Orfeus

Observatories and Research Facilities for European Seismology

EIDA European Integrated Data Archive

Recent developments in seismological networks and data management in Europe

The ORFEUS community

Presented by Angelo Strollo*

Prague

June 26. 2014

*Currently EIDA Management Board Chair and part of the interim ORFEUS Secretariat.

Outline

- EPOS and EPOS-Seismology
- ORFEUS
- EIDA => EIDA-NG
- RRSM and ESM
- DOIs for Seismic networks
- ORFEUS networking and outreach

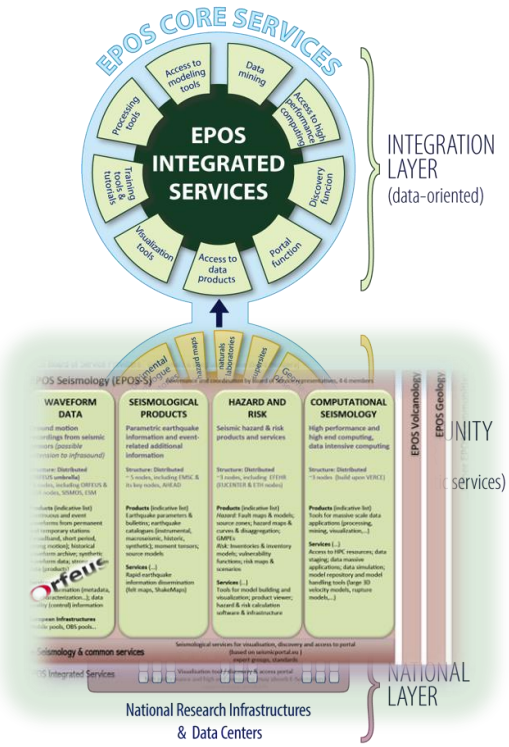
EPOS

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.**

EPOS-Seismology

Seismology provides Thematic Core Services (TCS) to EPOS. The multidisciplinary integration and interoperability will be ensured by the Integrated Core Services (ICS).



EPOS Integrated Core Services provide simplified access to multidisciplinary data and data-derived products, combine data with modeling results (simulations), processing and visualization tools

Thematic Core Services community-driven infrastructures provide discipline-specific data services, these will build on pre-existing international collaboration/organizations (e.g. **ORFEUS**).

The various communities organize their services. Seismology (**EPOS-S**) will provide and extend waveform data offerings through **ORFEUS/EIDA**.

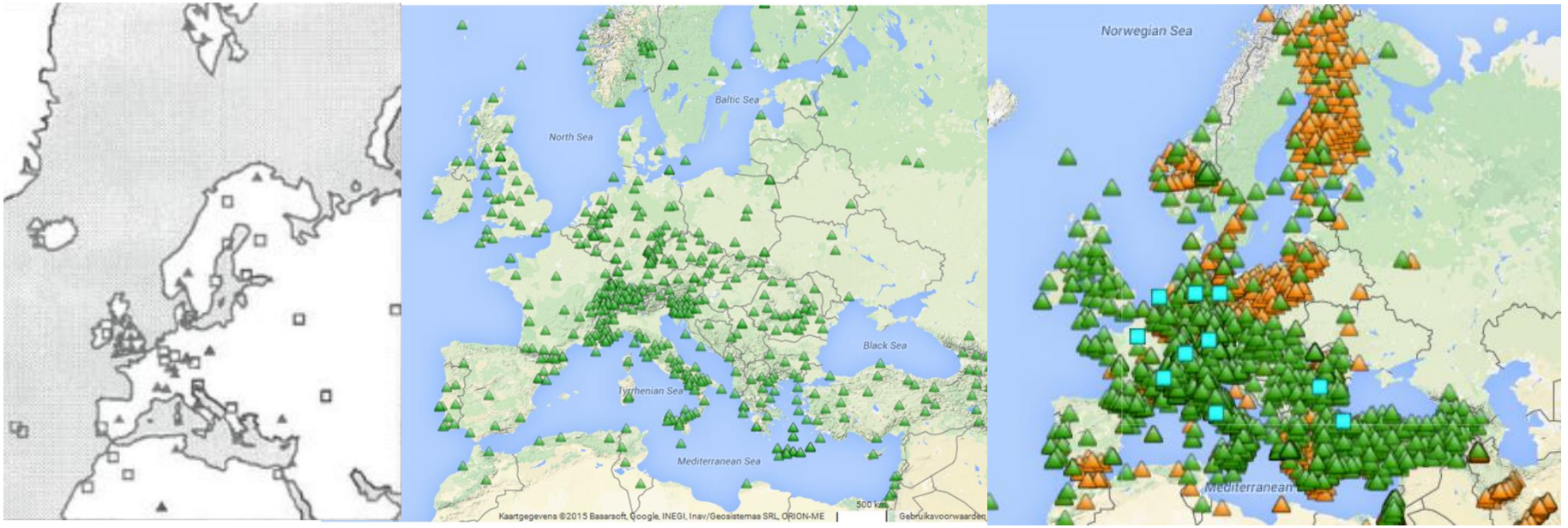
National Research Infrastructures and facilities provide services at national level and send data to the European thematic data infrastructures.

ORFEUS

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)
- 2015: ORFEUS-EIDA (10 nodes)

1987 - 30 **2013 - 613** **2015 ~2000**



Year - Number of open and operational stations

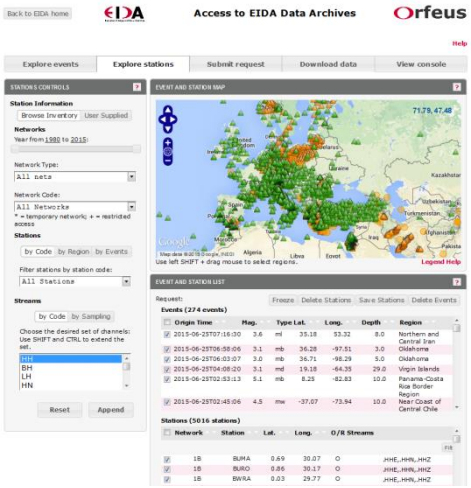
ORFEUS data infrastructure, services and products

EIDA => EIDA-Next Generation

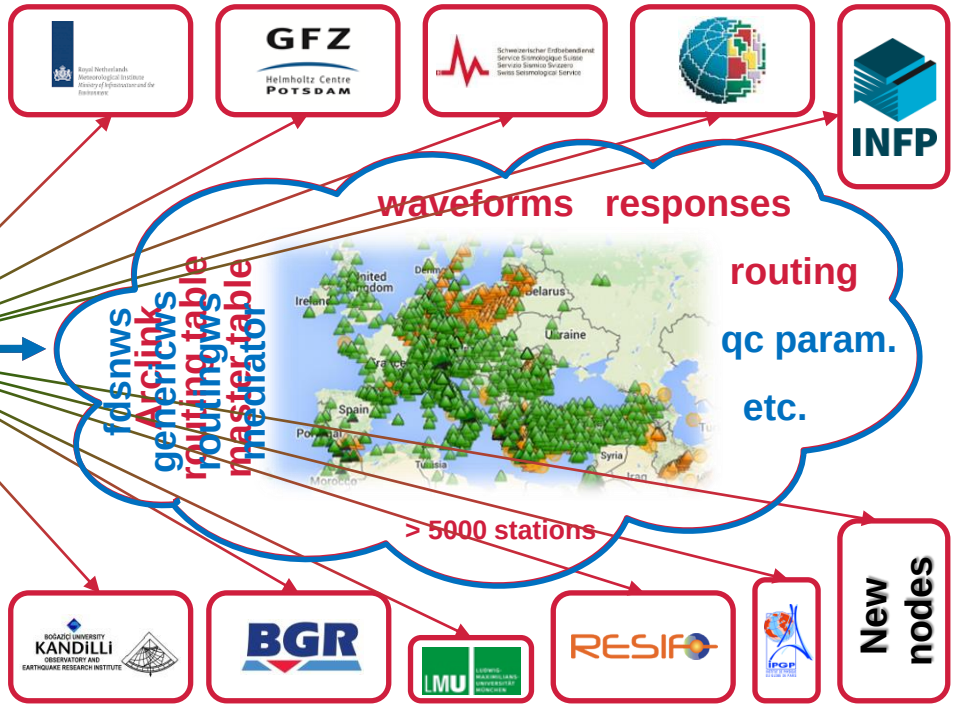
More than just data and federated archive

- **Coordination of data holdings and software/strategic developments**
- **Provides quality control of data/metadata**
- **Helps define seismological center 'best practice' for ORFEUS community**

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



Users:
Geoscientists
Etc…



ORFEUS data infrastructure, services and products

NERA key products: Station Inventory, RRSM and ESM

NERA

Station inventory: up-to-date station information ("Station Book") for strong motion and broad-band stations operational in Europe (station metadata, site characterization). www.orfeus-eu.org/stationbook

Rapid Raw Strong Motion database (RRSM): a high-quality, automatically and rapidly filled database build on state-of-the-art data collection and processing software to provide near real-time (web) access to open (unrestricted) strong motion data after a significant earthquake in Europe.
http://www.orfeus-eu.org/rrsm

Engineering Strong Motion database (ESM): a single, high quality database with historical and present time strong motion waveforms and carefully reviewed metadata, dynamically updated with manually processed data when significant new events occur. http://www.orfeus-eu.org/esm

ORFEUS data infrastructure, services and products

NERA key products: Station Inventory, RRSM and ESM

NERA

RRSM Rapid Response SM

Collection of accelerometric data from EIDA immediately after an earthquake

- Magnitude threshold: 3.5
- since **2005**
- wfs are processed automatically (software **scwfparam module of SeisComP3**)
- Station and event metadata are not revised
- Input for SHAKEMAPS provided

At 2015-06-15:

- **3700** events
- **>50000** waveforms,
- only digital instruments
- raw wf, DS and PSA (5%-dam.) comp. up to 10s
- PGA and PGV, SA @ 0.1s 0.3s and 1s

ESM Engineering SM

Collection of accelerometric data from EIDA and/or offline data

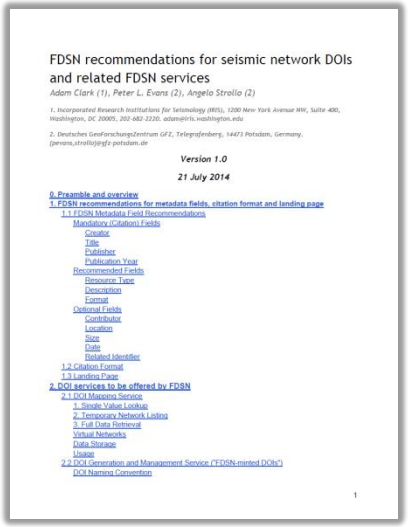
- Magnitude threshold: 4
- since **1969**
- wfs are processed manually (Paolucci et al. 2011)
- Station and event metadata are periodically revised

At 2015-06-15:

- **2345** events
- **2500** stations
- **14800** waveforms including records from analog instruments
- Unpr. acc, vel, DS and PSA (5% damping) PGA, PGV, PGD

Digital Object Identifiers for seismic networks

"… to ensure that permanent seismic networks and individual experiments undertaken by small groups or individuals are reliably identified in citations by researchers or monitoring networks that make use of their data …"



FDSN recommendations for seismic network DOIs and related FDSN services

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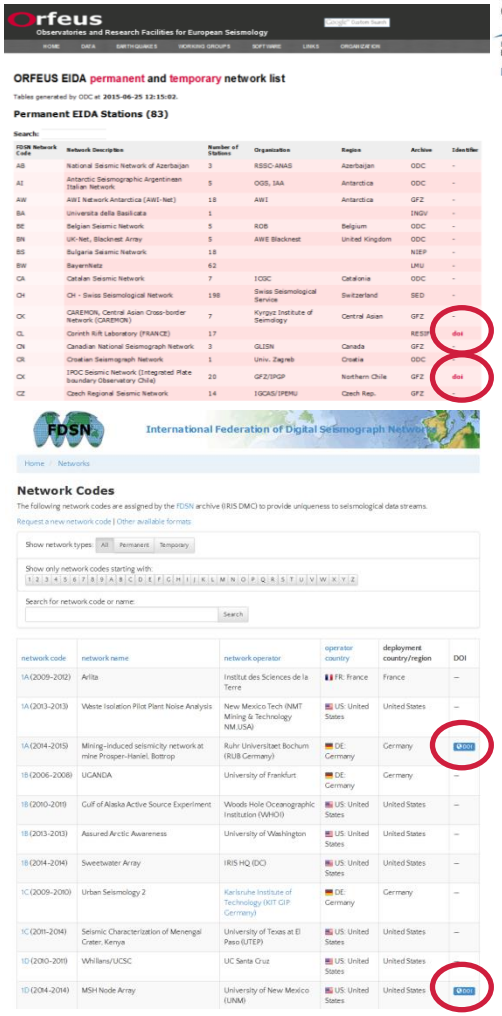
Version 1.0

21 July 2014

1



orfeus
Observatories and Research Facilities for European Seismology

ORFEUS EIDA permanent and temporary network list

Tables generated by ODC at 2015-06-25 12:15:02.

Permanent EIDA Stations (83)

Search:

FDSN Network Code	Network Description	Number of Stations	Organization	Region	Archive	Identifier
AB	National Seismic Network of Azerbaijan	3	RSSC-ANAS	Azerbaijan	ODC	-
AI	Antarctic Seismographic Argentinean Italian Network	5	OGS, IAA	Antarctica	ODC	-
AW	AWI Network Antarctica (AWI-Net)	18	AWI	Antarctica	GFZ	-
BA	Universita della Basilicata	1			INGV	-
BE	Belgian Seismic Network	5	ROB	Belgium	ODC	-
BN	UK-Net, Blacknet Array	5	AWE Blacknest	United Kingdom	ODC	-
BS	Bulgaria Seismic Network	18			NIEP	-
BW	BayernNetz	62			LMU	-
CA	Catalan Seismic Network	7	ICGC	Catalonia	ODC	-
CH	CH - Swiss Seismological Network	198	Swiss Seismological Service	Switzerland	SED	-
CK	CAREMON, Central Asian Cross-border Network (CAREMON)	7	Kyrgyz Institute of Seimology	Central Asian	GFZ	-
CL	Corinth Rift Laboratory (FRANCE)	17			RESIF	doi
CN	Canadian National Seismograph Network	3	GLISN	Canada	GFZ	-
CR	Croatian Seismograph Network	1	Univ. Zagreb	Croatia	ODC	-
CX	IPOC Seismic Network (Integrated Plate boundary Observatory Chile)	20	GFZ/IPGP	Northern Chile	GFZ	doi
CZ	Czech Regional Seismic Network	14	IGCAS/IPEMU	Czech Rep.	GFZ	-

FDSN International Federation of Digital Seismograph Networks

Home / Networks

Network Codes

The following network codes are assigned by the FDSN archive (IRIS DMC) to provide uniqueness to seismological data streams.

Request a new network code | Other available formats:

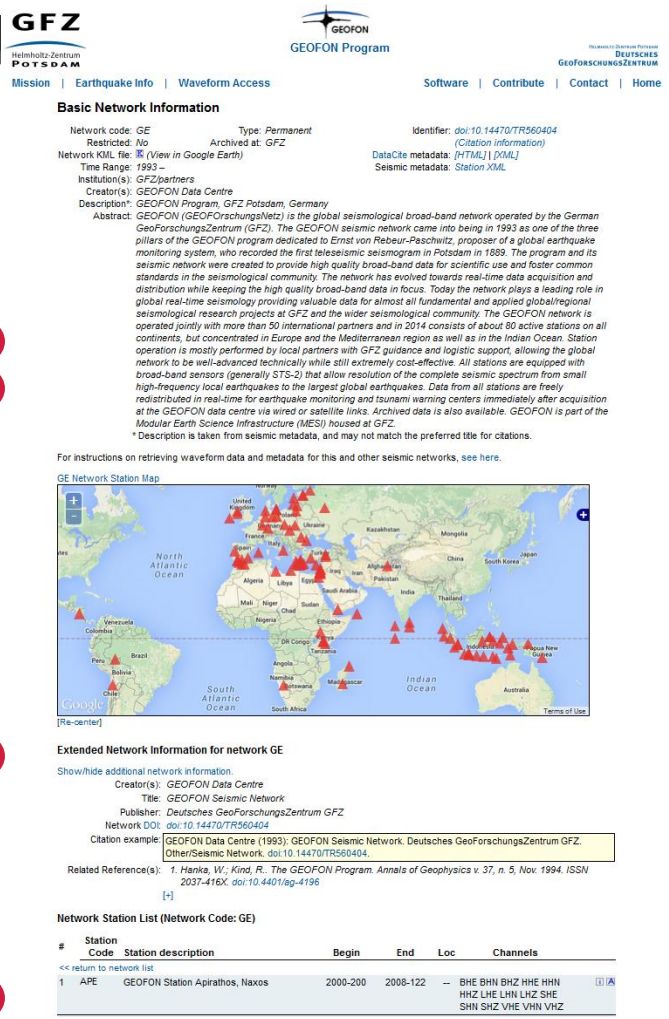
Show network types: All | Permanent | Temporary

Show only network codes starting with:

1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Search for network code or name: Search

network code	network name	network operator	operator country	deployment country/region	DOI
1A (2009-2012)	Arlita	Institut des Sciences de la Terre	FR: France	France	–
1A (2013-2013)	Waste Isolation Pilot Plant Noise Analysis	New Mexico Tech (NMT Mining & Technology NM (USA)	US: United States	United States	–
1A (2014-2015)	Mining-induced seismicity network at mine Prosper-Haniel, Bottrop	Ruhr Universitaet Bochum (RUB Germany)	DE: Germany	Germany	DOI
1B (2006-2008)	UGANDA	University of Frankfurt	DE: Germany	Germany	–
1B (2010-2011)	Gulf of Alaska Active Source Experiment	Woods Hole Oceanographic Institution (WHOI)	US: United States	United States	–
1B (2013-2013)	Assured Arctic Awareness	University of Washington	US: United States	United States	–
1B (2014-2014)	Sweetwater Array	IRIS HQ (DC)	US: United States	United States	–
1C (2009-2010)	Urban Seismology 2	Karlsruhe Institute of Technology (KIT GIP, Germany)	DE: Germany	Germany	–
1C (2011-2014)	Seismic Characterization of Menengai Crater, Kenya	University of Texas at El Paso (UTEP)	US: United States	United States	–
1D (2010-2011)	Whillans/UCSC	UC Santa Cruz	US: United States	United States	–
1D (2014-2014)	MSH Node Array	University of New Mexico (UNM)	US: United States	United States	DOI



GFZ Helmholtz-Zentrum Potsdam
GEOFON Program
Deutsches GeoForschungsZentrum

Mission | Earthquake Info | Waveform Access | Software | Contribute | Contact | Home

Basic Network Information

Network code: *GE*
Restricted: *No*
Network KML file: *[View in Google Earth]*
Time Range: *1993 –*
Institution(s): *GFZ/partners*
Creator(s): *GEOFON Data Centre*
Description*: *GEOFON Program, GFZ Potsdam, Germany*
Type: *Permanent*
Archived at: *GFZ*
Identifier: *doi:10.14470/TR560404 (Citation information)*
DataCite metadata: *[HTML] | [XML]*
Seismic metadata: *Station XML*

Abstract: *GEOFON (GEOFOrschungsNetz) is the global seismological broad-band network operated by the German GeoForschungsZentrum (GFZ). The GEOFON seismic network came into being in 1993 as one of the three pillars of the GEOFON program dedicated to Ernst von Rebeur-Paschwitz, proposer of a global earthquake monitoring system, who recorded the first teleseismic seismogram in Potsdam in 1889. The program and its seismic network were created to provide high quality broad-band data for scientific use and foster common standards in the seismological community. The network has evolved towards real-time data acquisition and distribution while keeping the high quality broad-band data in focus. Today the network plays a leading role in global real-time seismology providing valuable data for almost all fundamental and applied global/regional seismological research projects at GFZ and the wider seismological community. The GEOFON network is operated jointly with more than 50 international partners and in 2014 consists of about 80 active stations on all continents, but concentrated in Europe and the Mediterranean region as well as in the Indian Ocean. Station operation is mostly performed by local partners with GFZ guidance and logistic support, allowing the global network to be well-advanced technically while still extremely cost-effective. All stations are equipped with broad-band sensors (generally STS-2) that allow resolution of the complete seismic spectrum from small high-frequency local earthquakes to the largest global earthquakes. Data from all stations are freely redistributed in real-time for earthquake monitoring and tsunami warning centers immediately after acquisition at the GEOFON data centre via wired or satellite links. Archived data is also available. GEOFON is part of the Modular Earth Science Infrastructure (MESI) housed at GFZ.*

* Description is taken from seismic metadata, and may not match the preferred title for citations.

For instructions on retrieving waveform data and metadata for this and other seismic networks, see here.

GE Network Station Map

[Re-center]

Extended Network Information for network GE

Show/hide additional network information.

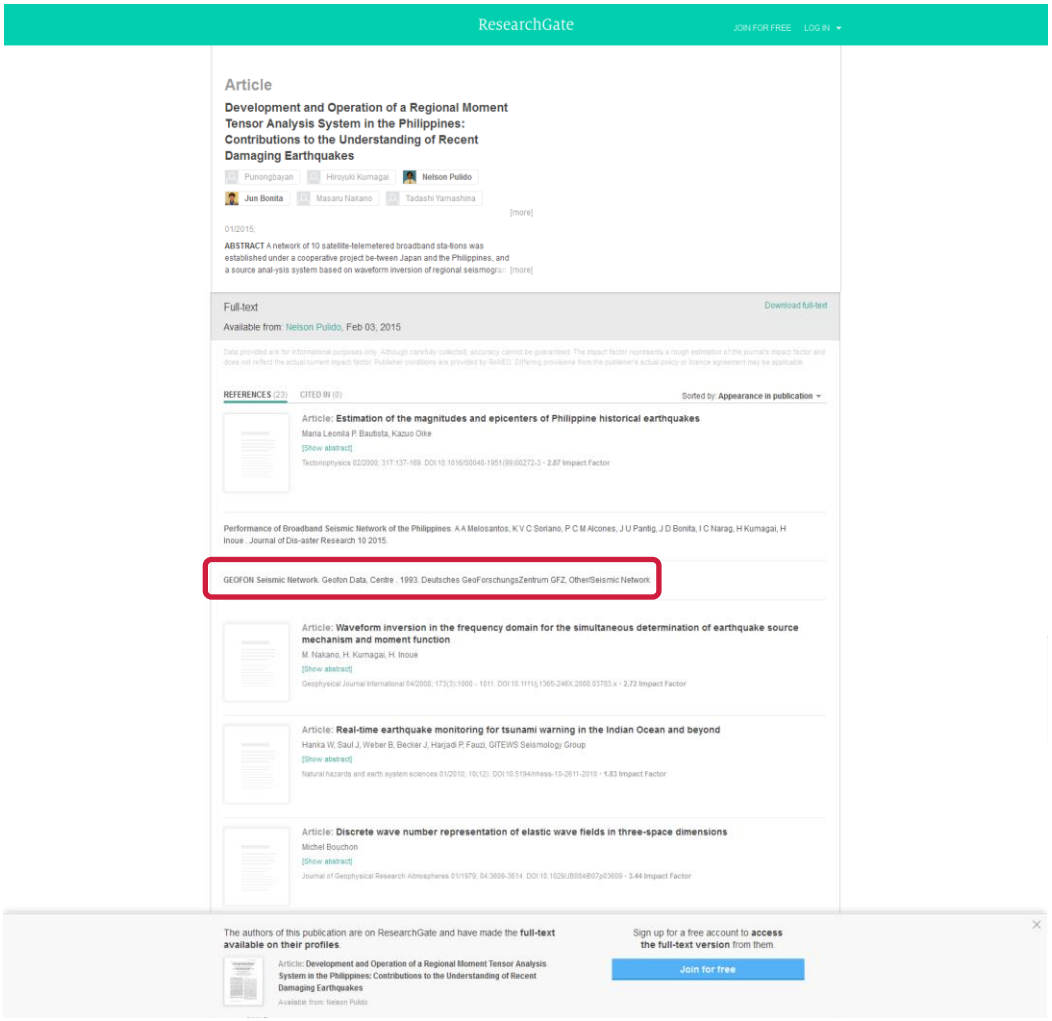
Creator(s): *GEOFON Data Centre*
Title: *GEOFON Seismic Network*
Publisher: *Deutsches GeoForschungsZentrum GFZ*
Network DOI: *doi:10.14470/TR560404*
Citation example: GEOFON Data Centre (1993): GEOFON Seismic Network. Deutsches GeoForschungsZentrum GFZ. Other/Seismic Network. doi.10.14470/TR560404.
Related Reference(s): *1. Hanka, W.; Kind, R.. The GEOFON Program. Annals of Geophysics v. 37, n. 5, Nov. 1994. ISSN 2037-416X. doi:10.4401/ag-4196*
[+]

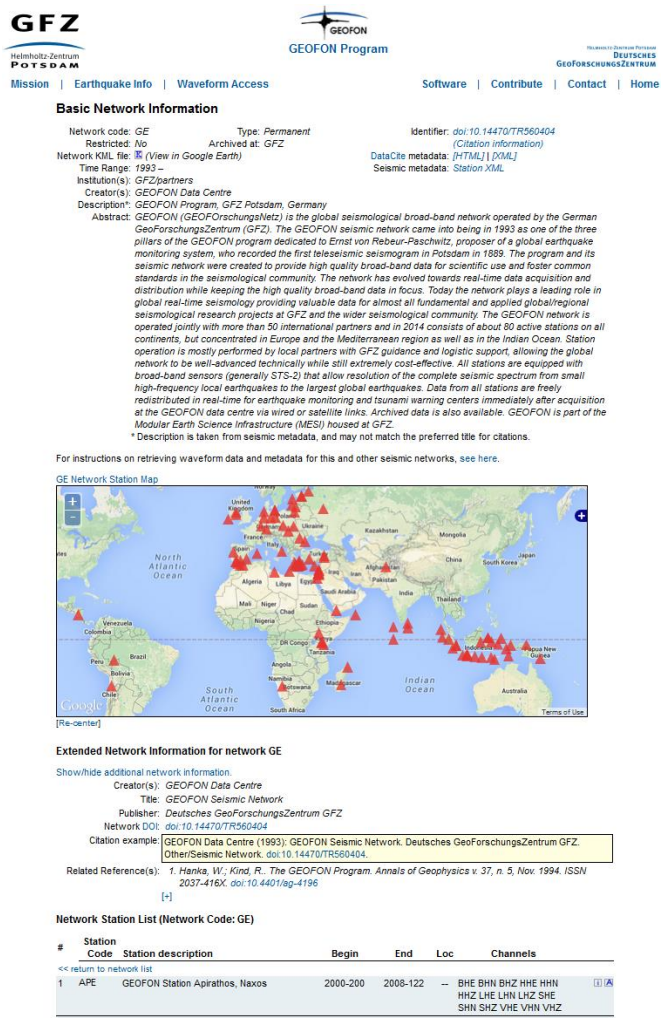
Network Station List (Network Code: GE)

#	Station Code	Station description	Begin	End	Loc	Channels
<< return to network list						
1	APE	GEOFON Station Apirathos, Naxos	2000-200	2008-122	--	BHE BHN BHZ HHE HHN HHZ LHE LHN LHZ SHE SHN SHZ VHE VHN VHZ

http://www.fdsn.org/services/doi/

Digital Object Identifiers for seismic networks





2015 ORFEUS Observatory Meeting

21-24 September, Bucharest, Romania

http://orfeus.infp.ro/

The meeting will focus on the following topics:

- **(Meta)data management and EIDA**
- **Quality assurance**
- **Attribution and data policies**
- **Strong motion community workshop on site characterization**
- **Joint SeisComP3 and ObsPy communities workshop**

Thanks for your attention!

Additional information at:
http://www.orfeus-eu.org/index.html

To join ORFEUS contact
orfeus_secretary@knmi.nl

Torild van Eck

5 Dec 1949 - 30 Nov 2014