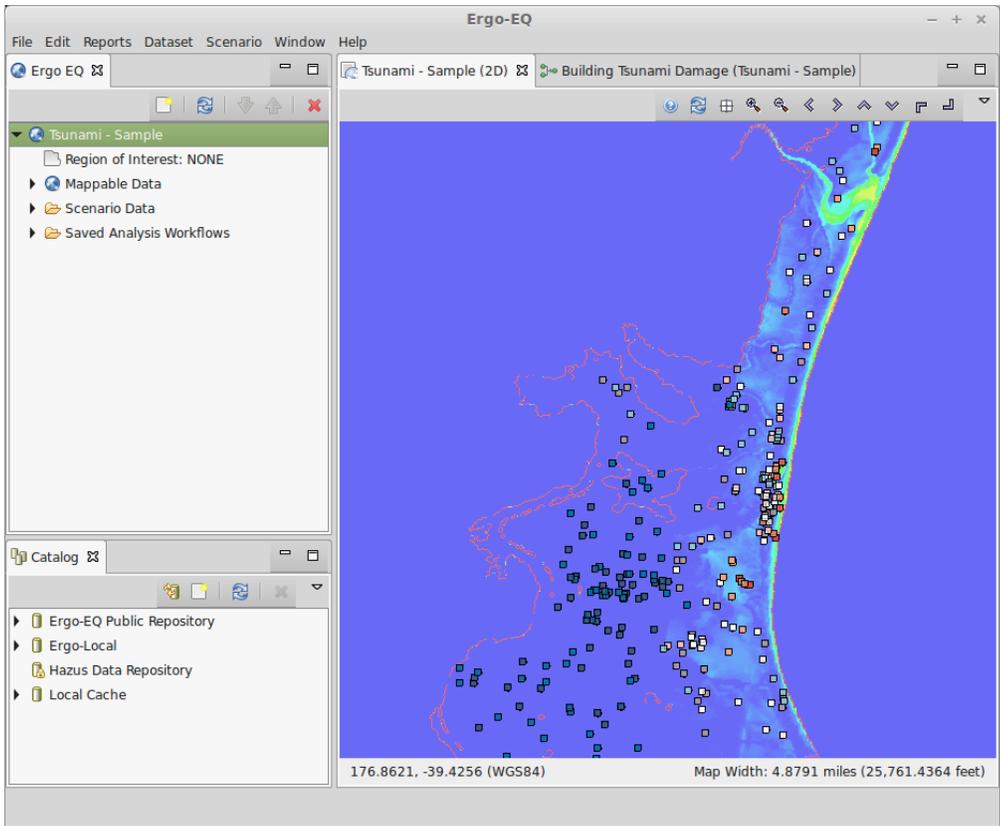
Expand the Advanced Parameters section and enter the following information:

1. For Fragilities, click the Search button and locate the Sample Fragilities dataset we ingested.
2. For Fragility Mapping, click the Search button and locate the Sample Mapping dataset we ingested.
3. For Expected Value, click the Search button and locate the Building Damage Ratios v1.1. This dataset should be in the public repository.

Once all the information is entered, the box around Building Tsunami Damage should turn green to indicate it is ready to execute. The Execute button that was previously disabled should now be enabled. Click the Execute button to run the analysis.

## View Analysis Results

Once the analysis is finished, find the tab that has the name of your scenario (e.g. Tsunami - Sample (2D) if you chose the name we did) and click on it to see the results. Your view should look similar to the one below:



You can also look at the individual building results by expanding the Mappable Data category in the Scenario view, right click on the name of the result dataset (e.g. Sample Building Damage) and select Show Attribute Table. Your view should look similar to the one below:

immo...	lifesfty (0-1)	collprev (0-1)	insignific (0-1)	moderate (0-1)	heavy (0-1)
0.66	0.03	0.00	0.34	0.63	0.02
0.93	0.47	0.10	0.07	0.46	0.37
0.71	0.04	0.00	0.29	0.66	0.04
0.89	0.32	0.04	0.11	0.57	0.28
0.00	0.00	0.00	0.00	0.00	0.00
0.90	0.37	0.06	0.10	0.54	0.31
0.66	0.02	0.00	0.34	0.63	0.02
0.90	0.36	0.05	0.10	0.54	0.30
0.95	0.62	0.19	0.05	0.34	0.43
0.90	0.34	0.05	0.10	0.56	0.29
0.89	0.32	0.04	0.11	0.57	0.28
0.77	0.09	0.00	0.23	0.68	0.08
0.93	0.46	0.09	0.07	0.46	0.37
0.93	0.49	0.11	0.07	0.44	0.38
0.91	0.38	0.06	0.09	0.53	0.32
0.91	0.38	0.06	0.09	0.52	0.32
0.89	0.32	0.04	0.11	0.57	0.28
0.62	0.02	0.00	0.38	0.60	0.02
0.66	0.02	0.00	0.34	0.63	0.02
0.93	0.49	0.11	0.07	0.44	0.38
0.66	0.02	0.00	0.34	0.63	0.02
0.91	0.41	0.07	0.09	0.51	0.34
0.89	0.32	0.04	0.11	0.57	0.28
0.93	0.49	0.11	0.07	0.44	0.38
0.00	0.00	0.00	0.00	0.00	0.00
0.99	0.90	0.58	0.01	0.09	0.32
0.91	0.38	0.06	0.09	0.53	0.32
0.89	0.30	0.04	0.11	0.58	0.27
0.93	0.49	0.11	0.07	0.44	0.38
0.95	0.59	0.17	0.05	0.36	0.42
0.65	0.02	0.00	0.35	0.62	0.02
0.96	0.66	0.22	0.04	0.30	0.44
0.89	0.32	0.04	0.11	0.57	0.28

Notice that the columns added by the analysis are indicated in a light blue color.

## Conclusion

Hopefully this tutorial was helpful to get you started with this analysis. Please email [ergo-dev](mailto:ergo-dev) with any questions or issues you have running this tutorial.

Work In Progress