

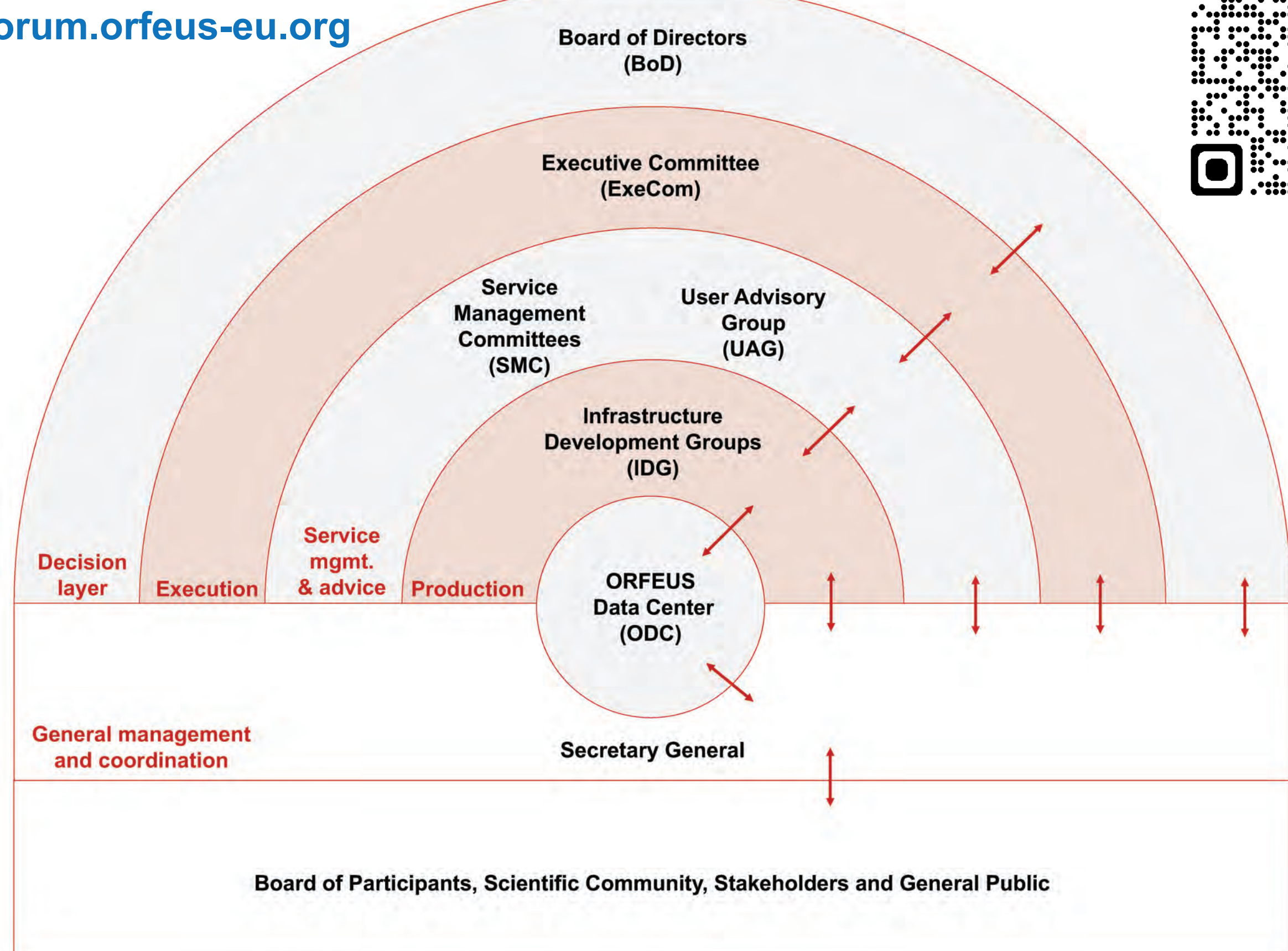
# Status and Outlook of Orfeus Data Services, Products and Activities to Coordinate Access to Seismic Waveform Data in the Euro-Mediterranean Region and Beyond

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ORFEUS (Observatories and Research Facilities for European Seismology) promotes seismology in Europe through the collection, archival and distribution of digital seismic waveform data, metadata and associated services and products.

- > <https://orfeus-eu.org>
- > <https://orfeus.readthedocs.io>
- > <https://forum.orfeus-eu.org>



Current ORFEUS data services:

- > **EIDA**: raw seismic waveform data and basic station metadata ([orfeus-eu.org/data/eida/](https://orfeus-eu.org/data/eida/));
- > **Strong-Motion**: event-based processed waveforms data and enhanced station / event metadata ([orfeus-eu.org/data/strong/](https://orfeus-eu.org/data/strong/));
- > **Mobile Instrument Pools**, onshore and offshore ([orfeus-eu.org/data/mobile/](https://orfeus-eu.org/data/mobile/)).

ORFEUS is one of the founding members of **EPOS SEISMOLOGY**

- > [www.epos-eu.org/tcs/seismology](http://www.epos-eu.org/tcs/seismology)
- > [www.ics-c.epos-eu.org](http://www.ics-c.epos-eu.org)

and a fundamental partner of EC-funded projects.



ORFEUS community services:

- > sessions at international conferences;
- > special issues in international journals (<https://pubs.geoscienceworld.org/srl/issue/92/3>);
- > workshops and webinars (<https://orfeus-eu.org/other/workshops/>);
- > documentation for users and data providers (e.g., StationXML; obsinfo);
- > travel grants, software and data integration grants, community support grants;
- > joint activities & collaboration with other international organisations.

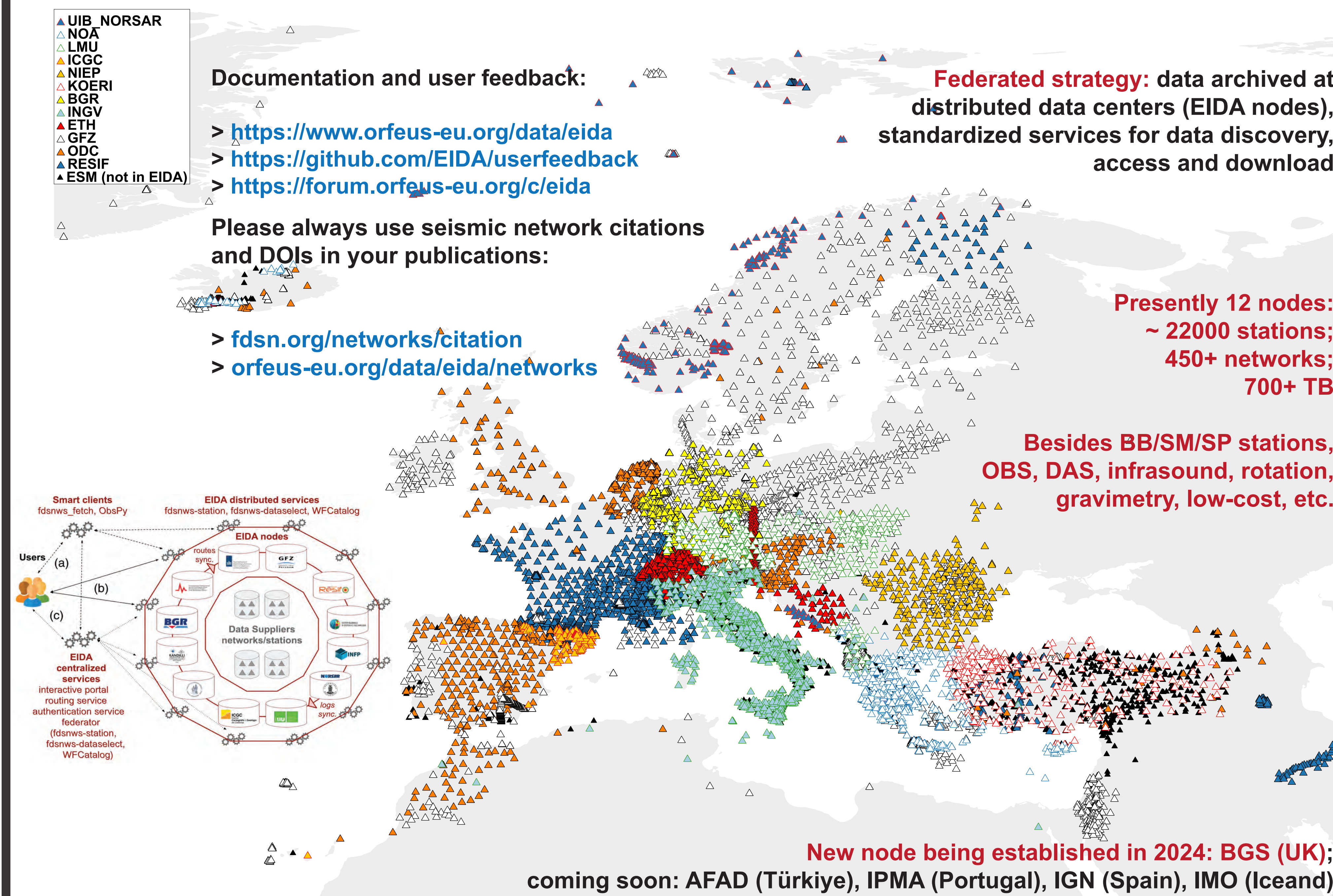
# ORFEUS EIDA: the European Integrated Waveform Data Archive and Associated Services ([orfeus-eu.org/data/eida/](https://orfeus-eu.org/data/eida/))



Managed and developed by the **EIDA SMC** within ORFEUS

<https://orfeus.readthedocs.io/en/latest/governance.html>

Strollo et al. (2021). EIDA: The European Integrated Data Archive and Service Infrastructure within ORFEUS Seismol. Res. Lett., doi: 10.1785/0220200413.



## EIDA web interfaces

> <https://orfeus-eu.org/webdc3/>

ORFEUS Data Center WebDC3 Web Interface



Allows for:

- searching events in **global and regional catalogues** (EMSC, GFZ, KNMI, INGV, ETH, USGS);
- searching **stations** contributing to the EIDA **federated archive**;
- downloading **raw waveform data (SEED format)** and **associated metadata (SEED and XML)** for user-defined time windows, including OT-based.

> <http://orfeus-eu.org/stationbook/>

Allows discovery and download of metadata of stations contributing to EIDA.

> <https://orfeus-eu.org/data/eida/stats/>

Allows exploring usage statistics for EIDA data services.

## (Meta)data quality & availability tools

> <https://www.orfeus-eu.org/data/eida/quality/>

- Data metrics & availability (based on wfcatalog)
- Waveform plots
- Instrument responses

## EIDA web services

> <https://orfeus-eu.org/data/eida/webservices/>

FDSN web service **fdsnws-dataselect**  
Provides waveform data in MSEED format  
<https://www.orfeus-eu.org/fdsnws/dataselect/1/query/>

FDSN web service **fdsnws-station**  
Provides station metadata in XML and text format  
<https://www.orfeus-eu.org/fdsnws/station/1/query/>

FDSN web service **fdsnws-availability**  
Provides data availability in geocsv, json, text format  
<https://www.orfeus-eu.org/fdsnws/station/1/query/>  
UI terminal application at <https://github.com/EIDA/a10y/>

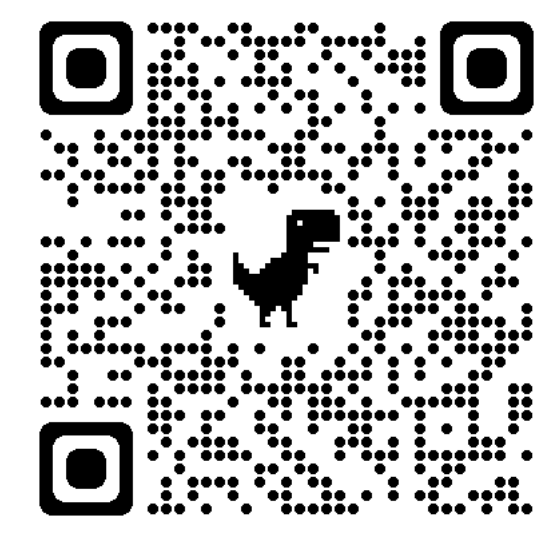
EIDA web service **eidaws-routing**  
Provides routes to different EIDA data and services  
<https://www.orfeus-eu.org/eidaws/routing/1/query/>

EIDA web service **eidaws-wfcatalog**  
Provides metadata and quality parameters of wf data  
<https://www.orfeus-eu.org/eidaws/wfcatalog/1/query/>

EIDA web service **eidaws-statistics**  
Provides unified usage statistics for EIDA data services  
<https://ws.resif.fr/eidaws/statistics/1/openapi.yaml>

EIDA **Federator**  
Provides a single, unified access point to EIDA  
<http://eida-federator.ethz.ch/fdsnws/station/1/query/>  
<http://eida-federator.ethz.ch/fdsnws/dataselect/1/query/>  
<http://eida-federator.ethz.ch/fdsnws/availability/1/query/>  
<http://eida-federator.ethz.ch/eidaws/wfcatalog/1/query/>

# ORFEUS Strong-Motion Databases and Associated Services ([orfeus-eu.org/data/strong/](https://orfeus-eu.org/data/strong/))



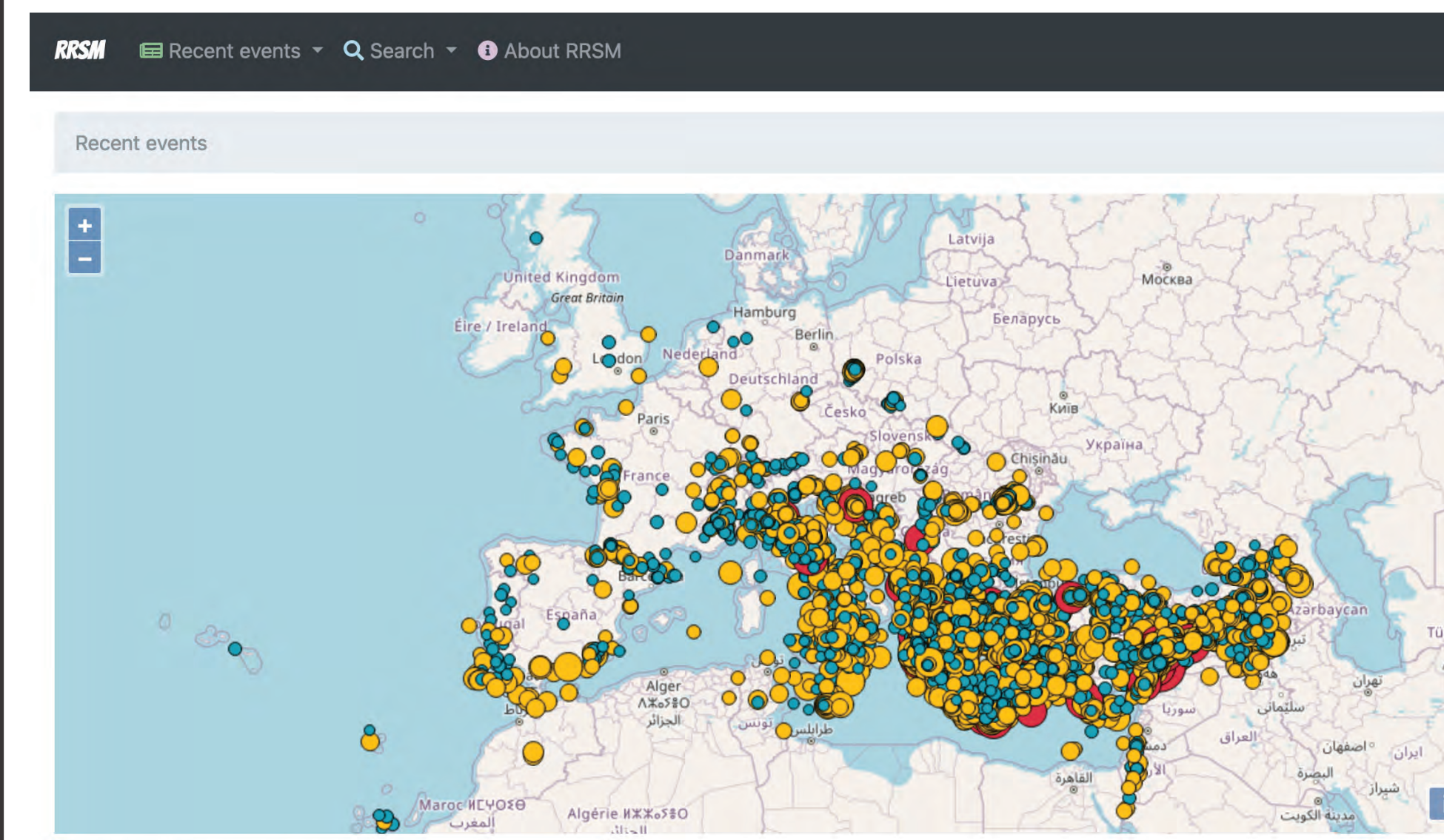
Managed and developed by the **SM SMC** within ORFEUS

<https://orfeus.readthedocs.io/en/latest/governance.html>

Lanzano et al. (2021). Accessing European Strong-Motion Data: An Update on ORFEUS Coordinated Services Seismol. Res. Lett., doi: 10.1785/0220200398.

## Rapid Raw Strong-Motion (RRSM)

> <https://orfeus-eu.org/rrsm/>

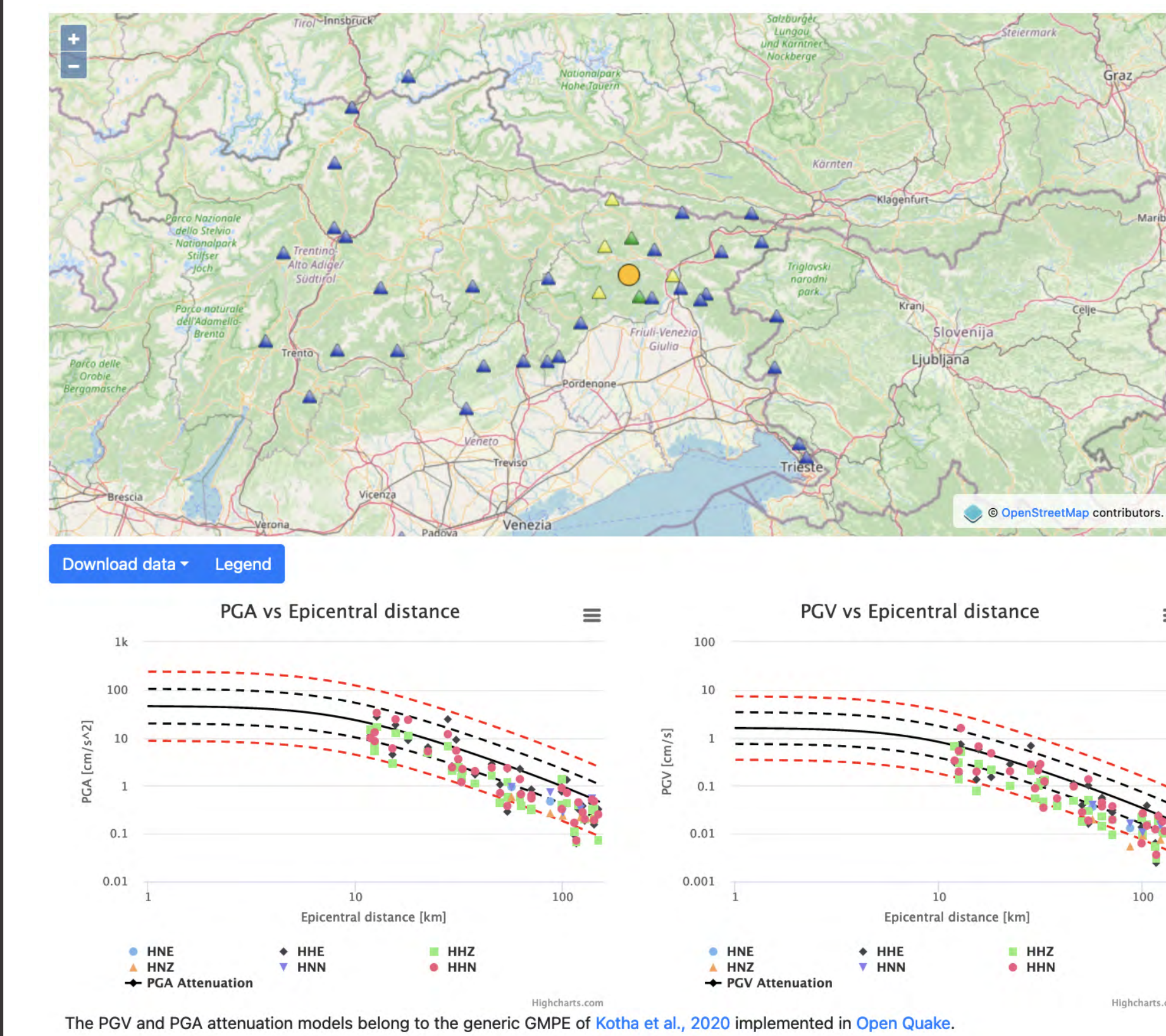


Triggering by **EMSC** reports of any earthquake with **M (any scale) >= 3.5** in the Euro-Med region.

Collection of input wf / st data in near-real-time from **EIDA**.

Automatic processing based on **SeisComP** module **scwparam** and SM database extension – Cauzzi et al., SRL 2016 (doi: 10.1785/0220150271)

Based on **ad-hoc Web Services**, delivers PGA, PGV, SA(T), SD(T), raw and processed waveforms in **SEED** format.



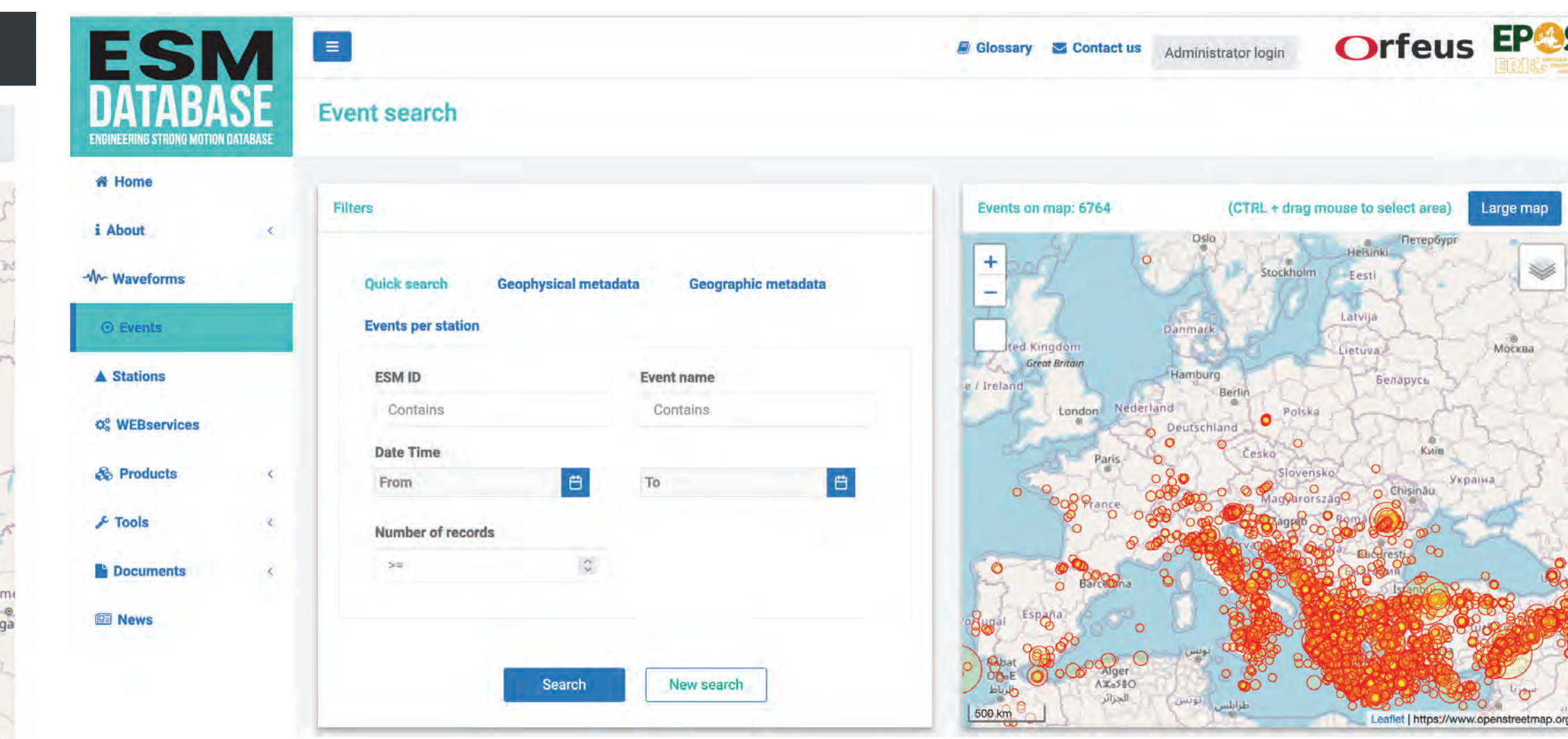
## RRSM and ESM as input to ShakeMap-EU ([shakemap.eu.ingv.it](http://shakemap.eu.ingv.it))

ESM ShakeMap web services  
<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_fault)  
[https://esm-db.eu/esmws/shakemap/1/query?eventid=...&catalog=EMSC&format=event\\_data](https://esm-db.eu/esmws/shakemap/1/query?eventid=...&catalog=EMSC&format=event_data)

RRSM ShakeMap web services  
<https://orfeus-eu.org/odcws/rrsm/1/shakemap?eventid=...&type=event>  
<https://orfeus-eu.org/odcws/rrsm/1/shakemap?eventid=...>

## Engineering Strong-Motion (ESM)

> <https://orfeus-eu.org/esm/> (<https://esm-db.eu/>)



First EMSC magnitude and location, updated using the best manual solution, including **finite fault** if available; **M (any scale) >= 4**.

Input data from EIDA & other Euro-Med SM datasets = **more than 4100 SM stations**.

Automatic and manual processing software based on Mascandola et al., SRL 2023 (doi: 10.1785/0220220246) and Paolucci et al., 2011 (doi: 10.1007/978-94-007-0152-6\_8).

Delivers PGA, PGV, response & Fourier spectra, engineering IMs, raw and processed waveforms - also spectrum-compatible (**REXELweb**) - in **engineering formats including ASCII and SAC**. Large set of web services at <https://esm-db.eu/webservices>.

