National Institute for Earth Physics

Current status of the Romanian EIDA (European Integrated Data Archive)

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EIDA overview

- Basic idea: European Integrated waveform Data Archive
- Federation/collaboration of data centres (“nodes”) - exchanging seismic metadata (“inventory”) and - resource location (“routing”)
- Data stays at original nodes
  - size (requests up to gigabytes)
  - access control (limited users, encrypted delivery)
- Rapid AND long-term availability is required.

- Important: EIDA IS a contributor to GEOSS (Global Earth Observation System of Systems) through EPOS. EPOS is a research infrastructure for the monitoring and observation of geophysical and seismic phenomena

EIDA GOALS

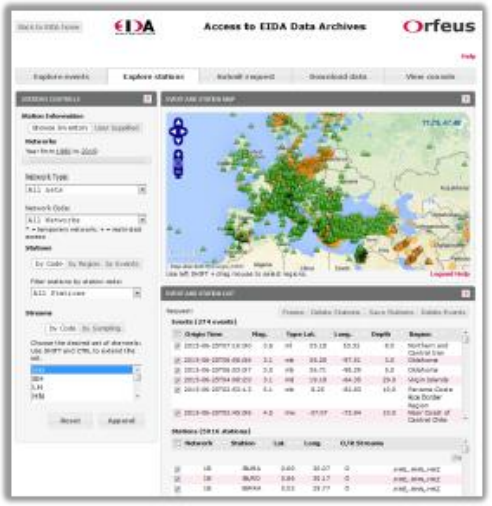
• safe, persistent archival and dissemination of high quality seismic waveform data collected by European datacenters via distributed archives

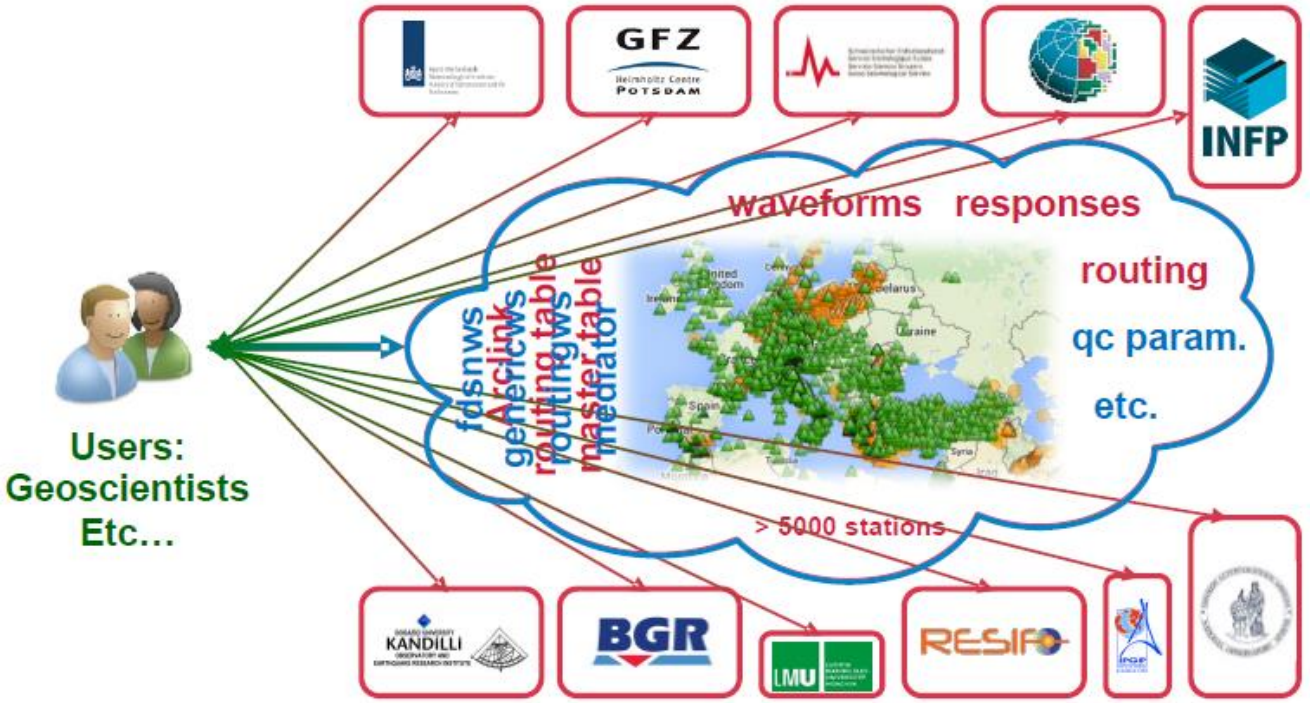
• easy access for scientists support multiple access methods, standards

• open access where possible, closed / restricted access is possible – all stations require standardised metadata

• distributed archives allows robust system independent of each individual node

EIDA





http://www.orfeus-eu.org/eida/eida.html

EIDA GOVERNANCE

MANAGEMENT

- MoUs between ORFEUS (KNMI) and the nodes (Nov. 2012)
- EIDA Management Board – sets overall policy and strategy
- EIDA Technical Commission – ensures operations, review performance, coordinate modifications and extensions
- Commitment by nodes to provide open access.

CONSTRUCTION

- a consortium of eight datacenters (EIDA primary nodes) and three seconday nodes
- each primary nodes commits resources for ongoing system development

EIDA data exchange

- Waveform data is hosted at a single node; tools need routing information.

- Inventory (seismic metadata) is copied to all nodes.

- Routing table is exchanged between all nodes.

- Nightly metadata updates; one designated node is responsible for each network. 68MB as XML

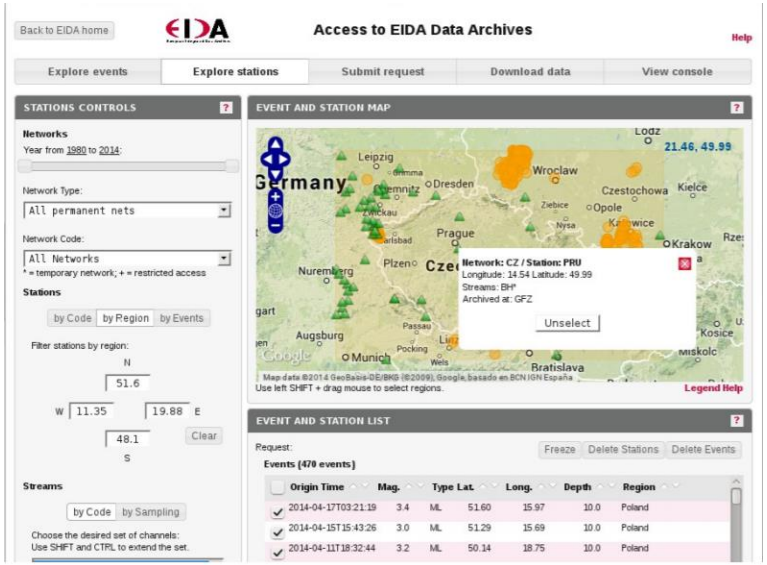
DATA ACCESS

- WebDC/Orfeus portals for web-based access

-- http://www.orfeus-eu.org
-- http://eida.gfz-potsdam.de

- Other access methods

-- custom Arclink protocol, custom client arclink fetch
-- web services (fdsnws)
-- e-mail based (BREQ_FAST)



EIDA EVOLUTION

- Historically, data was held at individual small European data centres
- Each running server for custom ArcLink protocol (GFZ)
- WebDC.eu portal running since 2004; major upgrade Oct 2013.
- Beginning to offer data, metadata as web services.
- Now 11 nodes. Added 3 data secondary centers in last 2 years.
- 2016: 75 permanent, 44 temporary networks. 6458 stations. 33593 streams 0.1-100 sps: 360 GB new data per day
- Downloads 25-50GB/day (peak days ~60GB); >200000 requests per day; 10s-100s of IP addresses per day

EIDA STATIONS

From the ORFEUS Data Center (single DC) to EIDA (distributed DC)

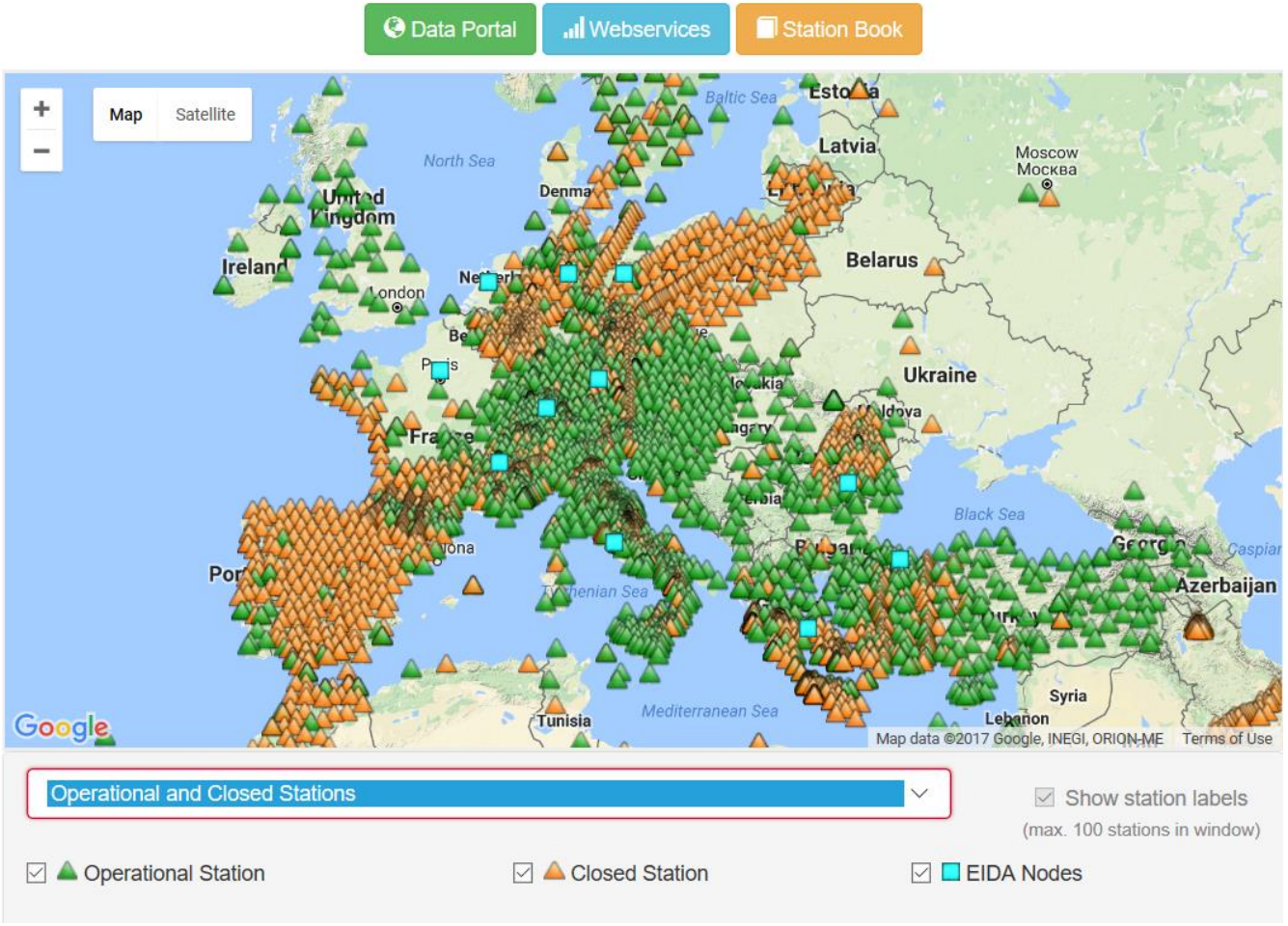
- 1986/87: ORFEUS plan launched/realized
- 2012/13: ORFEUS-VEBSN => ORFEUS-EIDA (EIDA = VEBSN + data holdings from 9 European DCs)
- 2016: ORFEUS-EIDA (11 nodes)

1987 - 30 **2013 - 613** **2016 ~6000**

Year - Number of open stations

EIDA DATA HOLDINGS- EIDA SEISMIC STATIONS BOOK

~ 7060 stations , 450 TB shared among 11 nodes



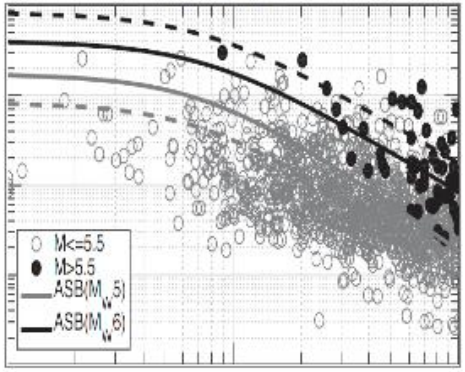
This map shows 7060 EIDA stations. Green triangles represent stations that are in operation (2552) according to the current metadata, while the orange triangles indicate stations that have stopped operation (4508). (last update: 2017-05-08 12:18:01 UTC)

DATA ACCESS, SEVICES and PRODUCTS

EIDA

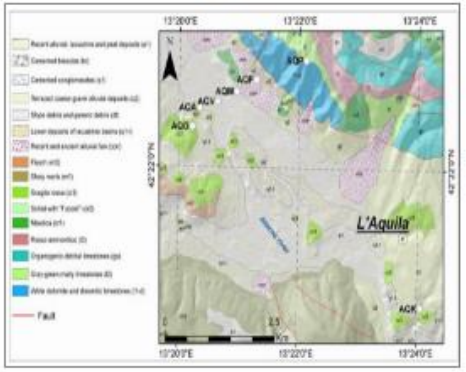
Interactive access to data from EIDA

RRSM



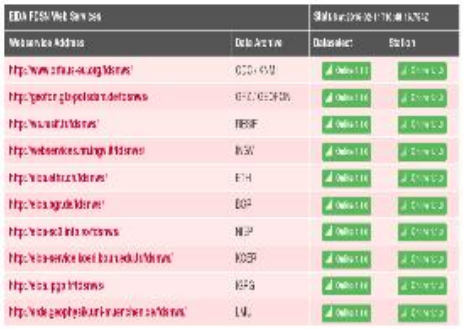
Interactive access to rapid, raw strong motion data

ESM



Interactive access to reviewed strong motion data

Web services

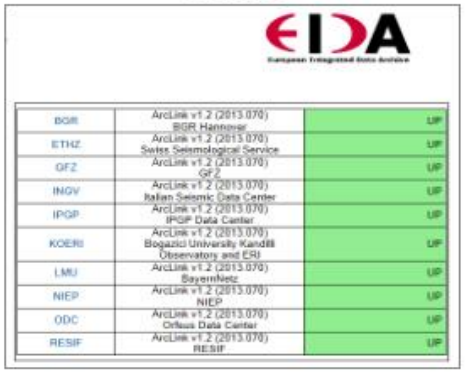


Access to EIDA data through webservices

Station Book

Station inventory of EIDA stations

Status



Overview of status and usage of EIDA

NIEP EIDA NODE

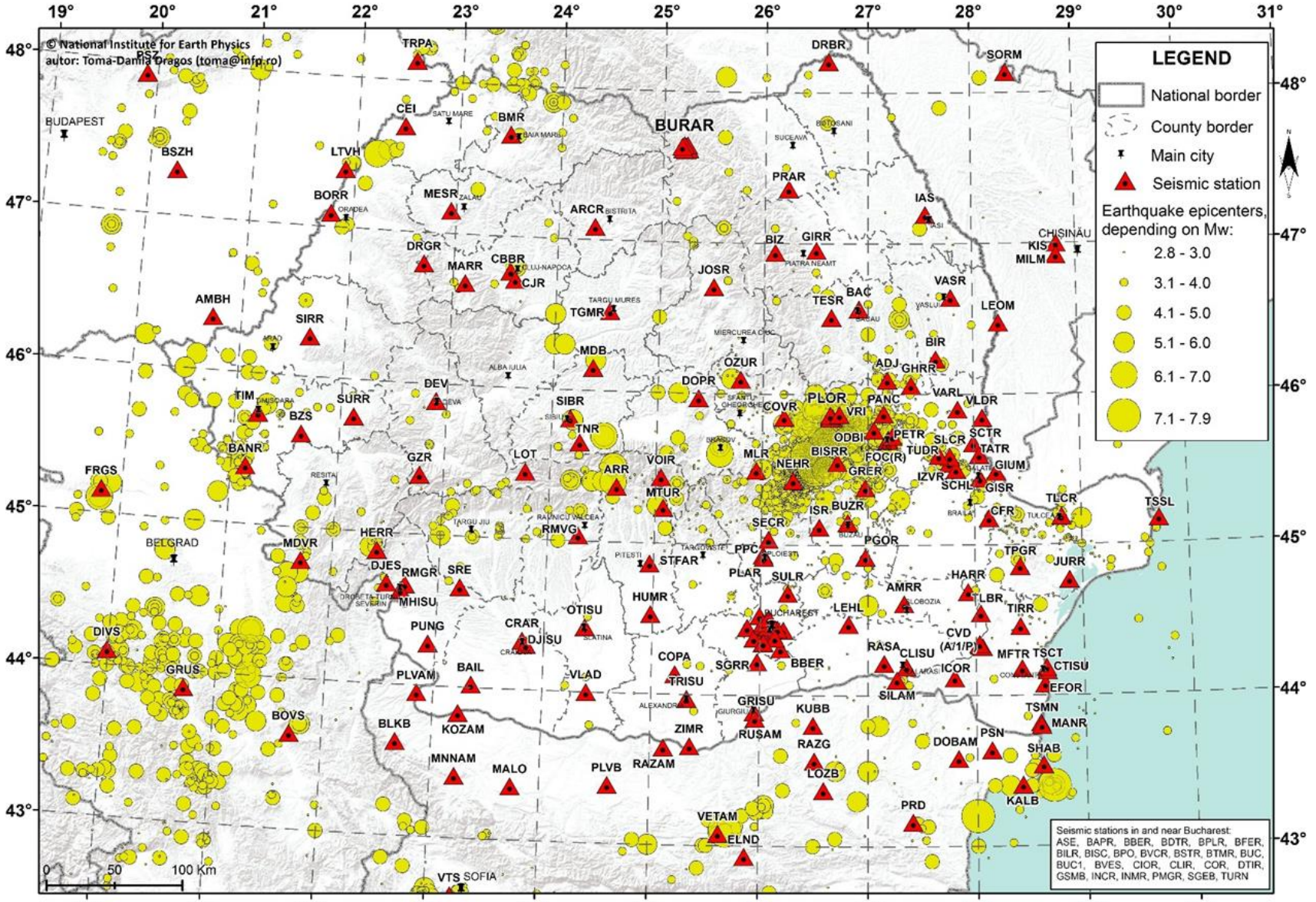
- NIEP EIDA node run the same services like the rest of EIDA NODES

- NIEP receives, archives and shares seismic data from Romania, Bulgaria, Republic of Moldova

- Until 2015, one seismic station from Ukraine (Crimeea) was acquired in NIEP-EIDA

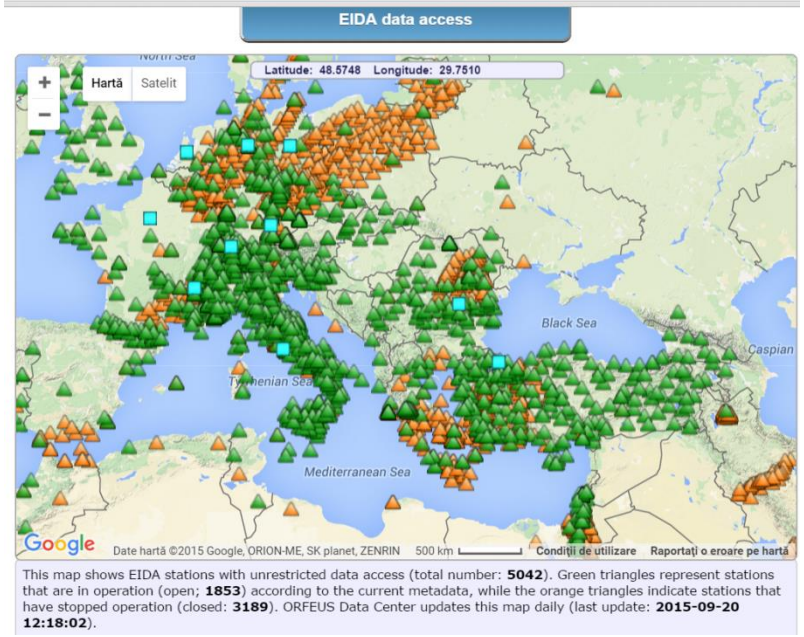
- NIEP have in plan to include in EIDA seismic data from Republic of Serbia, Ukraine and Belarus

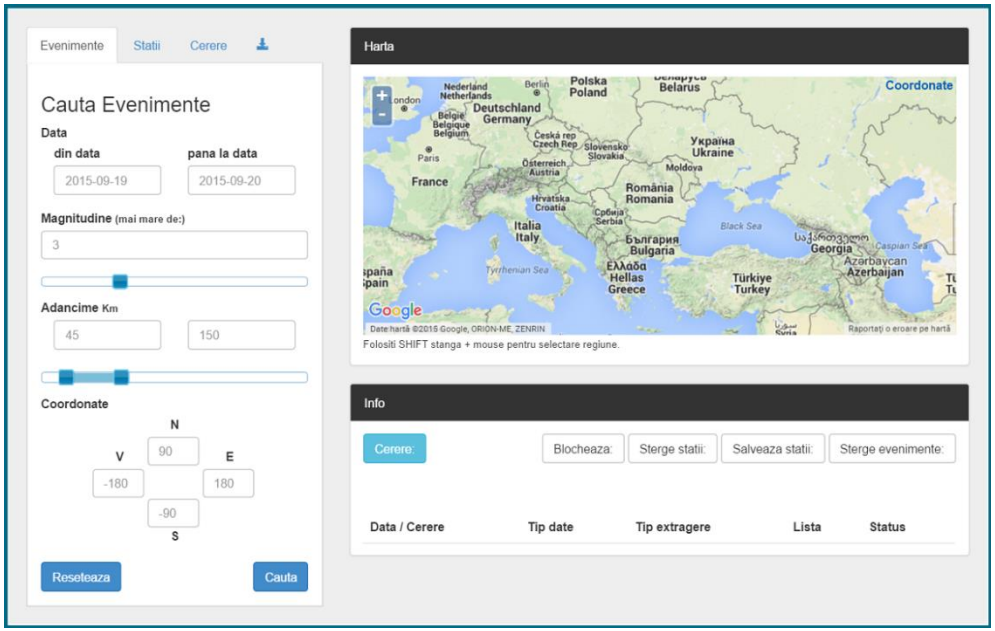
Romanian seismic network and the main seismicity



NIEP EIDA NODE

• NIEP provides services and access tools to all EIDA stations with unrestricted data access. Data access services:
- eida.infp.ro - access to NIEP data
- fdsnws-station - FDSN webservice for NIEP stations metadata
- fdsnws-dataselect -FDSN webservice for NIEP stations waveforms
- fdsnws-event - FDSN webservice for NIEP event data
• NIEP archived seismic data networks: Romania, Bulgaria, Moldova, Ukraine.
• NIEP has the necessary infrastructure for collaboration with other seismic networks in the region for integration into EIDA and European seismic network (~600 TB of storage).





NIEP, EIDA NODE-PRODUCTS

Local earthquakes | All events | Search for events

Earthquake 4.7 magnitude in ROMANIA - Vrancea on 9/30/10 05:31:22 (UTC)

Did you feel it ?

Macroseismic intensities

Information about the earthquake

Region	ROMANIA - Vrancea
Latitude	45.52N
Longitude	26.35E
Depth	138 km
Magnitude	ml=4.7
Epicentral intensity	IV
Closest cities	Siriu (11km),Gura Teghii (12km),Nehoiu (13km),Lopatari (17km),Chiojdu (18km)

Local seismicity

County	City	Intensity	Epicentral distance (km)	Answer count
Galati	Galati	1.31	94	4
Bucuresti	Bucuresti	1.90	76	40
Buzau	Buzau	1.00	34	5
Covasna	Sfantu Gheorghe	2.00	86	1
Bucuresti	Afumati	2.00	166	2
Constanta	23 august	1.00	155	2
Vaslui	Birlad	1.00	80	1
Ilfov	Darasti	4.49	85	2
Arges	Pitesti	2.00	85	1
Constanta	Constanta	1.92	147	4
Braila	Braila	2.54	80	2
Prahova	Ploiesti	1.94	42	4
Bacau	Bacau	2.00	78	1
Teleorman	Alexandria	2.24	117	1
Vrancea	Focsani	2.00	42	1
Calarasi	Calarasi	1.84	105	2
Dambovita	Branistea	2.00	69	1
Ialomita	Slobozia	1.00	83	2
Ialomita	Urziceni	1.00	58	1
Iasi	Iasi	8.09	128	1
Ialomita	Tandarei	1.00	84	1
Braila	Bertestii de Jos	1.50	85	2
Alba	Afumati	1.00	166	1
Cluj	Cluj Napoca	8.88	158	1
Dambovita	Targovista	2.69	59	1
Giurgiu	Giurgiu	2.00	113	1
Constanta	Lumina	4.07	128	1

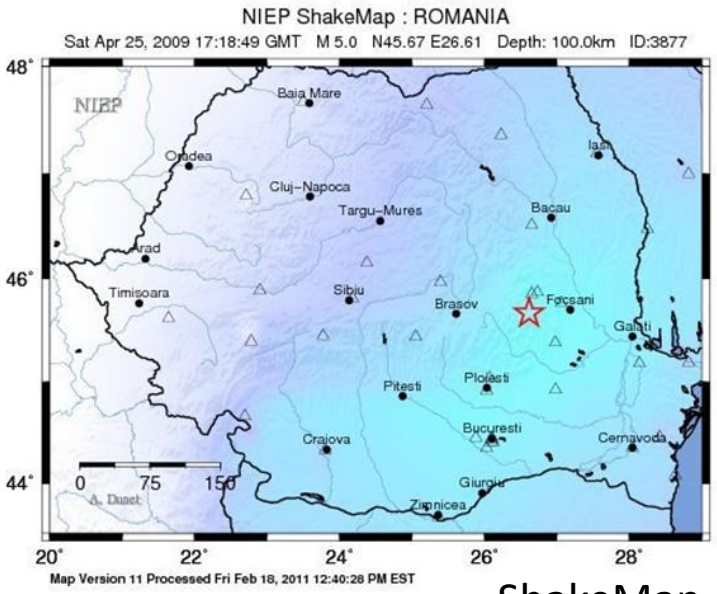
Center on event | Local seismicity | Macroseismic intensities | Seismic faults

Map | Satellite | Terrain

Center on event | Local seismicity | Macroseismic intensities | Seismic faults

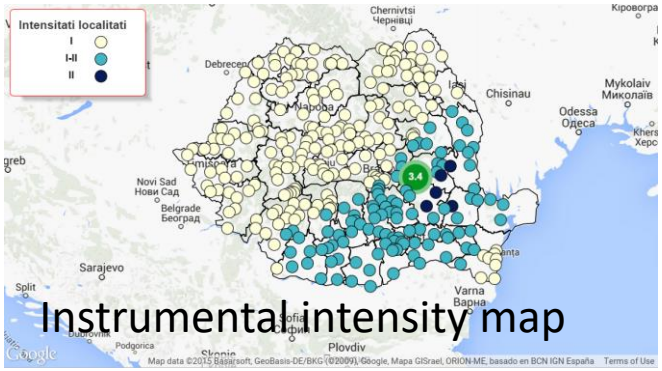
Map | Satellite | Terrain

Earthquake parameters



ShakeMap

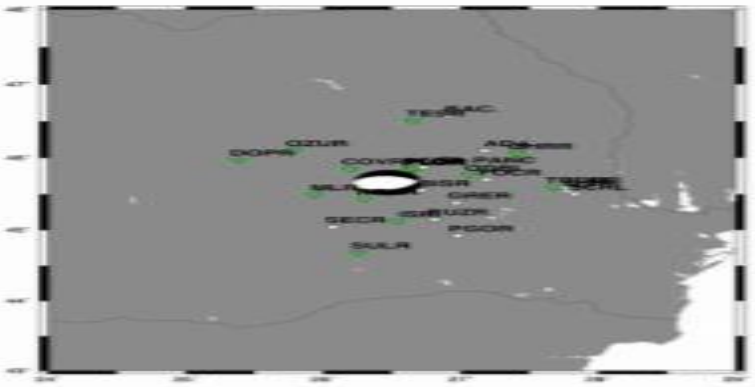
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
INSTRUMENTAL INTENSITY	I	II–III	IV	V	VI	VII	VIII	IX	X+

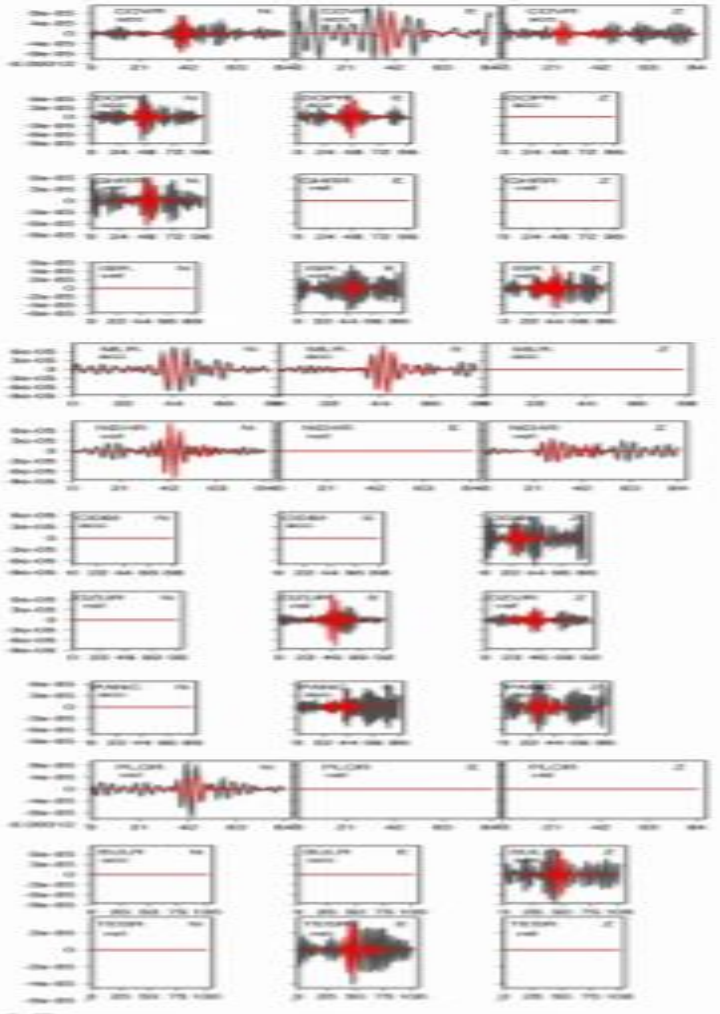


Instrumental intensity map

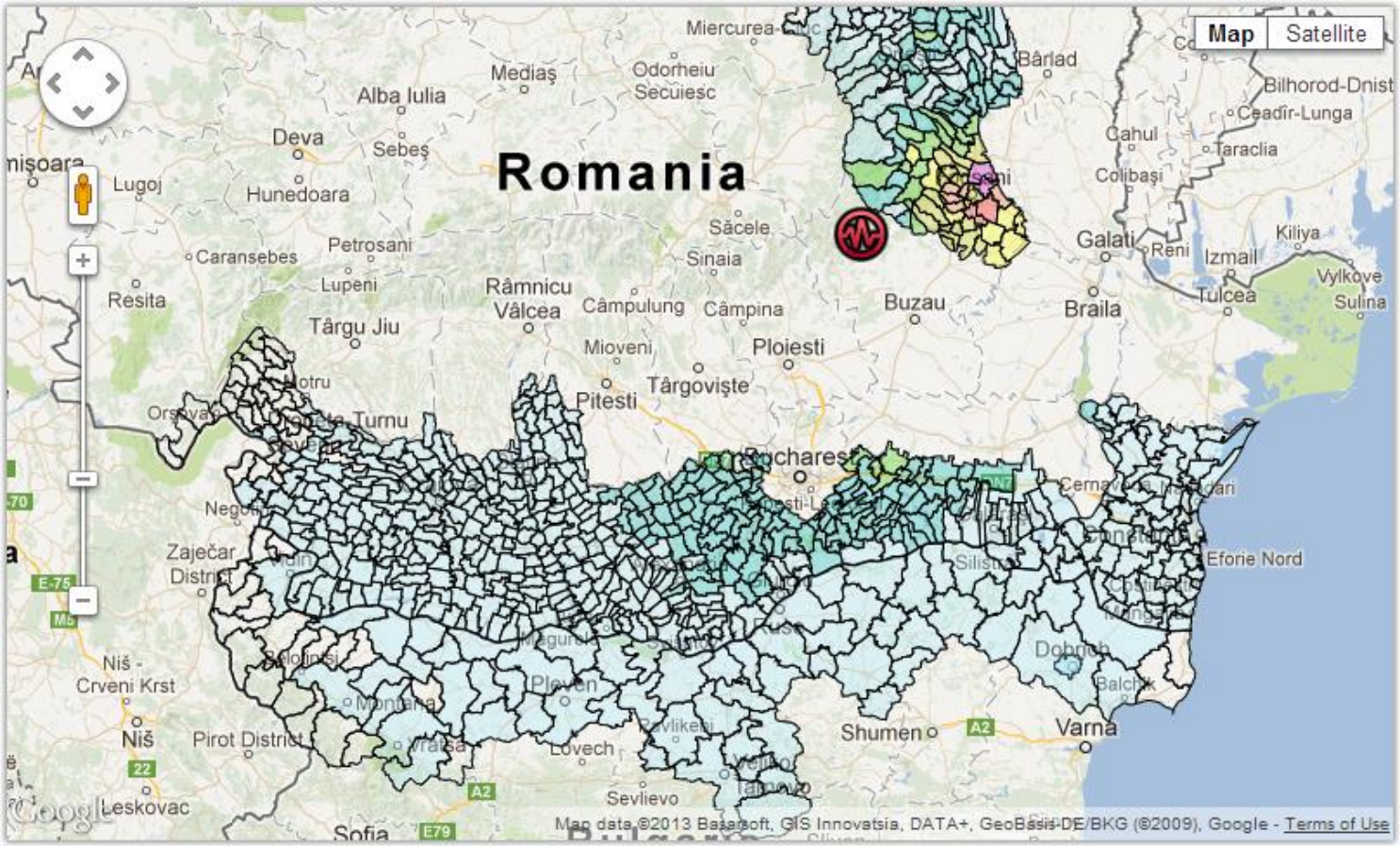
Moment Tensor

NIEP, EIDA NODE -PRODUCTS



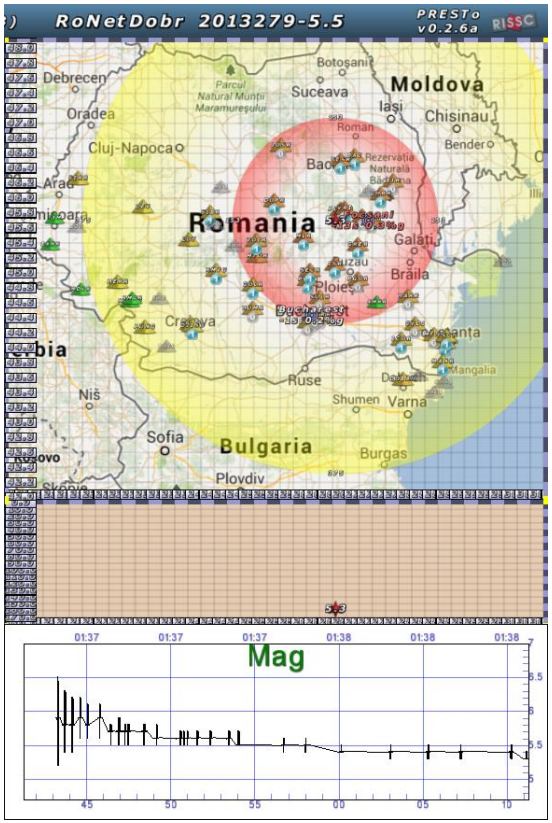


NIEP, EIDA NODE-PRODUCTS



Dynamic Map estimates of vulnerability of buildings for a similar scenario of 30 August 1986 (Mw=7.1) earthquake

NIEP EWS PRODUCT



Nuclear Research Institute, Bucharest

Nuclear source used for sterilization is automatically secured during an EEW alert

Pasajul Basarab Bridge, Bucharest

During an EEW alert, traffic light stops cars entering bridge

Vidraru Dam, Romania

Alert use to trigger data collection

Other End Users:

Nuclear Power Plants in Romania and Bulgaria

Emergency response institutions in Romania and Bulgaria

Governmental agencies involved in rapid intervention in case of a strong earthquake

Development in progress:

In progress installations of ~1000 receivers to stop gas flow in Bucharest buildings.

Until now 27 alerts were sent to authorities !!!!

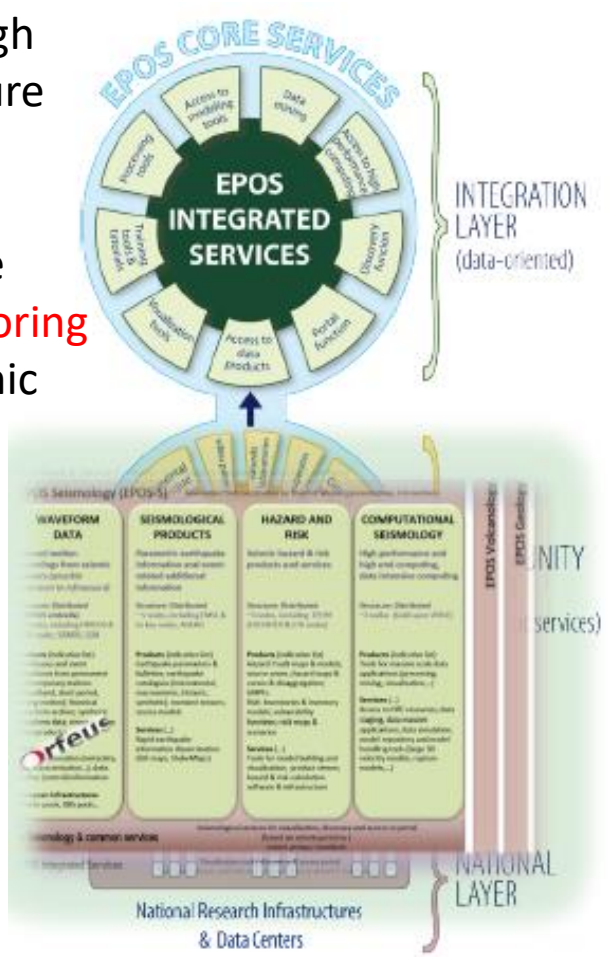
FUTURE - EIDA to EPOS

The European Plate Observing System (EPOS) is the ESFRI initiative of the Solid Earth sciences:

- **long-term plan to facilitate integrated use of data, models and facilities from pre-existing and newly established research infrastructures for solid Earth science;**
- **represents a scientific vision and approach to enable innovative multidisciplinary research towards a better understanding of the physical processes controlling earthquakes, volcanic eruptions and unrest episodes, tsunamis, as well as those driving tectonics and Earth surface dynamics.**

NIEP vs EIDA to EPOS (EUROPEAN PLATE OBSERVING SYSTEM)

The EPOS is a research infrastructure for the monitoring and observation of geophysical and seismic phenomena. Through the observation points and the development of infrastructure points, the processes in the fields of geology, geochemistry, seismology , space data laboratory and volcanology will be monitored. The project will create a unified and sustainable infrastructure which will include surface geophysical monitoring networks, local observations (permanent terrain and volcanic observatories) and experimental laboratories in Europe



The NIEP EIDA node will be integrated into Thematic Core Services (EPOS-S) where NIEP is a partner.

SEISMIC CONTROL ROOM

THANK YOU!