
DELIVERABLE

Overall Summary of Virtual Access for Public Outreach

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Summary

The Virtual Access (VA) activities of the SERA project aim to offer virtual access to the main European data and products for seismology and engineering seismology. There were 5 VA activities covering seismological products and information, seismic waveform data and metadata, historical data, faults and strong motion, earthquake hazard and risk products and data and products for anthropogenic seismicity.

The key objectives for these VAs were to improve the services and their usage but also to ensure they became part of the operational phase of EPOS (European Plate Observing System). All these objectives have been fulfilled beyond expectations by each of the 5 VA as underlined by external evaluations (both at the midpoint and at the end of the project). They now represent the bulk of the seismological component of the operational phase of EPOS which offers them a long term, sustainable framework.

This report aims to provide short highlights of these achievements which could be exploited beyond the end of the SERA project to attract further users especially from beyond European borders.

1 Introduction

The aim of the Virtual Access (VA) activities in H2O2O projects is to offer virtual (i.e. online) access to key products, data and services to the research community. Funding covers part of their operational costs with the objective of improving services (quality, usability, reliability) and/or statistics of their usage. The KPI (Key Performance Indicators) are different from one VA to another and include the evolution of number of users, their geographical distribution, volume of downloaded data, number of papers etc.

VAs in SERA are a follow up of the NERA Service Activities and are integrated in the framework of the ESFRI (European Science Forum for Research Infrastructure) EPOS (European Plate Observing System) to become part of EPOS operational phase. Beyond the traditional KPI for VA, the link and coordination with EPOS was of paramount importance.

In order to ensure a proper evaluation of the VA's evolution during the course of the project, 2 external independent evaluations were carried out, one at month 16 and one at month 34, the main idea being to leave enough time for the VA's operators to take possible corrective actions during the course of the project.


The purpose of this document is not to detail the VA's contents and achievements which are fully described in several deliverables (D18.1, D19.1, D20.1 and D21.1) but just to give a short highlight of some of the services, achievements and comments from external evaluators to illustrate their successes and how they are becoming a key part of the seismological component of EPOS.

In this document, each of the VA will be briefly described and some key results presented, along with remarks from external evaluators.

2 VA1: Seismological Data and Products

VA1 is operated by the EMSC (European-Mediterranean Seismological Center), it has been long established and had a yearly operational cost of 703k€ in 2016 and a SERA contribution of 210k€. It was evaluated twice by Dr. Paul Earle (USGS/NEIC).

It collates parametric earthquake information and crowdsourced global earthquake eyewitnesses' information to offer rapid information on earthquakes and their effects.



2. VA1: KPI & KPI Evolution

		SERA prop	2017	2019
DATA	Earthquakes	39 471	52 459	62 012
	Arrival times	2 329 705	3 077 100	2 575 238
	Moment Tensors	3 557	3 868	3 656
	Felt reports	56 014	96 637	219 828
	Crowdsourced Detections	1 411	2 233	2 984
SERVICES	M5+ Euro-Med, M7 world)			
	Prel. loc. (median in min)	4.2	4	4.7
	Manual loc. (median in min)	14.5	15	17
USAGES	App users	85 969	265 554	1 200 000
	Desktop website (v/d)	32 551	35 289	44 000
	Mobile (visits/day)	13 999	21 000	52 600
	@LastQuake	18 000	69 000	143 300
	FDSN webservice (daily users)	3 057	4 900	6 000

Figure 1: Time Evolution of key elements of the services and their usages since the SERA proposition

The following extract of the second evaluation emphasises the service's improvements:

EMSC service expansion and data access under SERA has been impressive for near real-time scientific information collection. Maintaining data imports and high-level collaborations with 96 institutes in numerous countries around the globe is labor intensive and EMSC's success with a limited staff is impressive


EMSC has a clear vision for moving forward. They have plans for serving the wide-ranging needs of their diverse user base and they embrace new technologies. Their continued vision and ingenuity clearly places them as a leader in the seismological community.

EMSC is the European infrastructure for seismological data and products in EPOS.

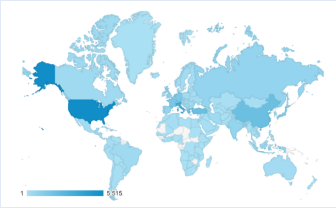
3 VA2: Seismological Waveforms

VA2, operated by the ORFEUS (Observatories & Research Facilities for European Seismology), has been long established. It had a yearly operational cost of 330€ in 2016 and a SERA contribution of 210k€. VA2 benefited from developments carried out in the SERA WP NA2. It was evaluated twice by Dr. Joachim Wassermann (Munich Univ).

It offers access to high-quality seismic waveform data and metadata both in real time and for archived data for the seismological community. It also extended services to include other data types such as infrasonic waveforms.



VA2 impact



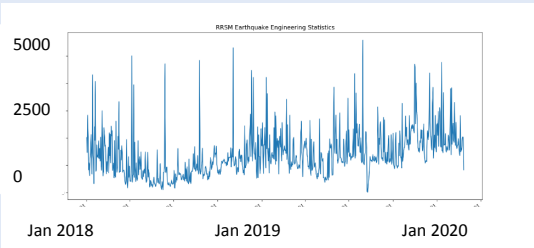
Geographical distribution of users of **ORFEUS services** across countries (01-01-2018 – 25-02-2020).

Notice the global impact of the services provided by ORFEUS (e.g. United States, China, and more recently Japan).

Data export statistics at ORFEUS Data Center (www.orfeus-eu.org/data/odc/statistics/).

This service retrieves statistics on-the-fly.

Year	Amount of data exported (TB)
SERA 1	8
SERA 2	16
SERA 3	27



Daily number of requests to the **RRSM** (01-01-2018 until 25-02-2020) for retrieving engineering parameters (PGA, PGV), rapidly after the occurrence of a significant earthquake.

www.sera-eu.org
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Figure 2: During the SERA project the amount of data exported increased from 8 to 27TB and attract users at a global scale.

The following extract of the second evaluation emphasises the service’s improvements:

The success of this European solution of distributed data holding is based on the successful implementation of “easy to use” services to access the data and meta data.

I’m impressed by the development and I’m confident that this tools are heavily used by the seismological community also in the future

ORFEUS is the European infrastructure for seismic waveform data in EPOS.

4 VA3: Data & Services for Engineering Seismology

VA3 is operated by the INGV (National Institute of Geophysics and Volcanology). It had a yearly operational cost of 350k€ in 2016 and a SERA contribution of 350k€. It was first evaluated by Dr. Hong Kie Thio (AECOM) and in 2020 by Dr. Dave Wald (USGS/NEIC).

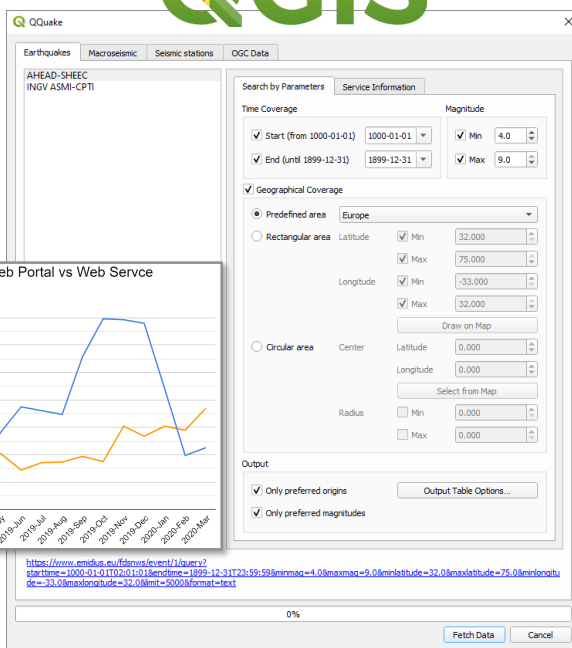
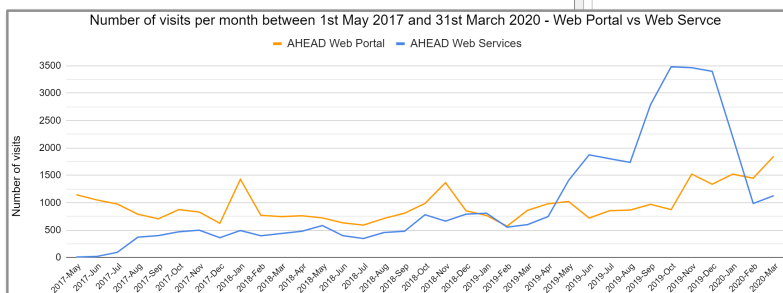
It offers access to historical data and seismogenic faults characteristics and strong motion data. These datasets are key to the VA4 which deals with seismic hazard and risk.



NEW ACCESS SOLUTIONS



increasing number of visitors is accessing data via Web Services,
 We started developing a **plugin for QGIS based on Web Services** that will enlarge the user base.



First public version to be published soon.



Figure 3: Data and services offered by VA3 are already used by a couple of thousands users a month. During SERA a plugin for QGIS was developed to further extend its user base.

Dave Wald in his 2020 evaluation praised the 3 components of the VA3:

European Strong Motion Database (ESM) is an impressive portal and service for engineers and seismologists. EMS is not only state-of-the-art, but I have encouraged USGS, California Geological Survey, COSMOS & other ground motion data center personnel to adopt EMS standards & protocols.

European Archive of Historical Earthquake Data (AHEAD). I'm impressed with the access, shared data across multiple agencies, and the functionality of the portal. USGS would be well served to accomplish such a task for the US, and despite our short history, we've not been able to accomplish this.

European Database of Seismogenic Faults (EDSF). Here, too, I am impressed. The interactive maps are absolutely beautiful. I've made sure USGS personnel working on our PSHA and Q-Faults databases are aware of this work and I've alerted our web team to the really nice legend on the maps.

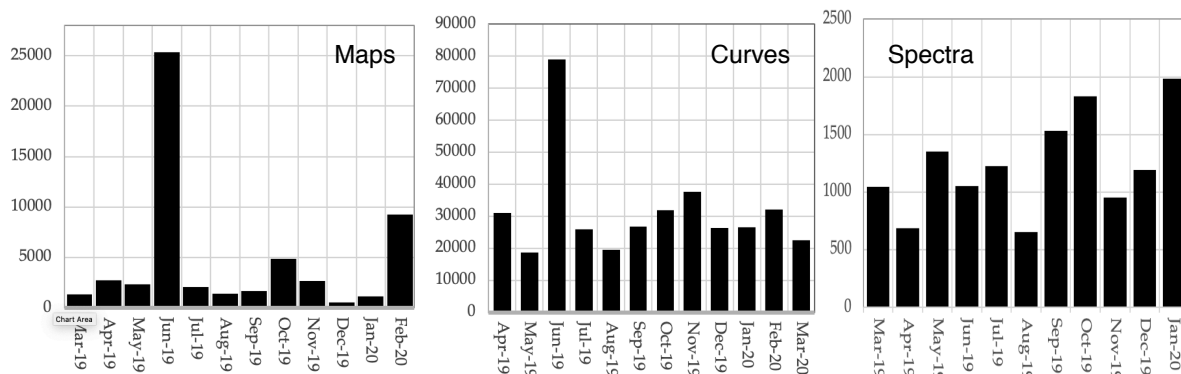
VA3 components are integrated in EPOS in the seismological data products (AHEAD) and in seismic hazard pillar (ESM, EDSF).

5 VA4: Access to Earthquake Hazard and Risk Products

VA4, operated by the EFHER (European Facilities for Earthquake Hazard and Risk), a platform established in 2013. It had a yearly operational cost of 625k€ in 2016 and a SERA contribution of 241k€. VA4 benefited from developments carried out in the SERA WP JRA3. It was evaluated twice by Dr. John Douglas (Univ. Strathclyde).

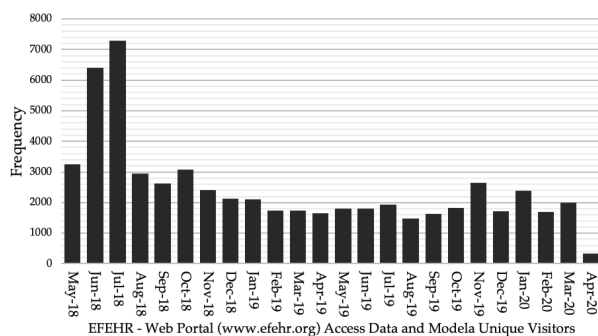
It offers access earthquake hazard and risk products including hazard maps, curves and spectra and has to deal with data of various types such as earthquake catalogue or faults. Product generation can be computer intensive.

EFHER hazard services: access statistics and new users



8.1M web service requests for hazard curves, spectra, or data discovery by 58'000 users

In the last 12 months: 694'000 map views | 7.2 millions curve views | 55'000 spectra views



58'000 new users since May 2018
Frequency of new users accessing EFHER web-portal in the reporting period May 2018 to April 2020 (left)

eu.org

Figure 4: With 58 000 new users since May 2018, EFHER is well identified within the research community.

In his 2020 evaluation, John Douglas underlines how unique EFHER platform is:

This is an excellent resource and, to my knowledge, the only free online resource worldwide providing such rich hazard results in a transparent manner.

EFHER is also invaluable in better communicating seismic hazard to decision-makers and the general public.

In conclusion, I believe that EFHER is a great step forward in the diffusion of knowledge on risk posed by earthquakes and it should be commended and continued.

EFHER is the European infrastructure hazard and risk products in EPOS.

6 VA5: Data & products of anthropogenic seismicity

VA5, operated by the IGPAS (Institute of Geophysics, Polish Academy of Sciences) is the most recent VA. It had a yearly operational cost of 458k€ in 2016 and a SERA contribution of 190k€. It was evaluated twice by Dr. Marcelo Assumpção (Univ. Sao Paulo).

It offers access to data sets from anthropogenic seismicity (called episodes) and tools to visualize and compare different episodes.

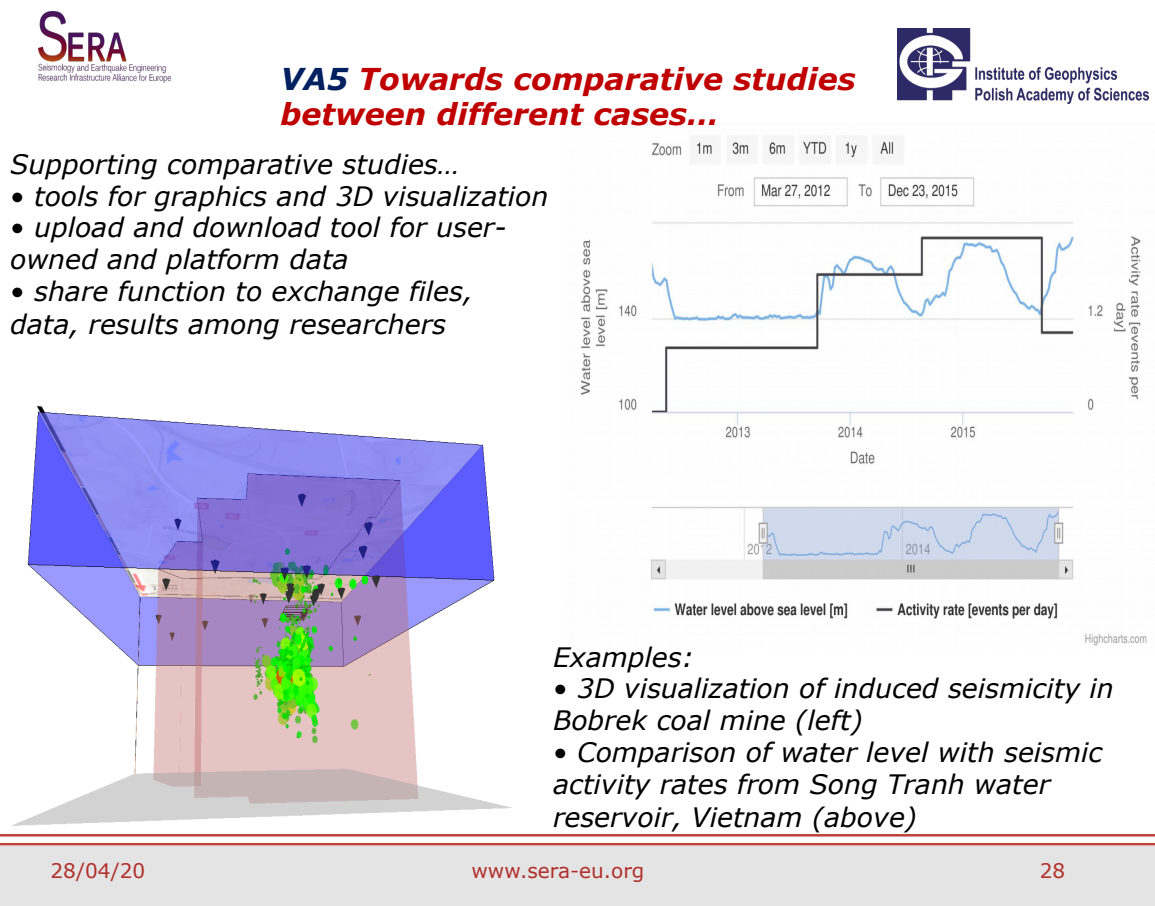


Figure 5: VA5 is not only a way to access episodes of anthropogenic seismicity but also offers the means to visualise them in 3D and compare datasets.

In his 2020 evaluation, Marcelo Assumpção underlines the usefulness of the platform and invites the community to contribute with new episodes:

Over all, the AH platform shows an excellent potential and will be very useful for the scientific Community

Many important and useful statistical tools are now available

One of the platform goals is to facilitate comparison from different episodes (...) invite people to contribute their datasets

VA5 is the thematic core service for anthropogenic hazard in EPOS.

7 Conclusion

The 5 VAs have performed excellently during the SERA project: they are now established both for the community of users and in EPOS.

This report has highlighted some of these successes which can be leveraged to increase VA outreach beyond the end of the SERA project and beyond European borders.

Contact

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