



Understanding Risk Forum
Cape Town, June 3rd 2012

Crowdsourcing Earthquake Data
Open-source tools developed within
the scope of GEM

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The Project

The tool is called **Faulted Earth**,
It is part of the **OpenQuake** Platform,
which is being developed by **GEM**.

Check out our booth!

The Project

The GEM Foundation is a public-private partnership that drives a collaborative effort aimed at developing and deploying tools and resources for earthquake risk assessment worldwide.

Hundreds of organisations and individual experts, professionals and practitioners are working together on uniform global databases, methodologies, tools and open-source software.

Check out our booth!

The OpenQuake Platform

OpenQuake is a tool that allows users to model, calculate earthquake hazard and risk, explore earthquake hazard and risk by looking at maps, indicators and curves, capture and integrate new data, and finally use decision-making support tools that help users manage risk.

Again, check out our booth!

The Faulted Earth Tool

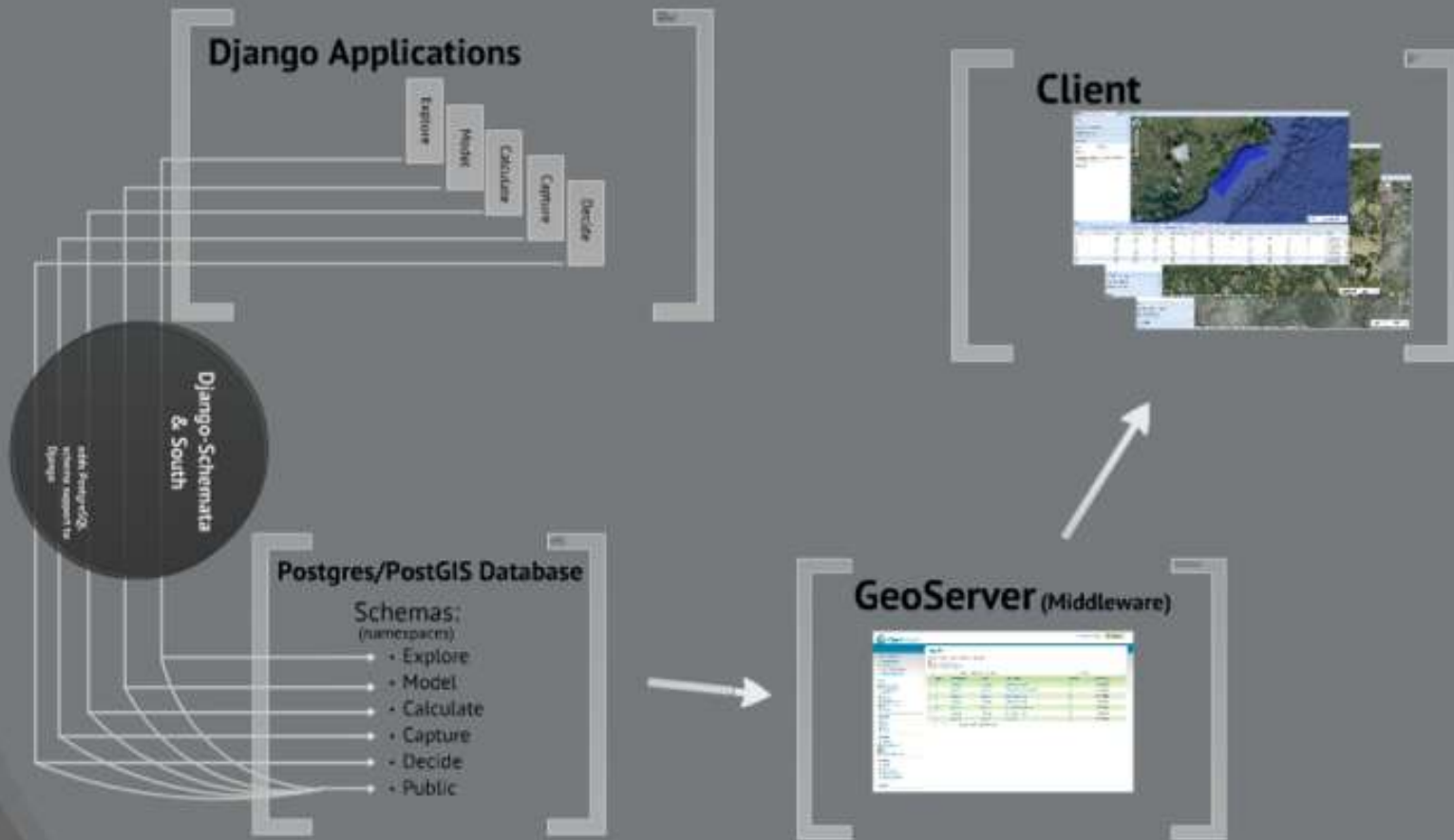
We are using GeoNode.

“GeoNode is a platform for the management and publication of geospatial data”

The GeoNode stack:

- **OpenLayers**
- **GeoServer**
- **Postgres/PostGIS**
- **Django**

The OpenQuake Platform



The Faulted Earth Tool

The tool is used to capture fault information and then to generate a fault source.

GEM is interested in capturing fault information in order to construct seismogenic sources in PSHA (Probabilistic Seismic Hazards Assessment) models to be used in hazard assessment.

OPENQUAKE – FAULTED EARTH

Map-centric layout

The screenshot displays the OpenQuake web application interface. At the top, there is a search bar and navigation icons. The main area is a world map showing various countries and oceans. On the left side, there is a 'Layers' panel with two sections: 'Overlays' and 'Base Layers'. The 'Overlays' section includes checkboxes for 'Site Observations', 'Traces', 'Neotectonic Sections', 'Neotectonic Fault', and 'Fault Source', all of which are checked. The 'Base Layers' section includes radio buttons for 'None', 'OpenStreetMap', 'Google Hybrid', and 'Google Terrain', with 'Google Terrain' selected. Below the map, there are several form expanders for 'Trace Form', 'Neotectonic Section Summary', 'Site Observation Form', 'Neotectonic Fault Form', and 'Fault Source'. At the bottom right of the map, there is a scale bar (2000 km / 1000 mi) and a scale dropdown menu set to '1 : 139770641'.

Trace Grid **Neotectonic Section Summary Grid** Site Observations Grid Fault Grid Fault Source Grid

Fault Section Na...	Length Min	Length Max	Length Pref	Strike (...?)	Episodic behavi...	Episodic behavi...	Upper seismoge...	Upper seismoge...	Upper seismoge...	Upper seismoge...	Lower seismoge...	Lower seismoge...	Lower seismoge...
joined fault													
Ohariu South							0.0	0.0	0.0	1.0	12.0	18.0	15.0
Ohariu North							0.0	0.0	0.0	1.0	12.0	18.0	15.0
Joined junk fault	2.0	5.0	4.0	15			0.0	0.0	0.0	2.0	15.0	20.0	17.5

OPENQUAKE – FAULTED EARTH

Digitize polylines & add attributes

The screenshot shows the OpenQuake software interface. The main window displays a 3D topographic map of a mountainous region. A blue and white digitized polyline is visible on the map. A dialog box is open over the map, displaying the following metadata:

Name	Value
Location Met...	Google Maps
Scale	3600000
Accuracy	3
Notes	Test Trace

The dialog box also includes a 'Save' button (checked), a 'Cancel' button, and a 'Save changes' button. The software interface includes a menu bar with 'Help' and 'Wellington, New Zealand'. The left sidebar contains a 'Layers' panel with options for 'Trace Form', 'Search for key word in notes', 'Create or modify a trace' (with 'Draw' and 'Modify' buttons), 'Upload a trace' (with 'Upload' button), and 'Neotectonic Section Name: test2'. At the bottom, there are buttons for 'Join traces' and 'Neotectonic Section Summary', 'Site Observation Form', and 'Neotectonic Fault Form'.

OPENQUAKE – FAULTED EARTH

Select records and join

The screenshot displays the OpenQuake software interface. The main window shows a 3D topographic map of the Tararua region in New Zealand. A red shaded area represents a fault zone, and a yellow line indicates a specific trace. The interface includes a sidebar on the left with various tool options and a data table at the bottom.

Neotectonic Section Name: test3

Join traces:

Trace Grid	Neotectonic Fault Section Summary Grid	Site Observations Grid	Fault Grid	Fault Source Grid
Location Method	Scale	Accuracy	Notes	
Google Earth	272989	0		
111	0	0		
	0	0		
	0	0		
	0	0		

OPENQUAKE – FAULTED EARTH

Modify existing records & change the geometry

The screenshot displays the OpenQuake software interface. The main window shows a 3D topographic map of Wellington, New Zealand, with a blue fault trace overlaid. A pop-up window titled "observations_trace.109" is open, showing the following data:

Name	Value
Location Met...	1
Scale	2
Accuracy	1
Notes	test

Below the map, there is a table with the following columns: Location Method, Scale, Accuracy, and Notes.

Location Method	Scale	Accuracy	Notes
Google Earth	272989	0	
111	0	0	
	0	0	
	0	0	
	0	0	

OPENQUAKE – FAULTED EARTH

Filter for records by record name (or any attribute)

The screenshot shows the OpenQuake software interface. At the top, the location is set to 'Wellington, New Zealand'. The left sidebar contains various toolbars and a search bar with the text 'test'. The main map area displays a topographic view of the region, with several fault lines highlighted in red. Below the map, there are tabs for 'Trace Grid', 'Neotectonic Fault Section Summary Grid', 'Site Observations Grid', 'Fault Grid', and 'Fault Source Grid'. The 'Neotectonic Fault Section Summary Grid' is currently active, displaying a table of fault records.

Fault Section Na...	Length Min	Length Max	Length Pref	Strike (...*)	Episodic behav...	Episodic behav...	Upper seismoge...	Upper seismoge...	Upper seismoge...	Upper seismoge...	Lower seismoge...	Lower seismoge...	Lower seismoge...
test3													
test2	12.0	14.0	12.0	45	yes	active	2.0	3.0	3.0	2.0	15.0	16.0	16.0
test1	2.0	4.0	2.0	40	yes	active	2.0	3.0	2.0	2.0	10.0	11.0	11.0

OPENQUAKE – FAULTED EARTH

Upload features

Help Wellington, New Zealand

Layers

Trace Form

Search for key word in notes:

Create or modify a trace: Draw Modify

Upload a trace: Upload

From the table below press either the Shift or ctd to select the Traces you would like to join into a Fault Section

Neotectonic Section Name: test3

Join traces: Join

Neotectonic Section Summary

Site Observation Form

Neotectonic Fault Form

Fault Source

Legend

Import Faults

Select a zipped shapefile for uploading. The shapefile needs to have a line geometry.

File: Browse...

Upload

Trace Grid	Neotectonic Fault Section Summary Grid	Site Observations Grid	Fault Grid	Fault Source Grid
Location Method	Scale	Accuracy	Notes	
Google Earth	272989	0		
111	0	0		
	0	0		
	0	0		
	0	0		

OPENQUAKE – FAULTED EARTH

The workflow

Help Wellington, New Zealand

Layers

Trace Form

Search for key word in notes:

Create or modify a trace: Draw Modify

Upload a trace: Upload

From the table below press either the Shift or ctd to select the Traces you would like to join into a Fault Section

Neotectonic Section Name: test3

Join traces: Join

Neotectonic Section Summary

Site Observation Form

Neotectonic Fault Form

Fault Source

Legend

Trace Grid Neotectonic Fault Section Summary Grid Site Observations Grid Fault Grid Fault Source Grid

Location Method	Scale	Accuracy	Notes
Google Earth	272989	0	
111	0	0	
	0	0	
	0	0	
	0	0	

OPENQUAKE – FAULTED EARTH

Generate a fault source

Help Wellington, New Zealand

Layers

- Trace Form
- Neotectonic Section Summary
- Site Observation Form
- Neotectonic Fault Form

Search:

Select a fault from the grid below, then use the modify button to create a simple geometry that will be used to create a fault source polygon

Edit a simplified fault geometry:

Once a fault has the required attributes, and simplified geometry, select a fault from the grid and use the 'generate' button to calculate a fault source

Generate Fault Source:

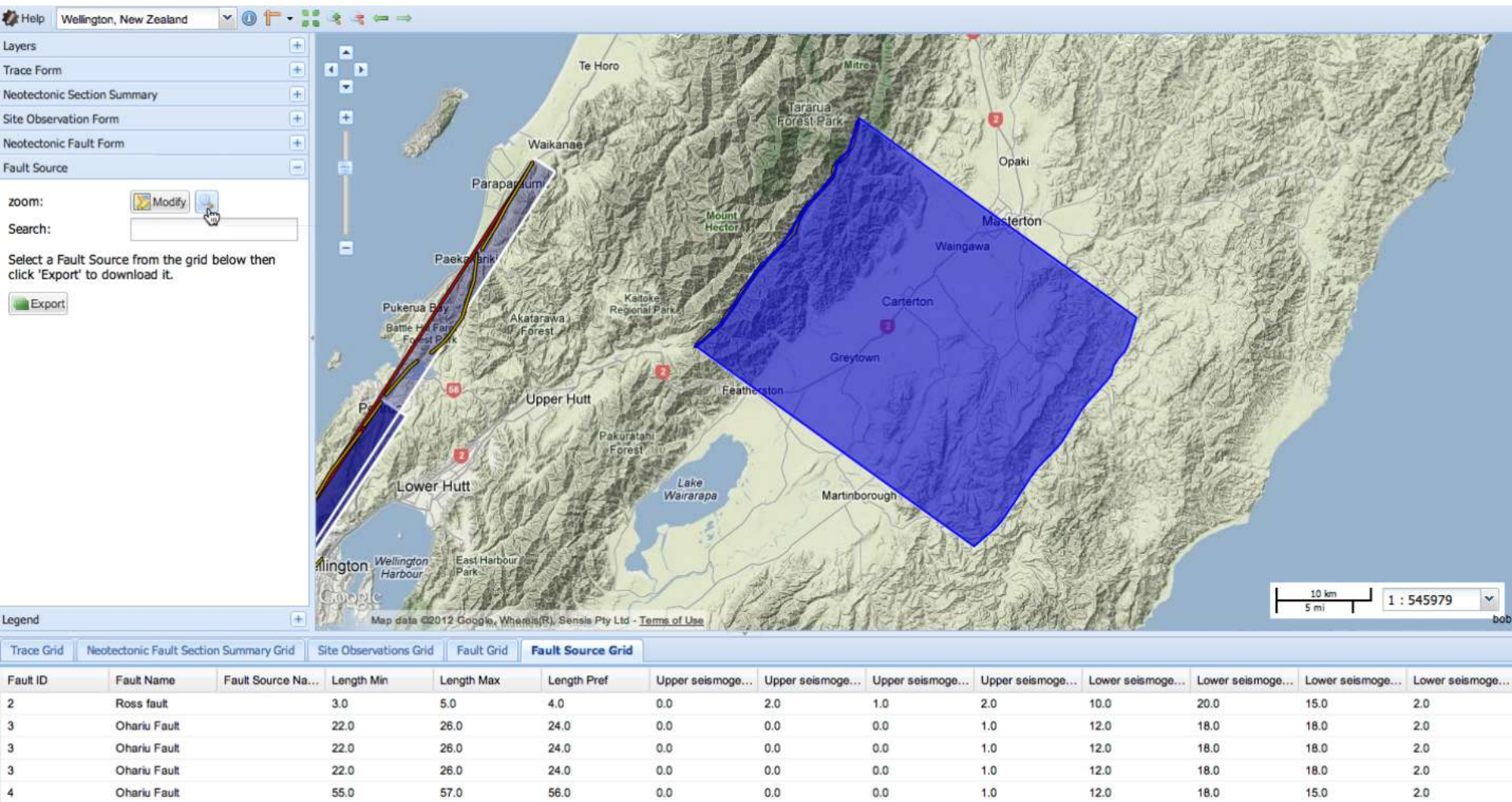
Map data ©2012 Google, Whereis(R), Sensis Pty Ltd - Terms of Use

Scale: 2 km / 2 mi | 1 : 272989

Fault Name	Length Min	Length Max	Length Pref	Strike (...*)	Episodic behavi...	Episodic behavi...	Upper seismoge...	Upper seismoge...	Upper seismoge...	Upper seismoge...	Lower seismoge...	Lower seismoge...	Lower seismoge...
Super fault													
Ross fault	3.0	5.0	4.0	22			0.0	2.0	1.0	2.0	10.0	20.0	15.0
Ohariu Fault	22.0	26.0	24.0	45			0.0	0.0	0.0	1.0	12.0	18.0	18.0
Ohariu Fault	55.0	57.0	56.0	45			0.0	0.0	0.0	1.0	12.0	18.0	15.0
test	50	55	54	45			0	0	0	1	7	8	8

OPENQUAKE – FAULTED EARTH

The final product



Why GeoNode?

OpenLayers + GXP

Django – User authentication & authorization (LDAP compatible)

- [gxp.plugins](#)
 - [gxp.plugins.AddLayers](#)
 - [gxp.plugins.BingSource](#)
 - [gxp.plugins.CSWCatalogueSource](#)
 - [gxp.plugins.CatalogueSource](#)
 - [gxp.plugins.ClickableFeatures](#)
 - [gxp.plugins.DeleteSelectedFeatures](#)
 - [gxp.plugins.FeatureEditor](#)
 - [gxp.plugins.FeatureEditorForm](#)
 - [gxp.plugins.FeatureEditorGrid](#)
 - [gxp.plugins.FeatureGrid](#)
 - [gxp.plugins.FeatureManager](#)
 - [gxp.plugins.FeatureToField](#)
 - [gxp.plugins.GeoNodeCatalogueSource](#)
 - [gxp.plugins.GeoServerStyleWriter](#)
 - [gxp.plugins.GoogleEarth](#)
 - [gxp.plugins.GoogleGeocoder](#)
 - [gxp.plugins.GoogleSource](#)
 - [gxp.plugins.LayerManager](#)
 - [gxp.plugins.LayerProperties](#)
 - [gxp.plugins.LayerSource](#)
 - [gxp.plugins.LayerTree](#)
 - [gxp.plugins.Legend](#)
 - [gxp.plugins.LoadingIndicator](#)
 - [gxp.plugins.MapBoxSource](#)
 - [gxp.plugins.MapProperties](#)
 - [gxp.plugins.MapQuestSource](#)

GeoNode wish list

If we could dream for a moment... we would love to see

- Federation
- Data revision control
- More documentation
- Mobile device integration

Pros & Cons

Pros

- Lots of 'out of the box widgets' to make your life easy
- It's all open source & has a great community!
- Robust tool with a lot of capabilities
- Scalability
- It's web based

Cons

- It's web based
- Customization comes with a cost



Thank you, please come talk to us at our booth and don't forget to check out our projects at openquake.org