

Updates on ShakeMap-EU: a European seismological service and a laboratory for collaborative research and capacity building

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Abstract

We provide an update on the current status of European ShakeMap service (ShakeMap-EU), an initiative introduced in 2018 with the key objective to establish a harmonised, collaborative archive of ShakeMaps across the Euro-Mediterranean region, based on the data services and products provided by ORFEUS, EMSC, EFEHR, and aggregated via EPOS Seismology, and on up-to-date community software (USGS ShakeMap, OpenQuake).

Over time, ShakeMap-EU has evolved into a reliable European seismological service capable of seamlessly integrating authoritative models and workflows. Accessible since mid-2020 via the web portal shakemap.eu, ShakeMap-EU operates under the collaborative governance of participating institutions, relying on voluntary institutional contribution and funding from EC projects (presently, Geo-INQUIRE & DT-GEO). The system utilises the latest version of ShakeMap® (which integrates OpenQuake ground motion models), earthquake data sourced from EMSC, seismic shaking data from ORFEUS, ground motion models from the European Hazard Model for mapping seismic hazard across Europe, and official ShakeMap configurations tailored for some of the most hazardous regions in Europe (e.g., Albania, Belgium, Croatia, France, Greece, Italy, Portugal, Romania, Slovenia, Switzerland). Two dedicated workshops have been held in recent years to consolidate the research community, create a hub for collaborations, and provide a common testing ground for seismological agencies to address the complexities associated with ground-shaking mapping strategies across Europe while promoting standardisation and adoption of best practices. Configuration management and input handling are facilitated through a GitHub repository, offering automated and manual triggering options and interaction capabilities for authorised users.

Statistics

Monthly History			
	Unique Visitors	Pages	Hits
June 2024	395	4120	7475
July 2024	1372	16792	36106
August 2024	2030	28052	50795
September 2024	846	9027	16610

Countries		
Countries	Pages	Hits
Italy	4472	8174
United States	2976	5508
France	385	732
Germany	268	460
India	140	291
Norwat	124	176
Unknown	91	183
Switzerland	86	188
China	74	106
New Zealand	49	76
Others	362	716

Key ingredients



USGS ShakeMap v4 usgs.github.io/shakemap

EMSC: Rapid earthquake information/catalog
<https://www.seismicportal.eu/fdsnws/event/1/query?>

ORFEUS: Seismic waveform data

- **EIDA** (Raw data and basic station metadata)
<https://www.orfeuseu.org/data/eida/webservices>
- **RRSM** (Rapid automatic processing of EIDA data) Origin time (OT) + minutes
<https://orfeus-eu.org/odcws/rasm/1/shakemap?eventid=...-&type=event>
- **ESM** (Manual processing of EIDA and other data sources)
 OT + hours (days, weeks)
<https://esm-db.eu/esmws/shakemap/1/query?eventid=...&catalog=EMSC&format=event>
https://esm-db.eu/esmws/shakemap/1/query?eventid=...&catalog=EMSC&format=event_fault
https://esm-db.eu/esmws/shakemap/1/query?eventid=...&catalog=EMSC&format=event_dat

EFEHR: European & national ground-motion models

The official ShakeMap configurations of some of the most hazardous countries in Europe: Albania, Belgium, Croatia, France, Greece, Italy, Romania. Slovenia Switzerland

Discussion

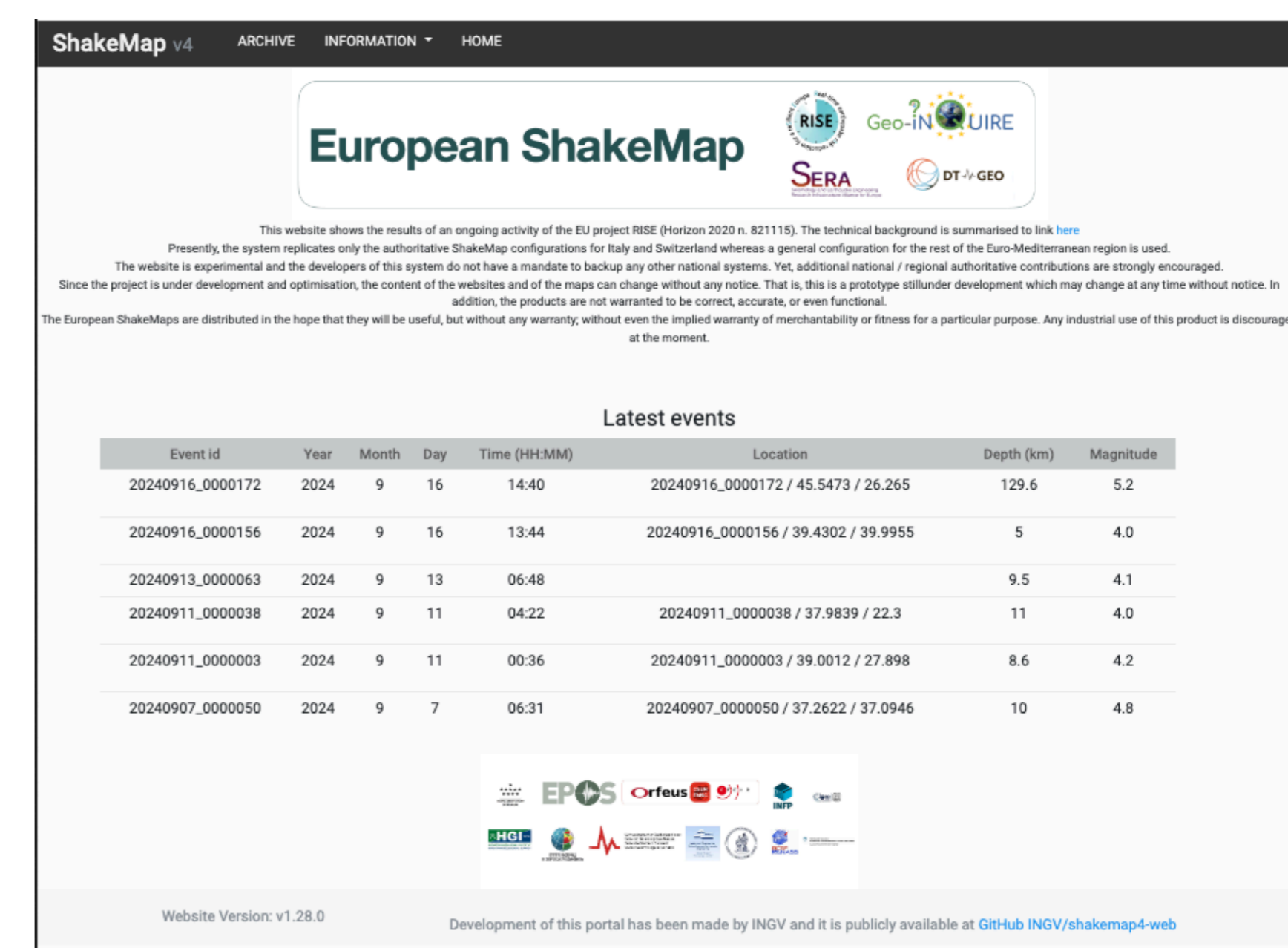
Interactive configuration and processing via GitHub

github.com/INGV/shakemap-input-eu
github.com/INGV/shakemap-conf-eu
github.com/INGV/shakemap-scripts-eu

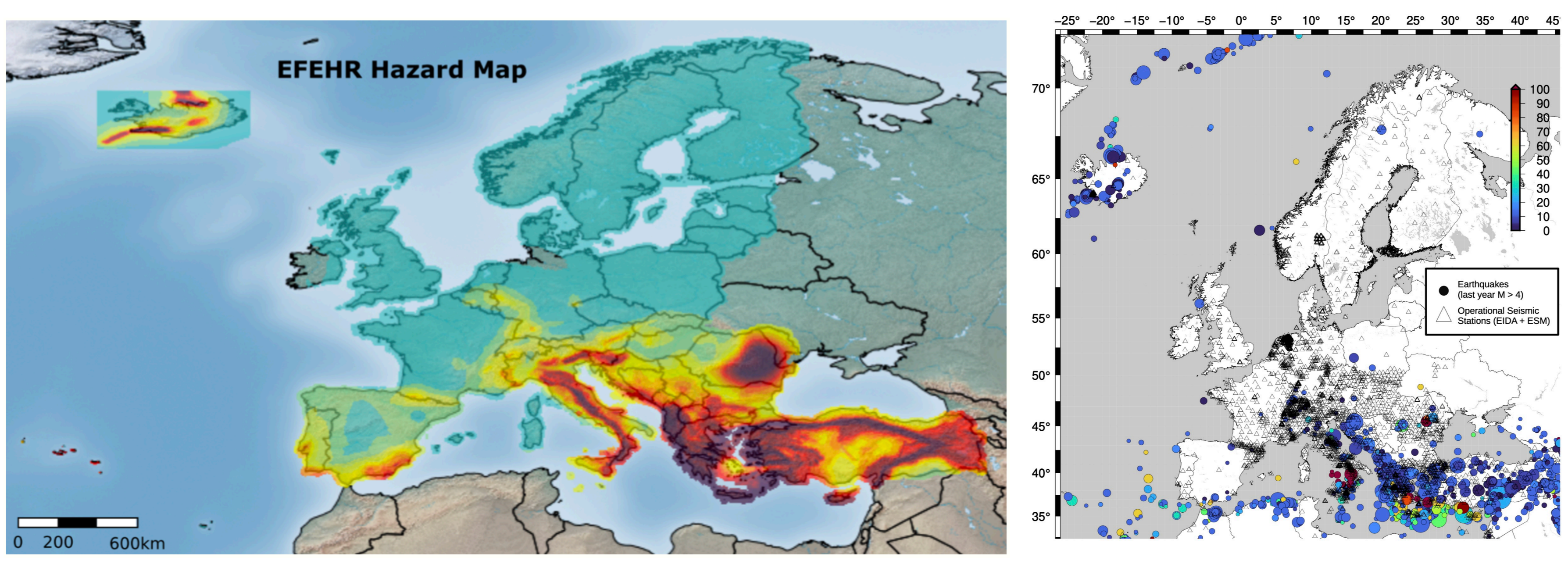
Dedicated open-source Web Interface at INGV

shakemap.eu github.com/INGV/shakemap4-web

ShakeMap 4 Product Visualization - Jozinovic et al. (2022-SRL)



Data and Parameters of Input



Developments and outlook

- Progressive inclusion of national authoritative configurations
- Cross-border harmonization
- Integration of the EMSC felt reports and national and international DYFI
- Rapid finite-fault characterization
- Secondary hazard
- Outreach of ShakeMap in EU

