



## Network of European Research Infrastructures for Earthquake Risk Assessment and Mitigation

### Report

### Shakemap

Activity:	<i>JRA2: Tools for real time seismology, acquisition and mining</i>
Activity number:	<i>D12.5</i>
Deliverable:	<i>Toolbox 4 - Shakemap</i>
Deliverable number:	<i>D12.5</i>
Responsible activity leader:	<i>Alberto Michelini</i>
Responsible participant:	<i>INGV</i>
Author:	<i>Alberto Michelini</i>

**Seventh Framework Programme**  
**EC project number: 262330**



## Summary

This software is used to make rapid estimates of the ground motion in the areas next to the epicenter and extending as far as where the earthquake has been felt. This software has been designed and developed by the USGS since 1999. It is nowadays used by many institutions and agencies working in seismic monitoring throughout the world. During the course of the project it has been implemented (or refined its implementation) and it is now in operation mode at three of the institutions participating to the JRA2 activities - ETHZ (<http://rzshakemap.ethz.ch/archive/>), NOA (<http://hydra2.gein.noa.gr/shakemaps/archive/>), and INGV (<http://shakemap.rm.ingv.it/shake/index.html>).

The software Shakemap provided by USGS is used as is in WP12.

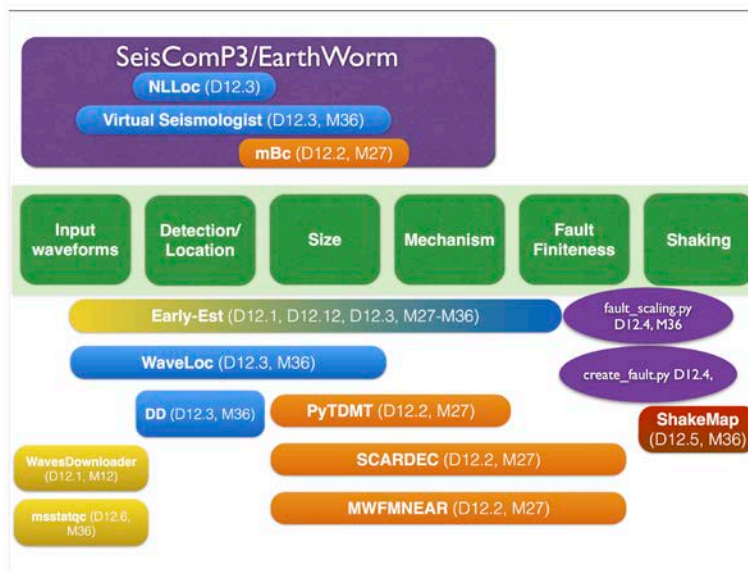


Figure 1. Simplified diagram showing the software implemented in JRA2 and the associated deliverable. The D12.5 deliverable corresponds to Shakemap software shown in the red color to the right.

## Shakemap<sup>1</sup>

The USGS version 3.5 has been used throughout.

In detail and from the "ShakeMap Background Information for Software Installation"

**4) Software/Hardware.** ShakeMap requires the freely-available PERL, MySQL, GMT (Generic Mapping Tools) and a few other packages. PERL and GMT are used quite extensively so any background with them is advantageous. You will need to assemble the basic GMT-formatted base maps, road, city data files, etc., but I'm sure they are available for your area.

The latest version of ShakeMap, V3.5 available at the svn repository <https://vault.gps.caltech.edu/repos/products/shakemap/tags/release-3.5> at:

## Operational implementation

The Shakemap procedure is operational at three of the seismic monitoring centers of JRA2

INGV (Italy) - <http://shakemap.rm.ingv.it/shake/archive/>

NOA (Greece) - <http://hydra2.gein.noa.gr/shakemaps/archive/>

SED/ETHZ (Switzerland) - <http://rzshakemap.ethz.ch/archive/>

And it has been also implemented at

NIEP (Romania) - <http://atlas.infp.ro/~shake/shakemap/archive/>

that did not participate to the WP12/JRA2 activities but is part of the NERA project

The following figure shows an example of application of the technique for an earthquake M=5.1 that occurred in Greece (Ionian Sea) and two institutions (INGV and NOA) produced shakemaps for the same event.

---

<sup>1</sup> The status of deliverable to the software Shakemap has been probably assigned inopportunoely since the software is promptly available at the USGS site.

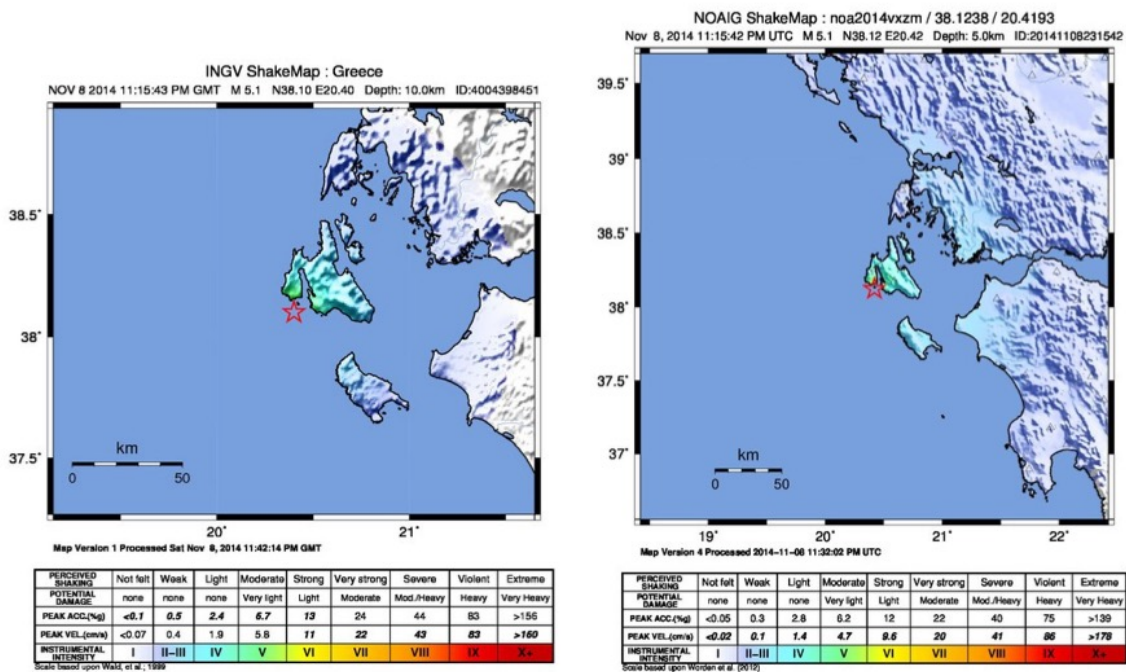


Figure 2. Example of application of the Shakemap procedure by INGV (left) and NOAA (right) to the November 8, 2014, M=5.1 earthquake near Argostolion island in Greece. Besides the different geographical scales, note that the different levels of shaking depend on the different color scales adopted by INGV and NOAA.

## Conclusions

The Shakemap procedure is well established and it has become part of the set of products produced by the European institutions involved in seismic monitoring. Shakemaps provide rapid, very first glance of what has occurred in case of large earthquakes and it provides valid information to lead civil protections to assess the impact of earthquakes.