

ORFEUS Data Center Operations

Quanterra & Antelope Users Group Meeting, 21-23 March 2011, Bucarest

Reinoud Sleeman

Gert-Jan van den Hazel

Torild van Eck



ORFEUS Organizations and Research Facilities for European Seismology

The European non-profit foundation that aims at co-ordination and promoting digital, broadband (BB) seismology in the European-Mediterranean area.

Coordinating services (Europe)

- Working groups (station siting, technical support, mobile networks, software)
- Technical workshops (e.g. SCUG, meetings)
- European scale fund raising
- FDSN

Orfeus Data Center (ODC) main priorities:

- Data archive for European BB stations
- Services to the research community

Mission statement:

The mission of the ORFEUS Data Center (ODC) is to collect and archive high-quality seismic broadband waveform data from European-Mediterranean organizations and to provide open access to this data for monitoring and research purposes by the scientific community.

- The core activity of the ODC is to run an automatic, sustainable system to achieve this mission.
- The ODC can fulfill this mission only in strong cooperation with seismic observatories, seismic network operators and end users from the scientific community.
- Statement of Operation

ORFEUS Data Center - operations structure

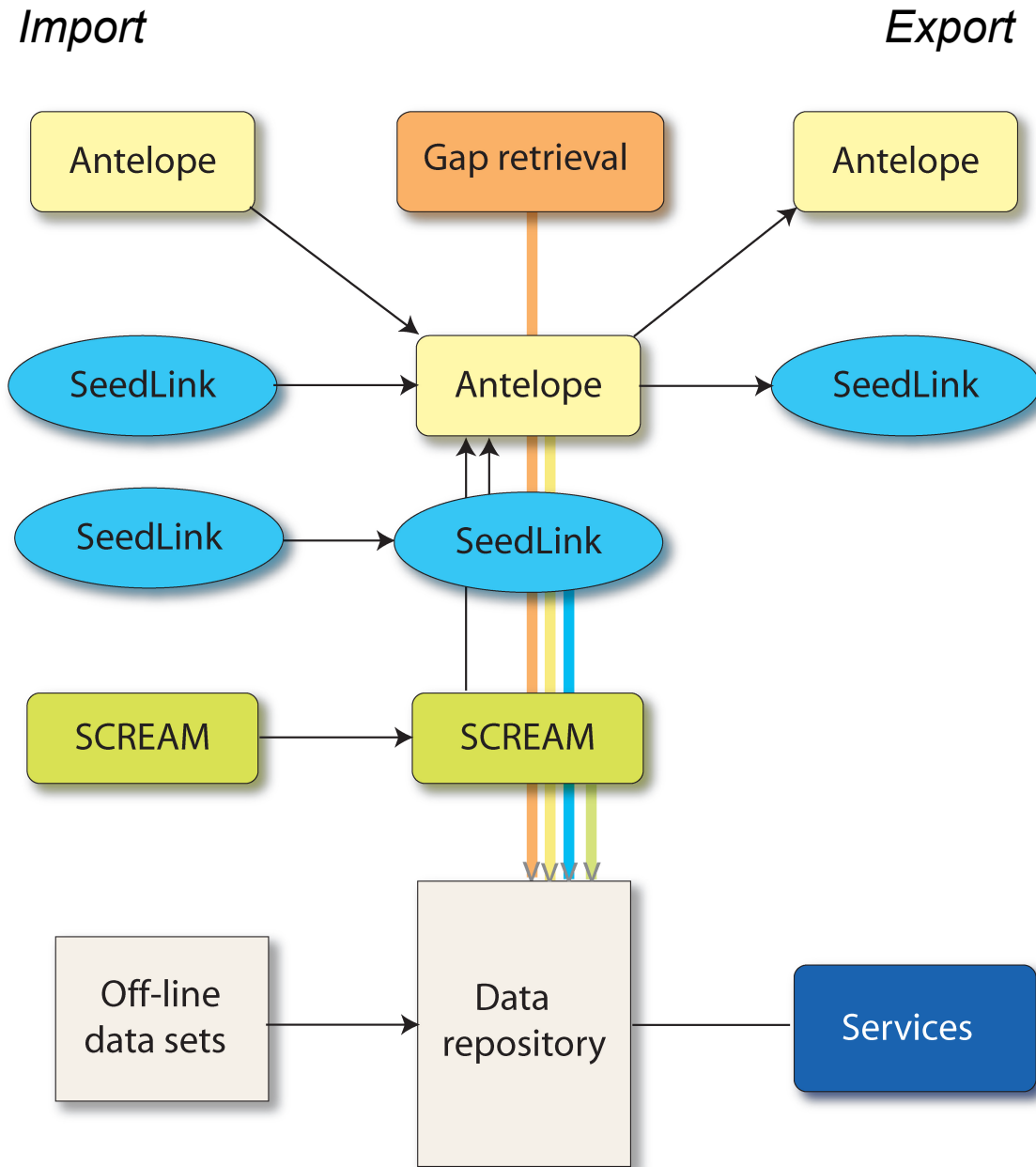
RT acquisition

- Antelope 4.11
- SC2.6 / SeedLink
- SCREAM

-
- Linux RH Enterprise 5.1
 - HP Blade 64-bit, 16 CPU

KNMI support: maintenance of hardware and storage systems

ORFEUS Data Center - data flow

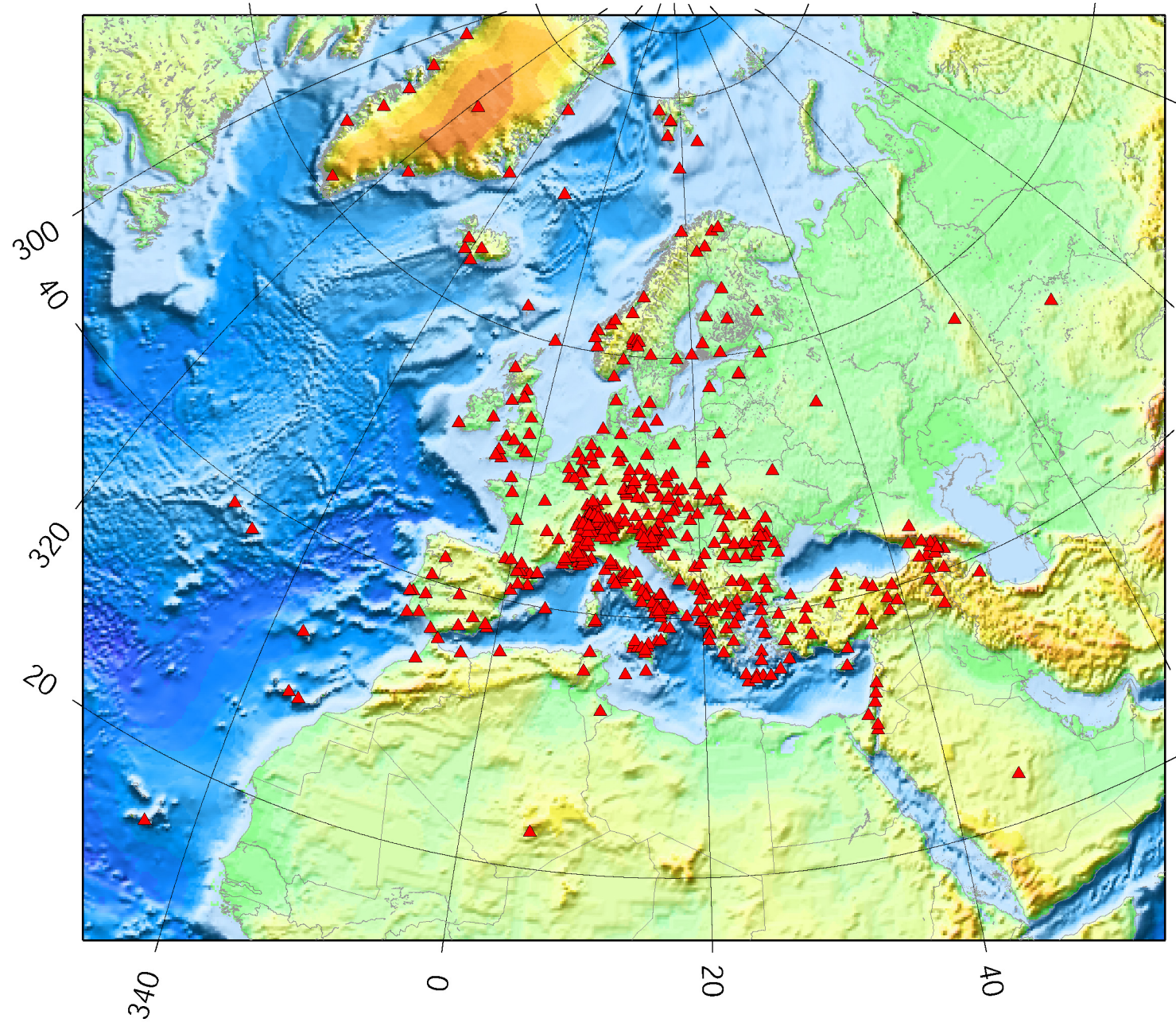


VEBSN – Virtual European Broadband Seismograph Network

AC	Albanian Seismological Network	HU	Hungarian Seismological Network
AI	Antarctic Seismographic Argentinean Italian Net	IG	Instituto Andaluz de Geofisica
BE	Belgian Seismic Network	II	IRIS/IDA Network
BN	UK-Net	IP	Instituto Superior Tecnico Broadband Seismic Net
BS	National Network of Bulgaria	IS	Israel National Seismic Network
BW	BayernNetz	IU	IRIS/USGS Network
CA	Catalan Seismic Network	IV	Italian National Seismic Network
CH	Switzerland Seismological Network	KO	Kandilli Observatory
CR	Croatian Seismograph Network	MN	MEDNET
CZ	Czech Seismic Network	NA	Netherlands Antilles Seismic Network
DK	Danish Seismological Network	NL	Netherlands Seismic Network
DZ	CRAAG, Algeria	NO	Norwegian Seismic Array Network
EB	Ebro Observatory, Spain	NR	NARS Array
EI	Irish Regional Digital Seismic Network	NS	Norwegian National Seismic Network
ES	Spanish Digital Seismic Network	OE	Austrian Seismic Network
FN	Northern Finland Seismological Network	PL	Polish Seismological Network
FR	French Broadband Seismological Network	PM	Portuguese National Seismograph Network
G	GEOSCOPE	RO	Romanian Seismic Network
GB	Great Britain Seismograph Network	SJ	Serbian National Network
GE	GEOFON	SK	Slovak National Seismic Network
GO	Georgia	SL	Slovenia Seismic Network
GR	German Regional Seismic Network	SX	Saxon network / Leipzig
GU	University of Genua, Italy	TT	Seismic Network of Tunisia, Inst. Nat. de la Meteorologie
HE	Finnish National Seismic Network (HEL)	TU	National Earthquake Observ. Netw., Ankara, Turkey
HF	Swedish Seismic Array Network	UP	University of Uppsala Network
HL	National Observatory of Athens Digital Broadband	VI	Icelandic National Digital Seismographic Network
HP	University of Patras		
HT	Aristotle University of Thessaloniki Seismology		

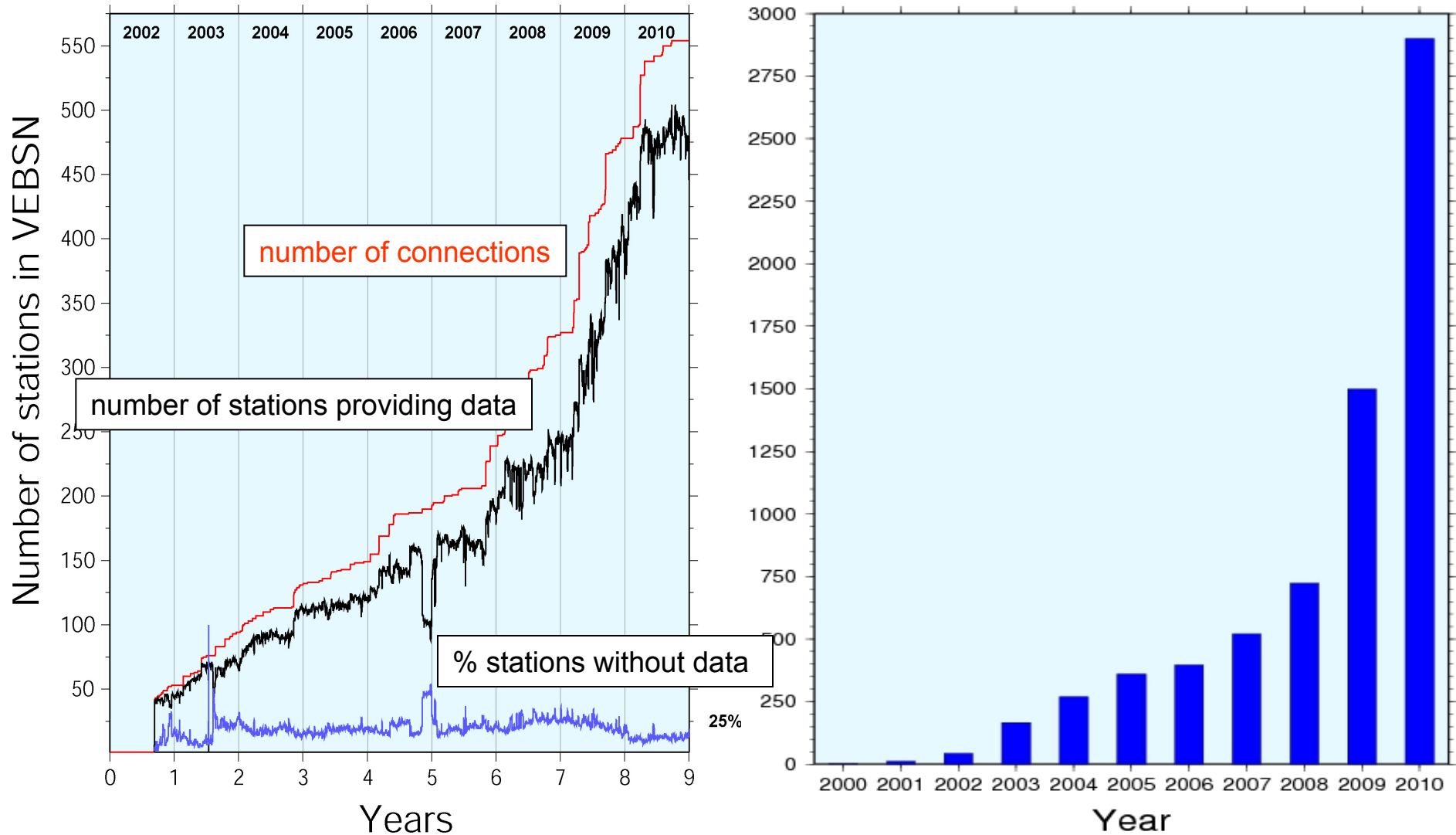
VEBSN contributing networks (54) - All stations are ISC registered and have a FDSN network code

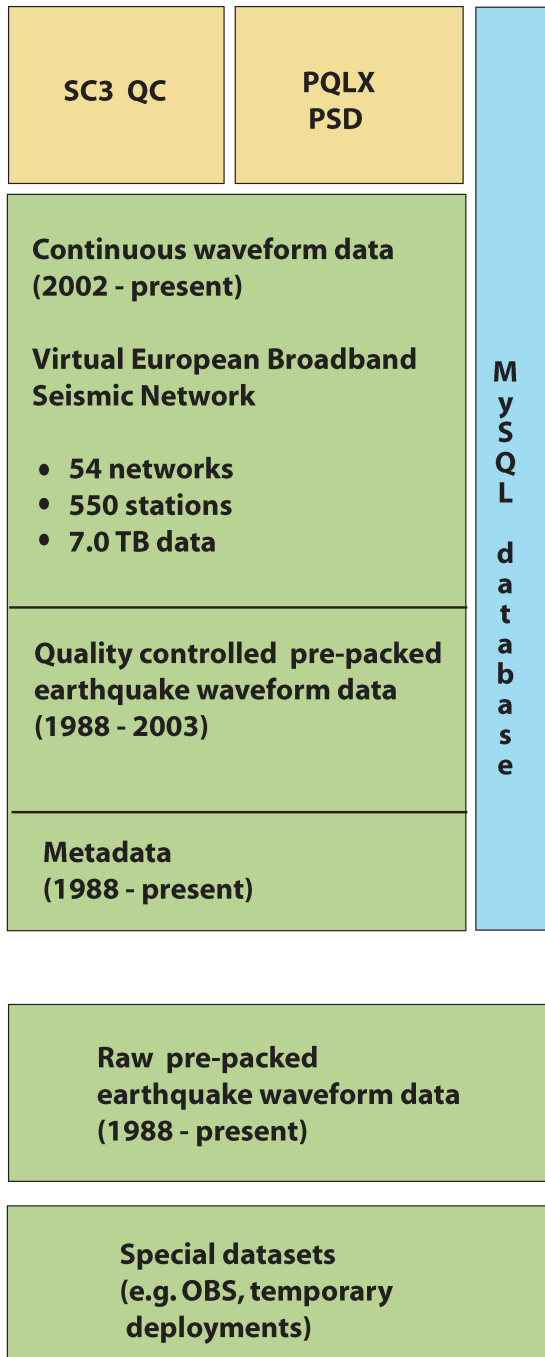
VEBSN 2002 - 2011



VEBSN – Virtual European Broadband Seismograph Network

data growth of 3.0 TB VEBSN in 2010; present 8 GB per day





ODC data holdings

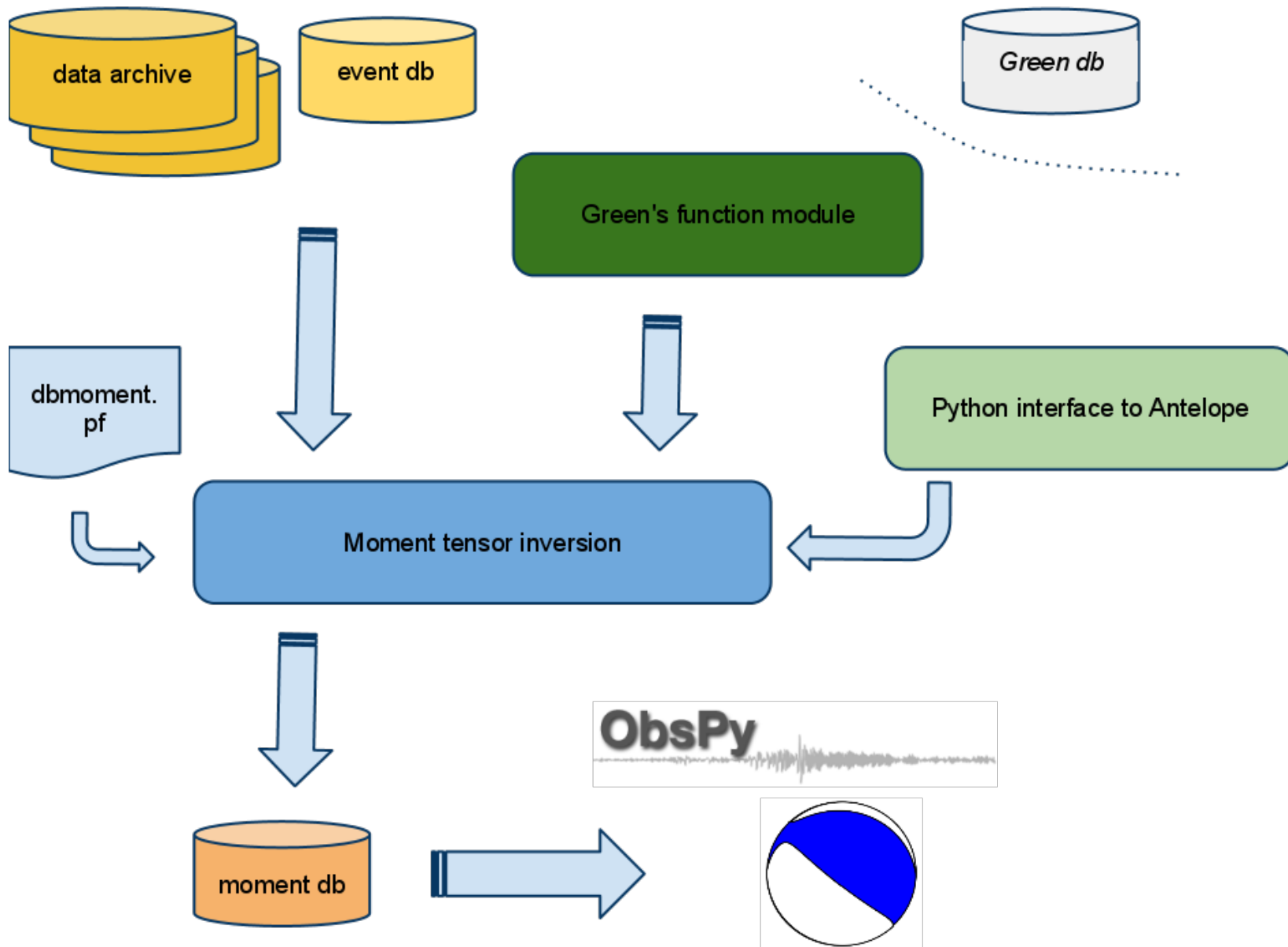
- continuous 7 TB
- event waveforms 0.5 TB
- special datasets 0.5 TB

- A new absolute arrival time data set for Europe (M.L. Amaru et al., 2008)
- OBS waveform data Ligurian Sea (Dec 2006 – Dec 2007), AWI, NERIES
- OBS waveform data Ionian Sea, INGV, NERIES (2008)
- Temporary stations Jordan, 1998 – 1999, LLNL
- Temporary deployments UJF, Grenoble

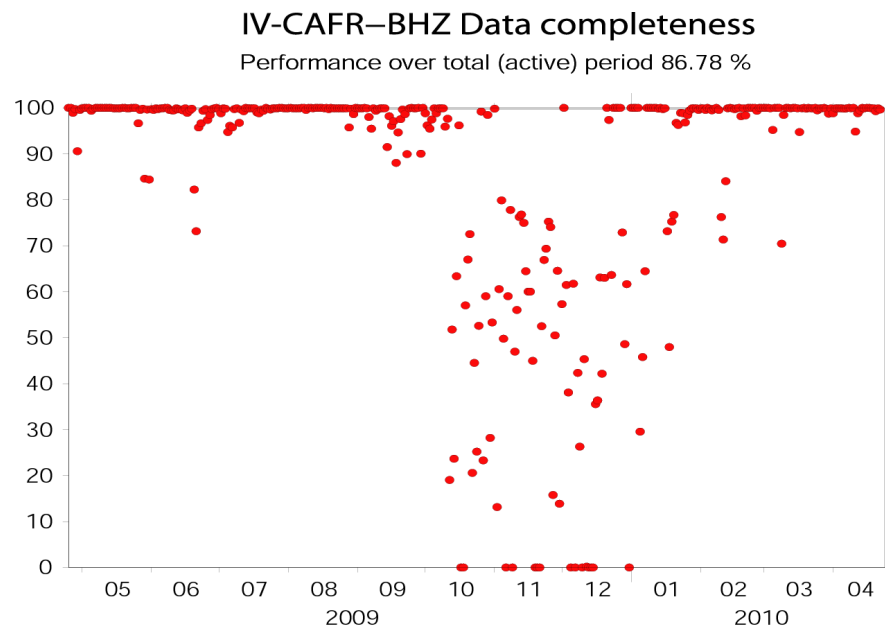
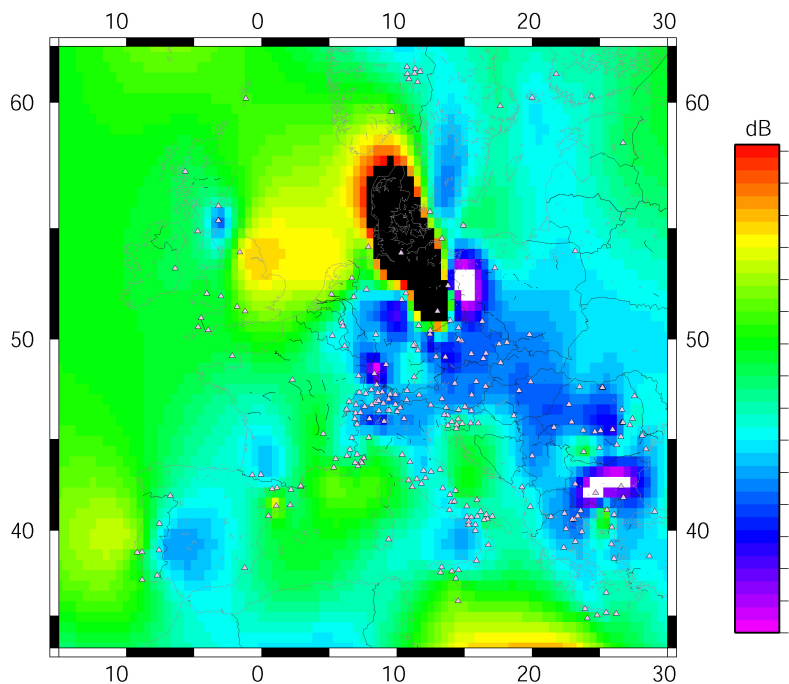
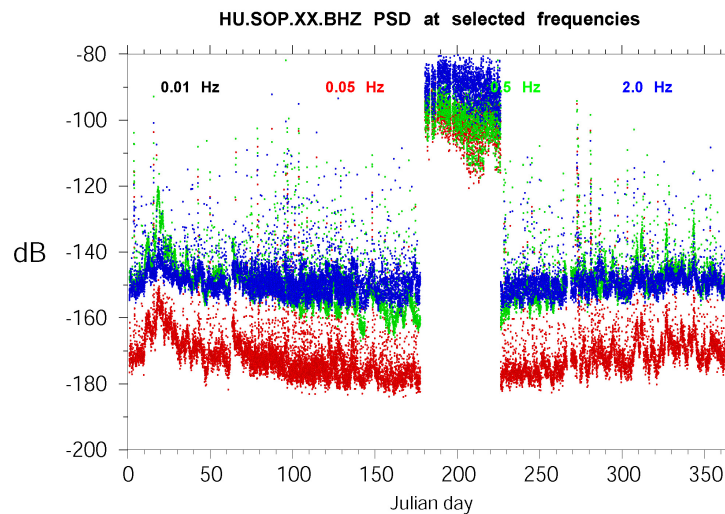
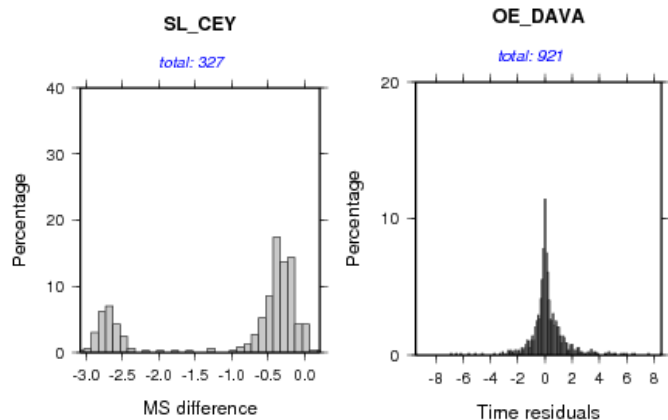
1999-2002	5 stations,	Horn of Africa
2001-2005	61 stations,	Zagros Lithospheric Transect (Iran)
2001-2005	11 stations,	Polynesian Lithosphere and Upper Mantle Exp.
2001-2005	53 stations,	Tibet/China
2003	26 stations,	Mongolia/Russia
2004	42 stations,	Tabriz, Iran
2004	9 stations,	Bam, Iran
- Continuous waveform data AI network (Antarctica)

ORFEUS Data Center – Quality Control Procedures

- Antelope: automatic phase picks and locations (Tres, Mb, MS ...)
- Antelope: data latency
- PSD vs time (2008 – present)
- PSD contour map (test)
- PQLX DB (2002 – present)
- data completeness (and gap management)
- SeisComp3 QC tool
- metadata verification and completeness
- manual (polarity check)
- Goran Ekstrom (orientation; initial test)
- cooperation ORFEUS / UCSD (Moment tensor inversion)

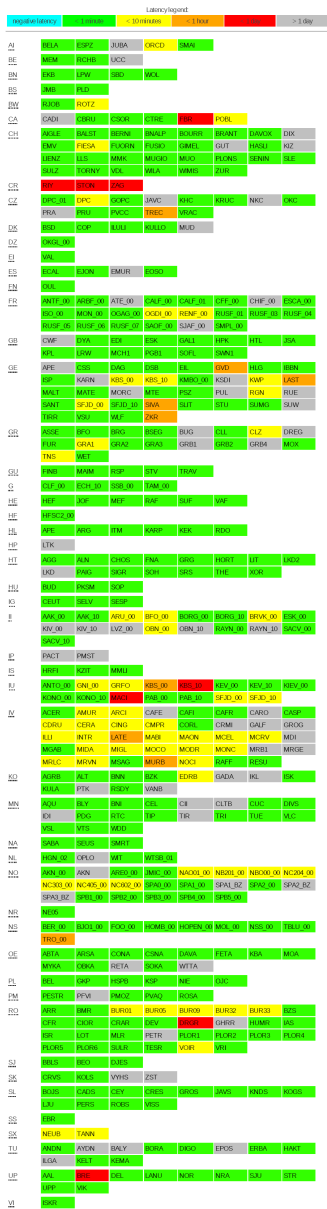


ORFEUS Data Center - QC and data completeness

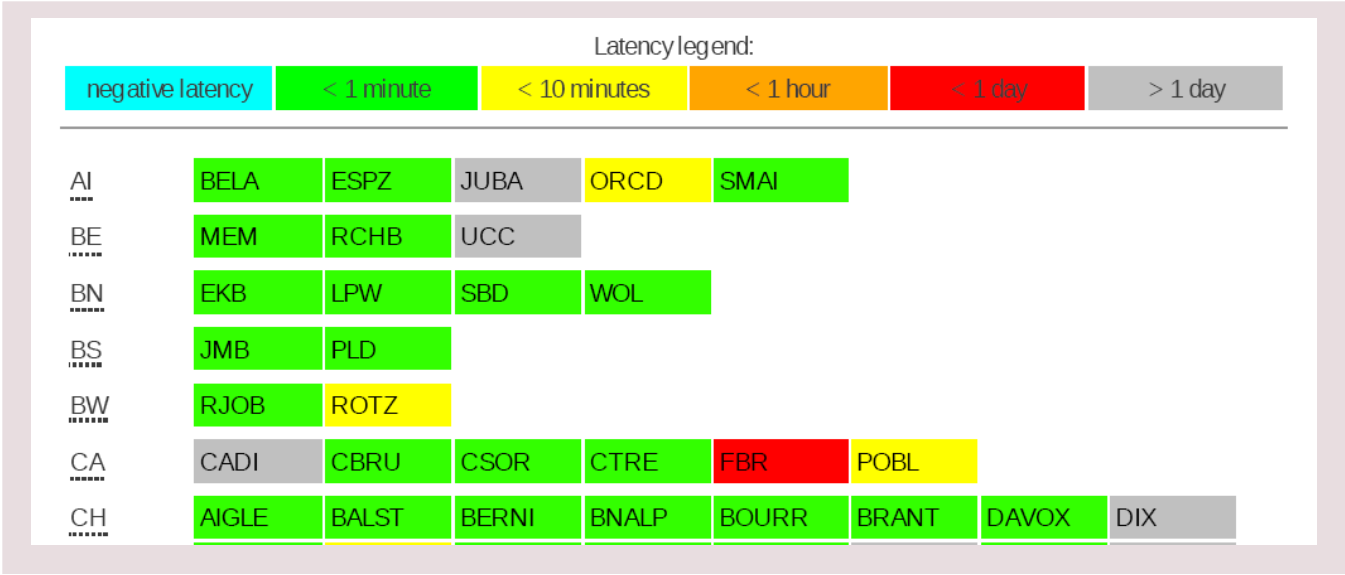


PSD contour map for 01-Jan-2010 @ 0.5 Hz rel. to m/s^2

The data stream latency by VEBSN station is given in seconds, sorted alphabetically per network. By clicking on a station name, detailed information on the latency is given, specified per channel.



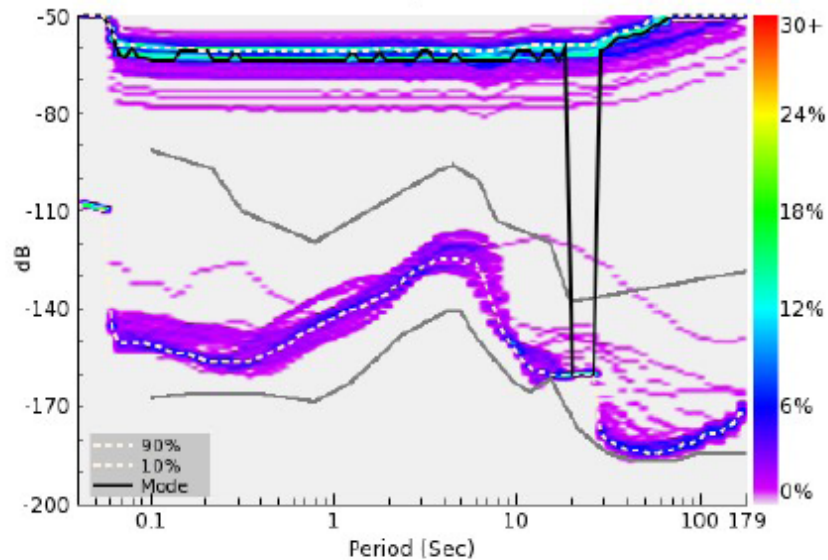
Vebsn – realtime status



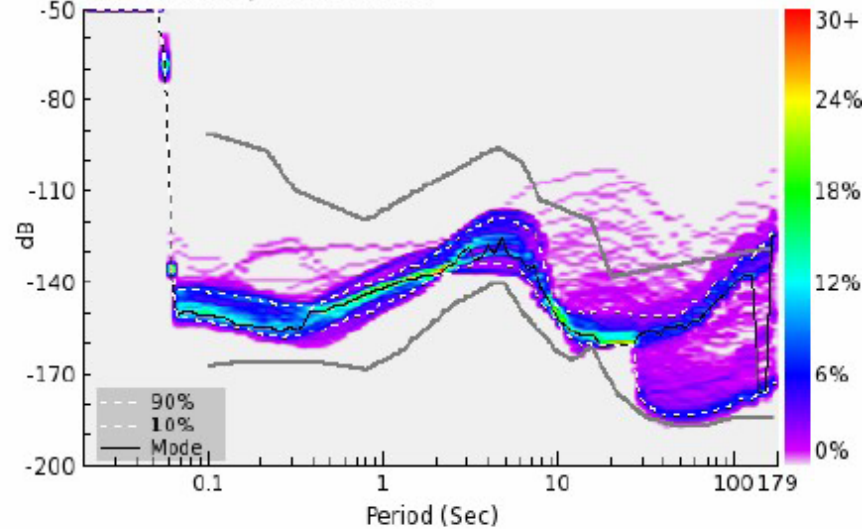
- Current status, up to channel level

Example at ODC

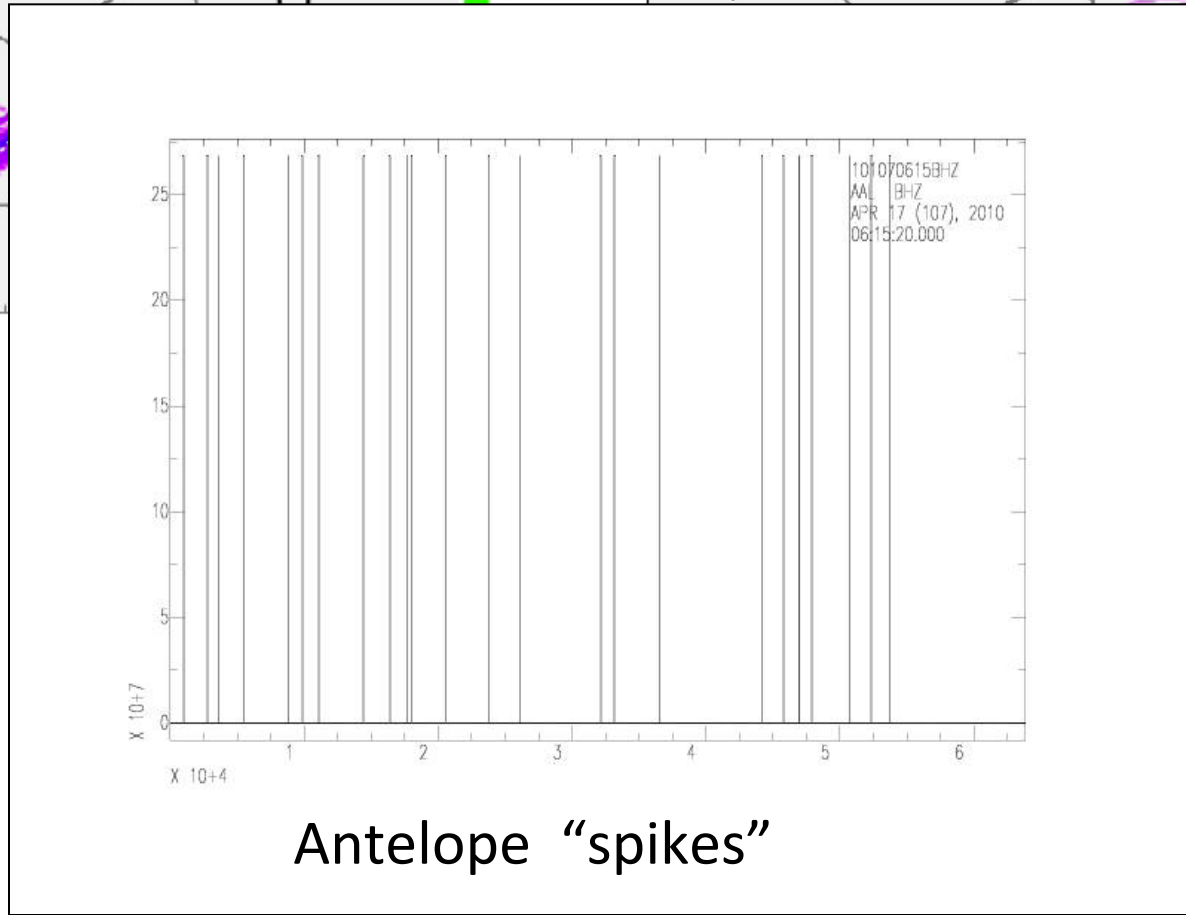
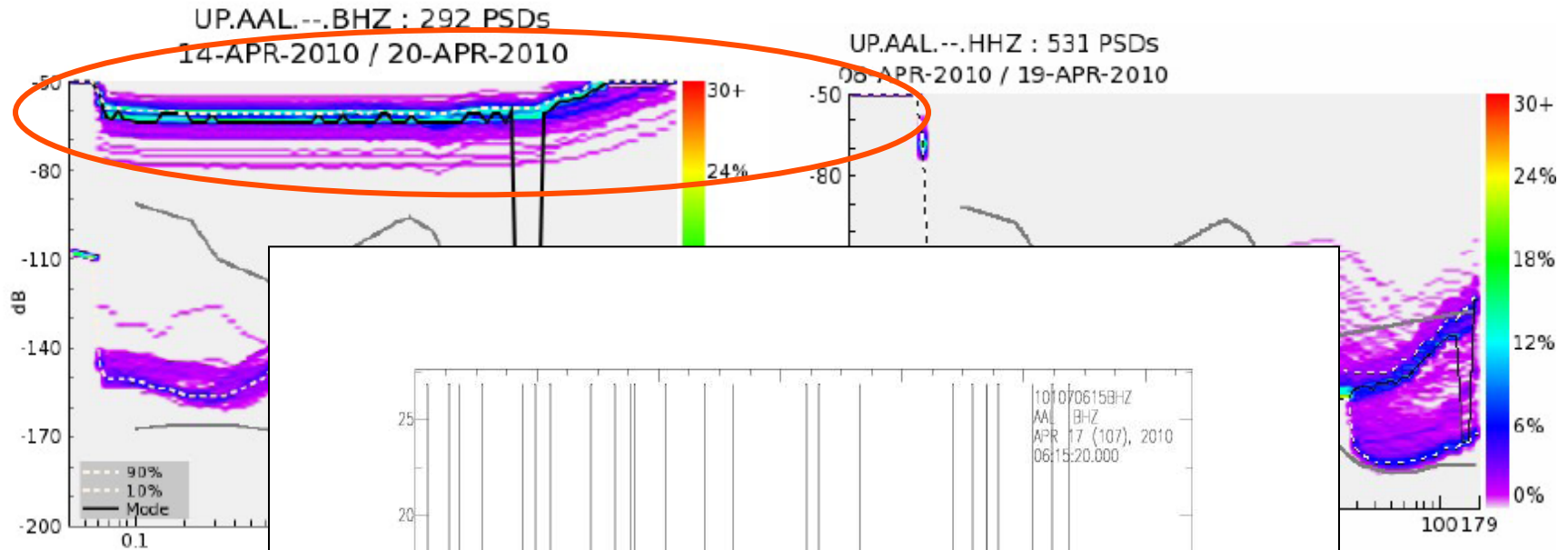
UP.AAL--.BHZ : 292 PSDs
14-APR-2010 / 20-APR-2010



UP.AAL--.HHZ : 531 PSDs
08-APR-2010 / 19-APR-2010

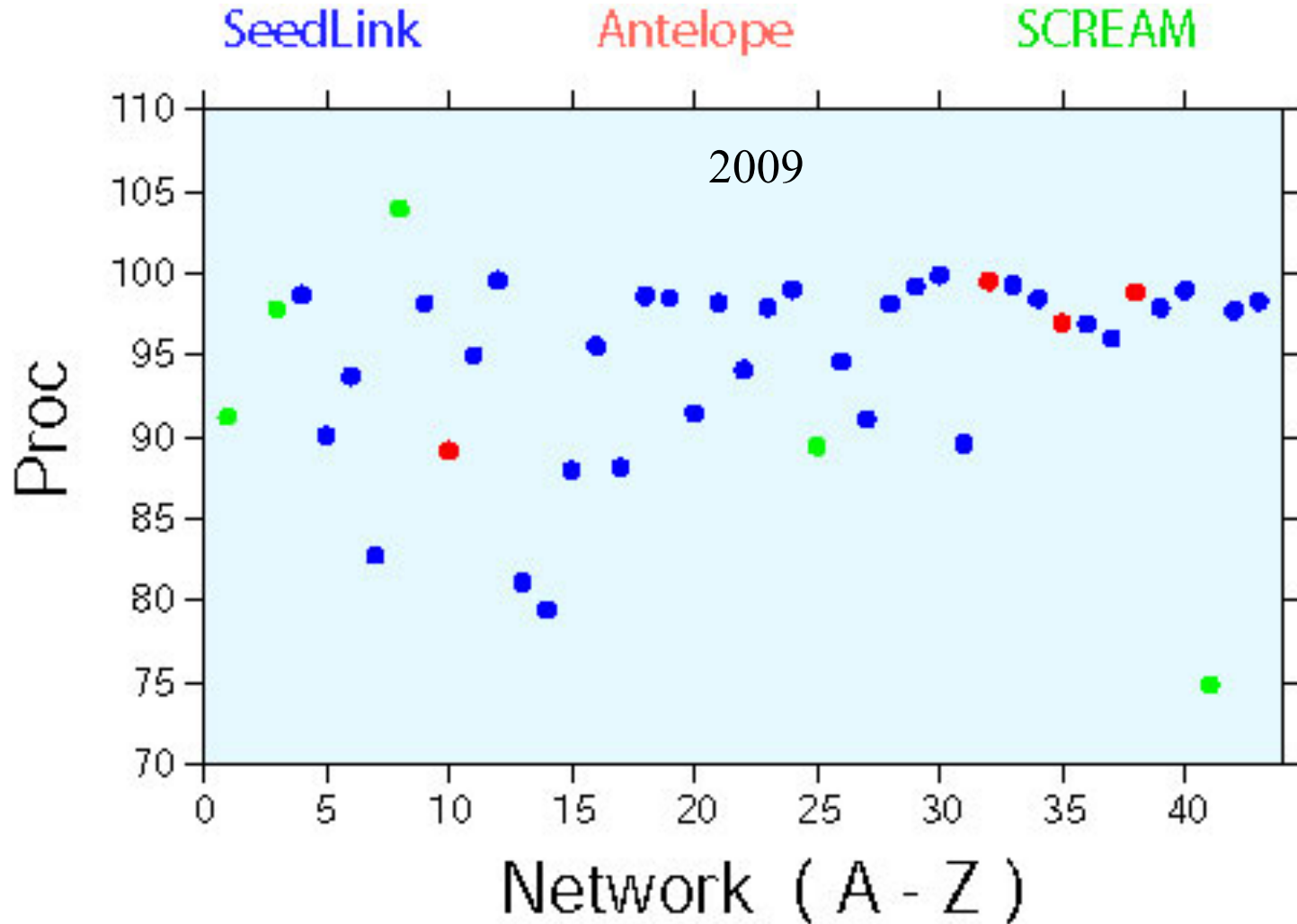


Example at ODC - PQLX



Antelope "spikes"

Data completeness per network

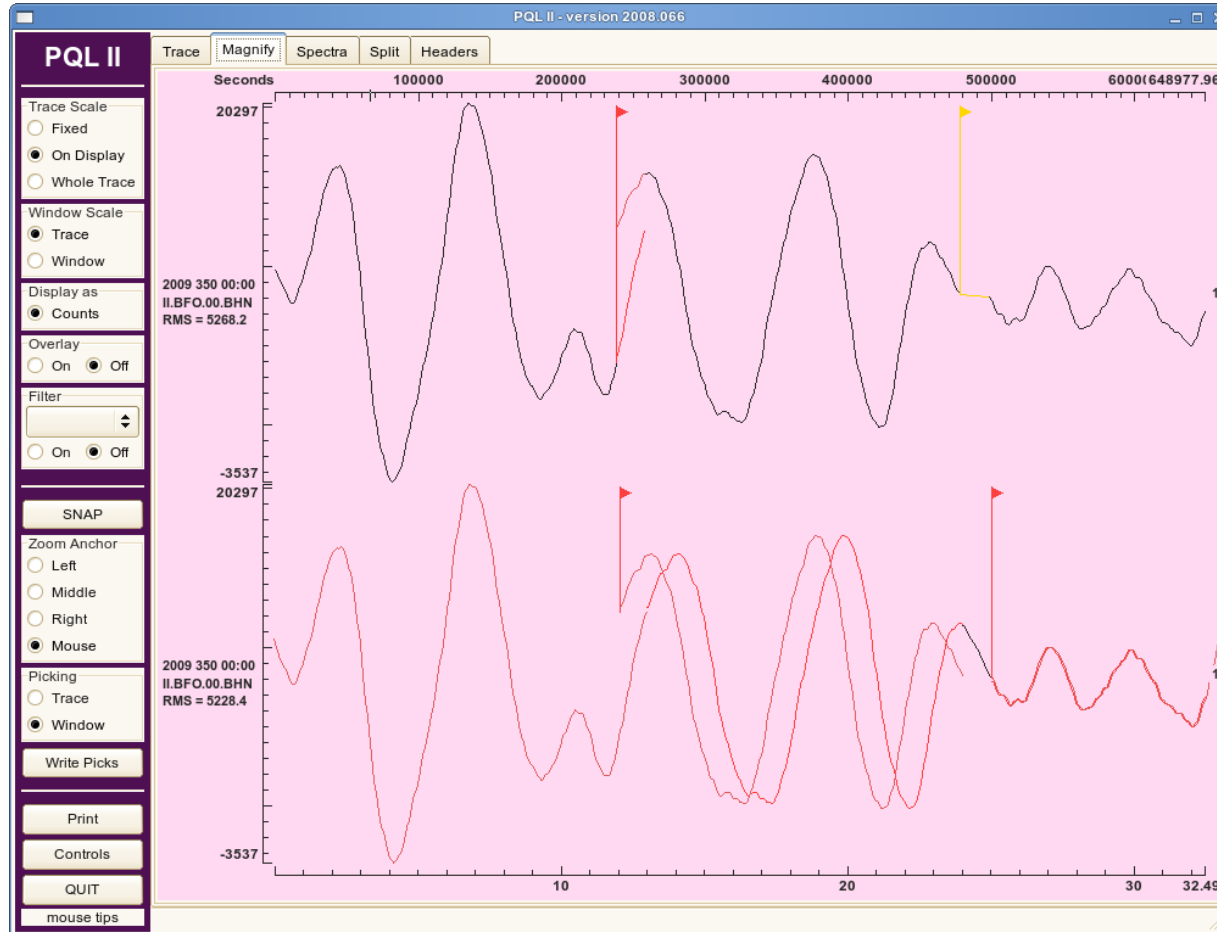


ORFEUS Data Center - QC and data completeness

Developments to reduce datagaps:

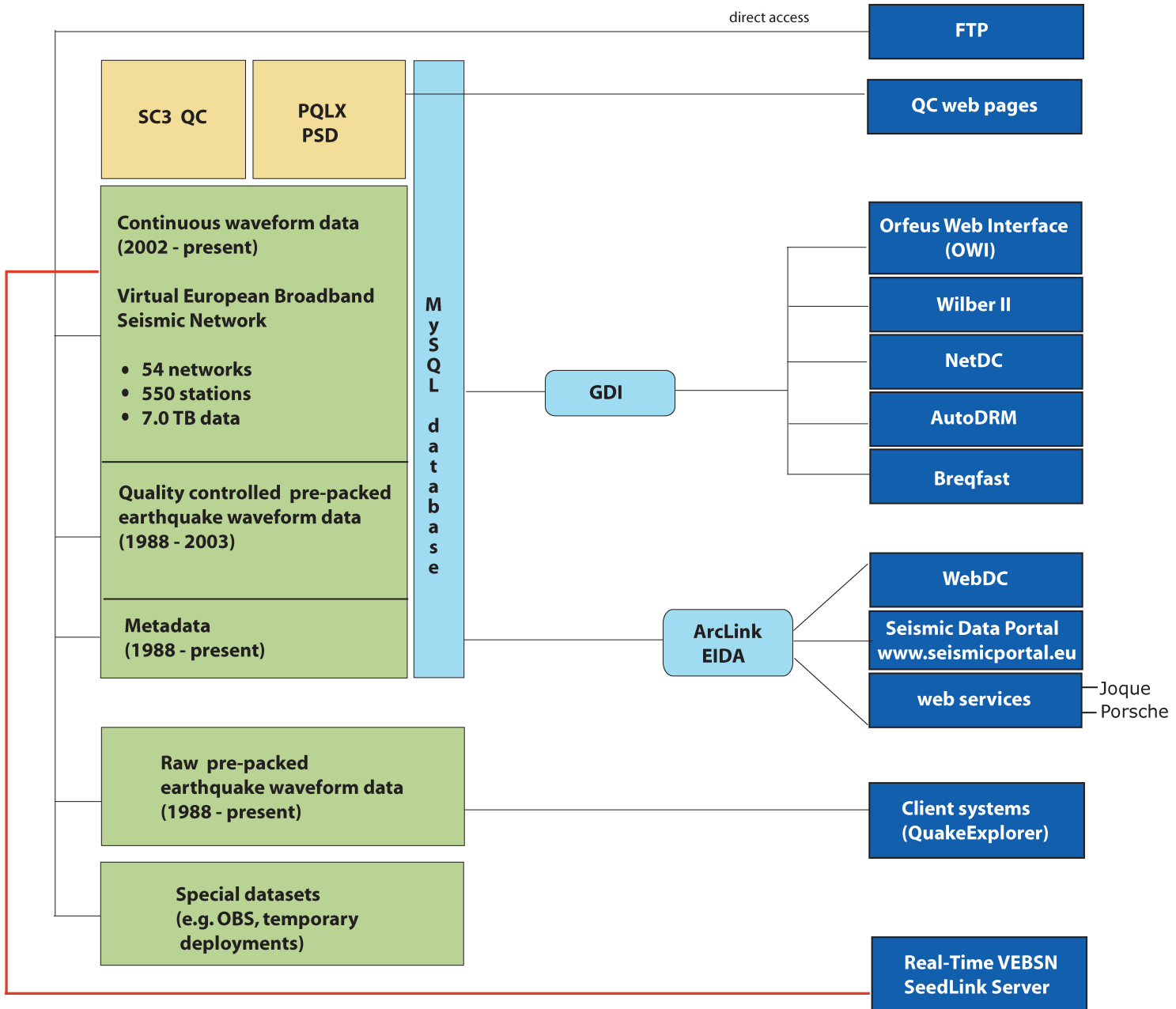
- new SCREAM plugin for SeedLink (threaded, ringbuffer)
- implementation of secondary data retrieval procedures (DB; *data merging*)
- SeedLink/slarchive in parallel to Slink2ORB/ORB2DB

ORFEUS Data Center – Data Gap Repair

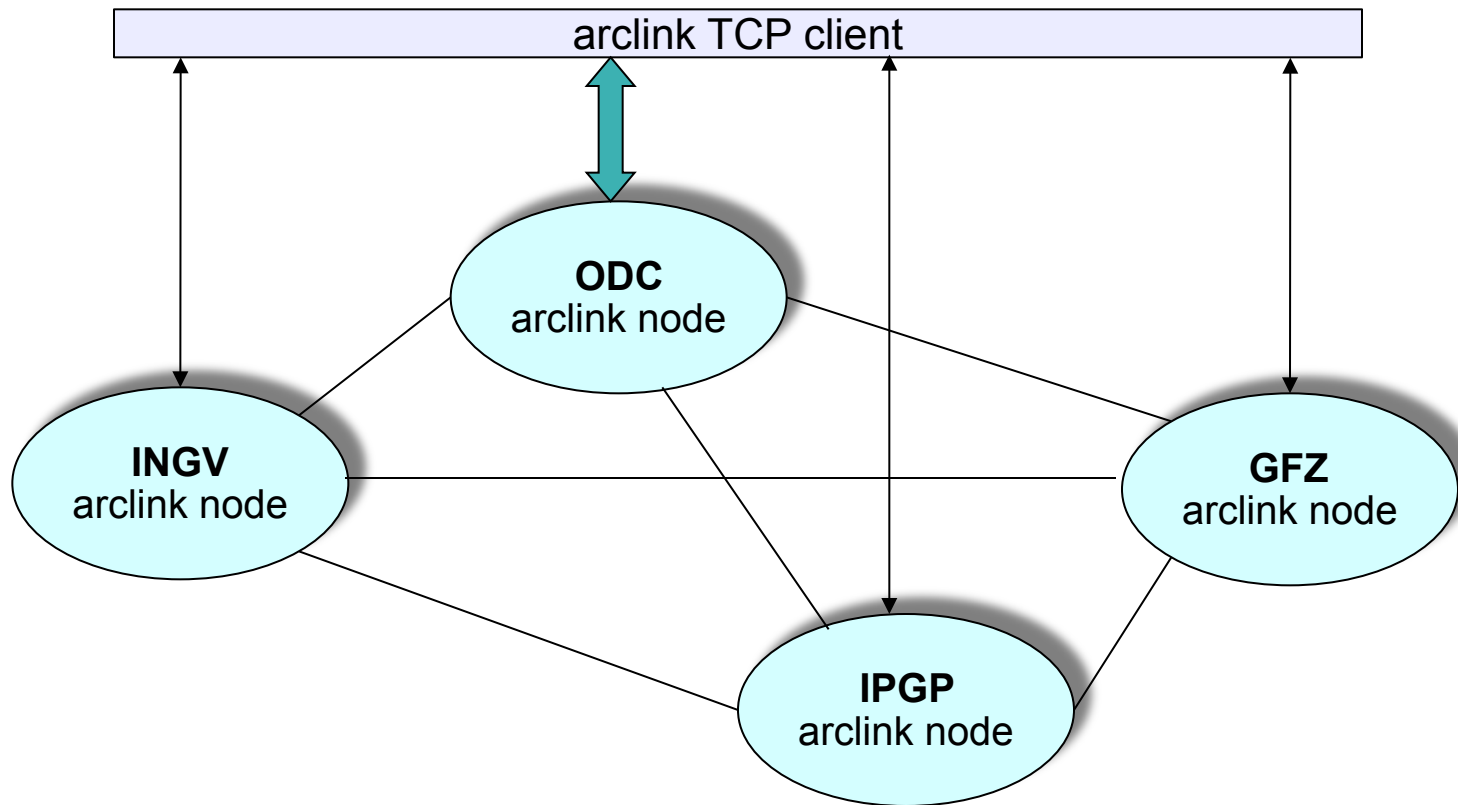


ODC Data

ODC Services



ArcLink



- metadata synchronization
- waveform data routing

Services

Access to ODC-VEBSN data

- **Email** based data request services, like NetDC, BreqFast and AutoDRM
- **Interactive** selection interface, like Wilber II, OWI

Access to ODC-VEBSN data + other EIDA (ArcLink) data

- **Web-services:** provides access by stand-alone clients on your computer to download bulk-data (command line; batch)
- Seismic data **portal** (www.seismicportal.eu) – earthquake shopping

Stand-alone ODC webservice clients

JOQUE: Java ORFEUS Quake Explorer

- Event selection from catalogues in ndk and QuakeML format based on user defined regions and/or magnitude thresholds
- Stream selection on network, station and channel level, based on geographical region and epicentral distance
- Direct and automatic waveform harvesting (SEED) from EIDA
- Time window adjustment using configurable phase arrival times

PORSCHE: Perl ORFEUS SEED “Control & Harvest” Engine

- a command-line tool to retrieve (bulk) data directly from the EIDA based on time windows (and networks, stations, channels).

Earthquake Data Portal

«Exploring seismological data and products»

Welcome Login Registration Explorers Feedback About Web Services Contact

Welcome to the Earthquake Data Portal

The Earthquake Data Portal is the rendering layer of an integrated Infrastructure that enables the research community to have access to a broad range of earthquake data from Europe and its surroundings.

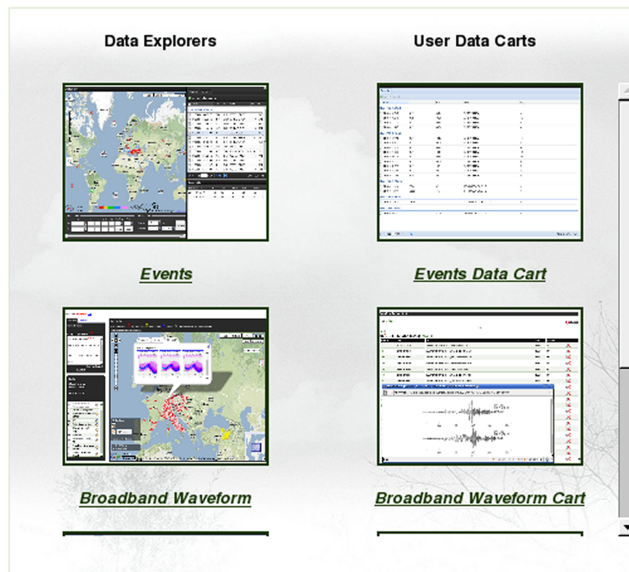
Add the Earthquake Data Portal Gadget to your iGoogle Page 

follow us on


To receive updates and datasets

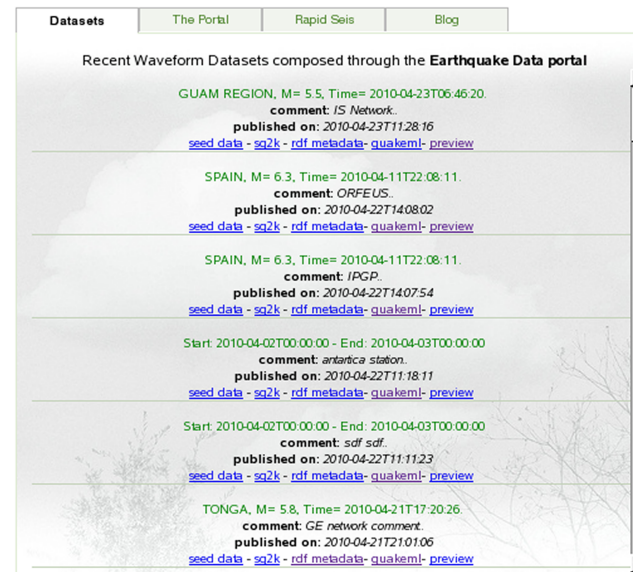
Username
Password

Please note that as part of our upgrade, old user logins are no longer available. It is necessary to use the [registration page](#) to recreate your user accounts. We apologize for this inconvenience.



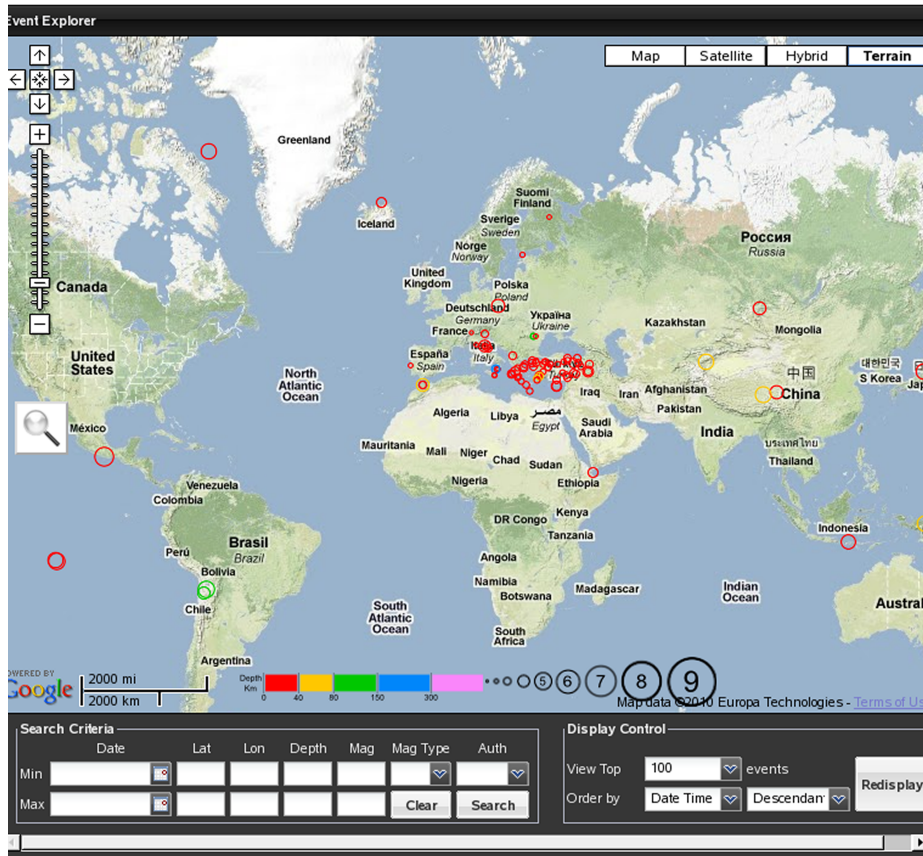
The screenshot displays four main data visualization components:

- Data Explorers:** A map of Europe with a data table overlay showing earthquake locations and details.
- User Data Carts:** A table listing various data products and their associated metadata.
- Events:** A map showing earthquake event locations with a detailed view of a specific event.
- Events Data Cart:** A table listing specific earthquake events and their associated data products.
- Broadband Waveform:** A plot showing seismic waveform data for a specific event.
- Broadband Waveform Cart:** A table listing broadband waveform data products.



The screenshot shows the 'Datasets' section with a list of recent waveform datasets:

- GUAM REGION, M= 5.5, Time= 2010-04-23T06:46:20.**
comment: *IS Network.*
published on: 2010-04-23T11:28:16
[seed data](#) - [sq2k](#) - [rdf metadata](#) - [quakeml](#) - [preview](#)
- SPAIN, M= 6.3, Time= 2010-04-11T22:08:11.**
comment: *ORFEUS.*
published on: 2010-04-22T14:08:02
[seed data](#) - [sq2k](#) - [rdf metadata](#) - [quakeml](#) - [preview](#)
- SPAIN, M= 6.3, Time= 2010-04-11T22:08:11.**
comment: *IPGP.*
published on: 2010-04-22T14:07:54
[seed data](#) - [sq2k](#) - [rdf metadata](#) - [quakeml](#) - [preview](#)
- Start 2010-04-02T00:00:00 - End: 2010-04-03T00:00:00**
comment: *antartica station.*
published on: 2010-04-22T11:18:11
[seed data](#) - [sq2k](#) - [rdf metadata](#) - [quakeml](#) - [preview](#)
- Start 2010-04-02T00:00:00 - End: 2010-04-03T00:00:00**
comment: *sdf sdf.*
published on: 2010-04-22T11:11:23
[seed data](#) - [sq2k](#) - [rdf metadata](#) - [quakeml](#) - [preview](#)
- TONGA, M= 5.8, Time= 2010-04-21T17:20:26.**
comment: *GE network comment.*
published on: 2010-04-21T21:01:06
[seed data](#) - [sq2k](#) - [rdf metadata](#) - [quakeml](#) - [preview](#)



Event Explorer

Event List Events Cart

Add To Cart Export to File

Date	Lat	Lon	Region	Km	Mag
Date: 2010-04-16 (25 Events)					
<input type="checkbox"/>	2010-04-16 13:48:48.0 UTC	38.86	30.65	WESTERN TURKEY	5 2.6 MD
<input type="checkbox"/>	2010-04-16 13:44:20.0 UTC	40.02	37.88	CENTRAL TURKEY	8 3.5 ML
<input type="checkbox"/>	2010-04-16 13:22:18.0 UTC	40.97	36.06	CENTRAL TURKEY	2 3.0 MD
<input type="checkbox"/>	2010-04-16 13:16:24.0 UTC	40.28	35.01	CENTRAL TURKEY	8 2.5 MD
<input checked="" type="checkbox"/>	2010-04-16 13:14:37.0 UTC	66.47	-17.59	ICELAND REGION	5 3.6 ML
<input type="checkbox"/>	2010-04-16 13:04:24.0 UTC	39.11	40.05	EASTERN TURKEY	30 2.6 MD
<input type="checkbox"/>	2010-04-16 12:48:13.0 UTC	36.12	32.95	CENTRAL TURKEY	3 2.9 MD
<input type="checkbox"/>	2010-04-16 12:45:38.0 UTC	40.41	26.91	WESTERN TURKEY	5 2.4 MD
<input type="checkbox"/>	2010-04-16 12:29:01.0 UTC	-2.74	139.42	NEAR N COAST OF PAPU	40 4.7 mb
<input type="checkbox"/>	2010-04-16 12:28:49.0 UTC	40.55	29.56	WESTERN TURKEY	6 2.7 MD
<input type="checkbox"/>	2010-04-16 12:20:16.0 UTC	37.14	36.00	CENTRAL TURKEY	2 2.8 ML
<input type="checkbox"/>	2010-04-16 12:07:32.0 UTC	40.13	29.47	WESTERN TURKEY	17 2.5 MD
<input type="checkbox"/>	2010-04-16 11:43:27.0 UTC	39.51	31.45	WESTERN TURKEY	8 2.5 MD

Page 1 of 4571 | Events 1 - 25 of 114267

Origins Details


Date	Lat	Lon	Depth	Mag Type	Mag	Network
2010-04-16 1	66.471	-17.588	4.5	ml	3.6	IMO
2010-04-16 1	66.462	-17.599	4.3	ml	3.7	IMO

www.seismicportal.eu

EDP Waveform dataset preview

refresh - download - QuakeML

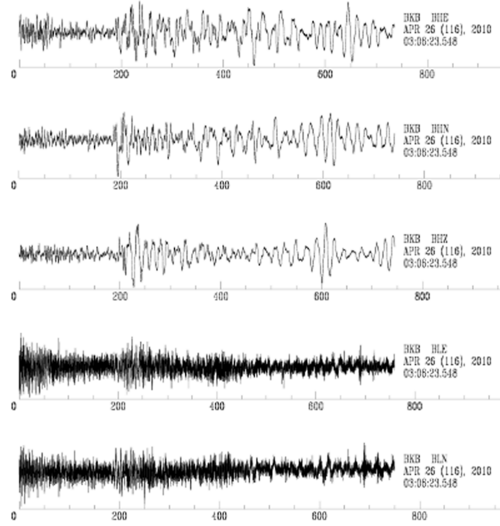
SOUTHEAST OF TAIWAN, M= 6.5, Time: 2010-04-26T02:59:49.



Map Satellite Terrain

user comment: GE Indonesia

Go Up



BKB BHG APR 26 (116), 2010 03:08:23.518

BKB BHN APR 26 (116), 2010 03:08:23.518

BKB BHZ APR 26 (116), 2010 03:08:23.518

BKB HLE APR 26 (116), 2010 03:08:23.518

BKB HLN APR 26 (116), 2010 03:08:23.518