



# Antelope in Vienna Austrian Earthquake Service

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Department of Geophysics, ZAMG, Vienna



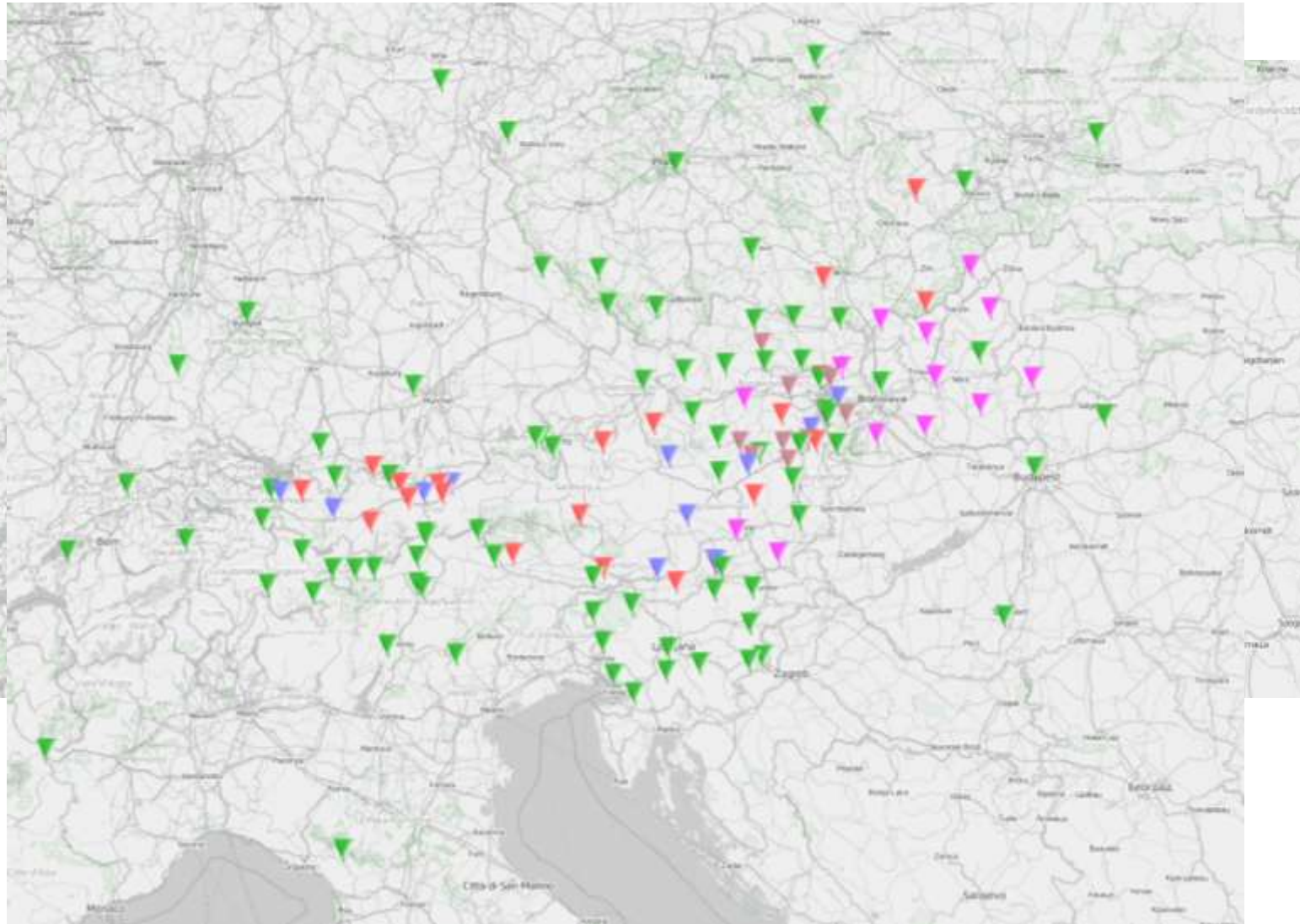
**ZAMG**  
Zentralanstalt für  
Meteorologie und  
Geodynamik



## Geophysical Department

- Conrad Observatory
- Geomagnetism and Gravimetry
- Applied Geophysics – Engineering and Archeology
- Geophysical Electronics – Stations
- Seismology
  - NDC
  - Historical Research
  - Earthquake Service

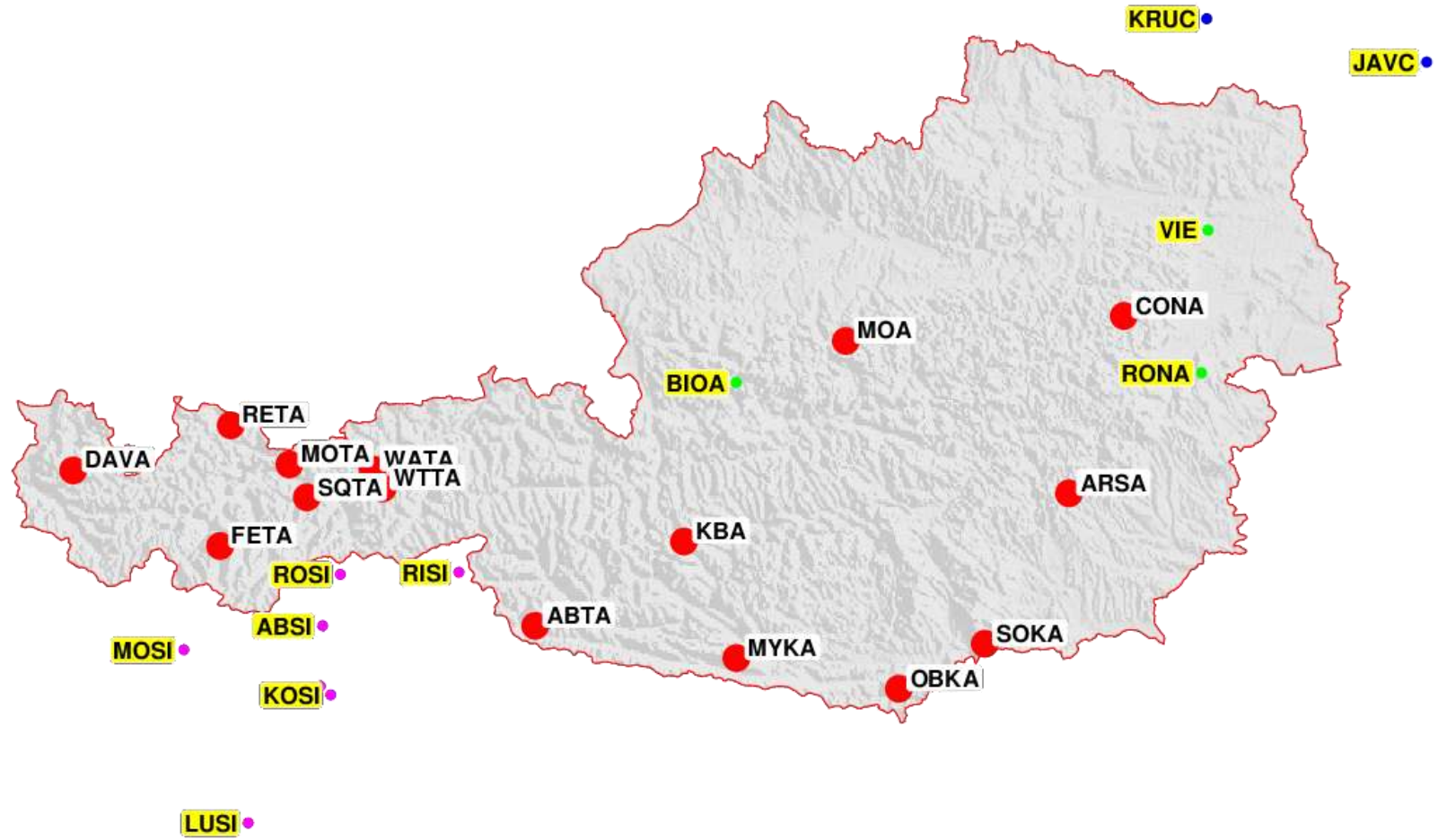
# current network

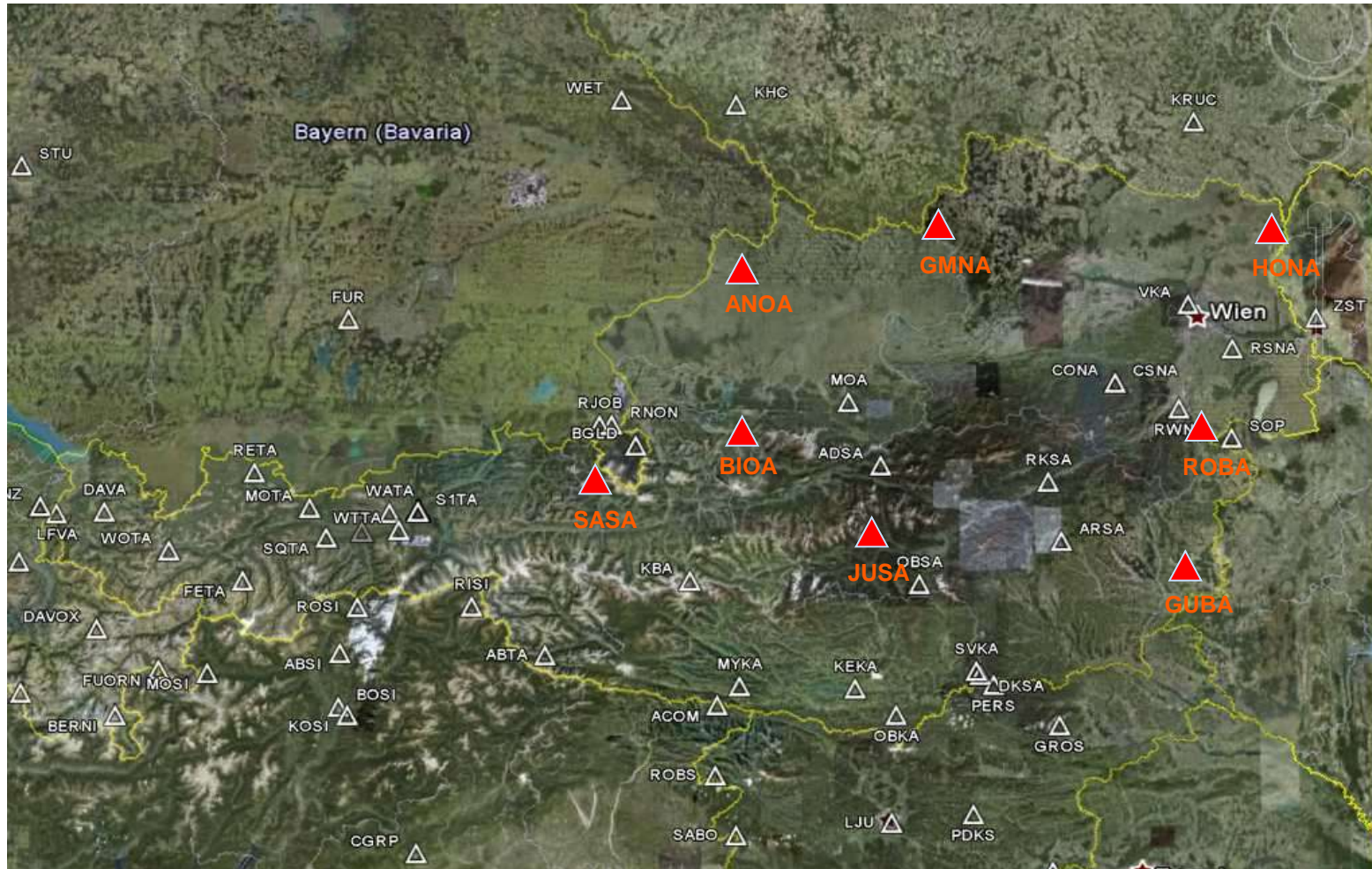


# new stations

5/28/14

Folie 7





# station design - broadband

5/28/14

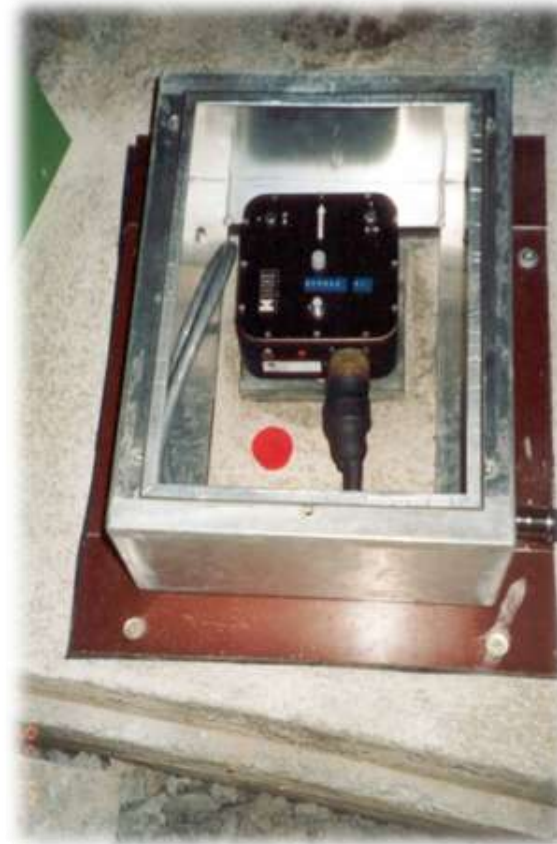
Folie 7



# station design – strong motion

5/28/14

Folie 7



# new station BIOA

5/28/14  
Folie 7





# new station RONA

5/28/14  
Folie 7



# data exchange

- redundancy: 3 machines for data exchange

VM / CentOS 138.22.184.20

Sun / Solaris8 138.22.184.21

Sun / Solaris10 138.22.184.22

port range 40100 to 40120 open to partners

- data distribution

orb2orb, seedlink, autodrm, fdsn webservices, email, sms

- data acquisition

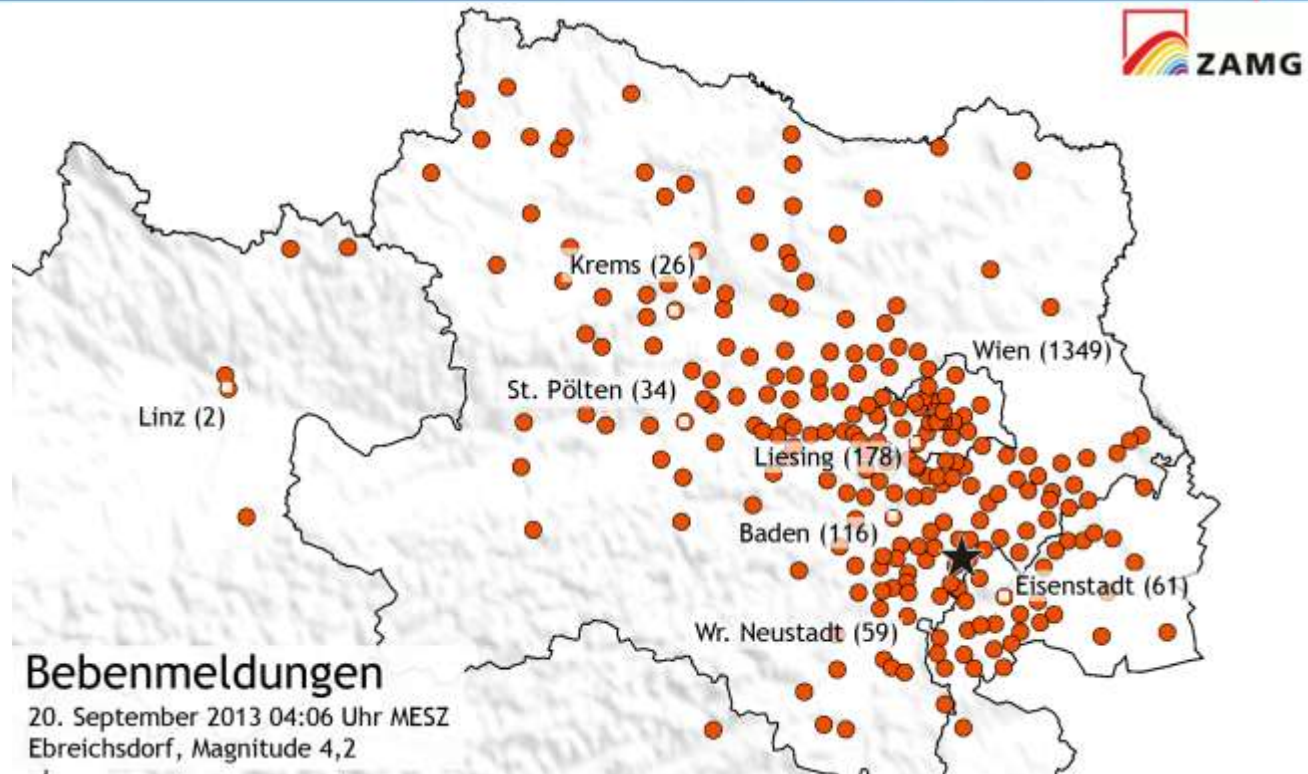
orb2orb, seedlink

q3302orb, qt2orb, altus2orb, rtp2orb (Thank you, Luisa !),  
guralp2orb

autodrm (CTBT NMS), fdsn-webservice

webpages and webservices

# data exchange – macroseismic data

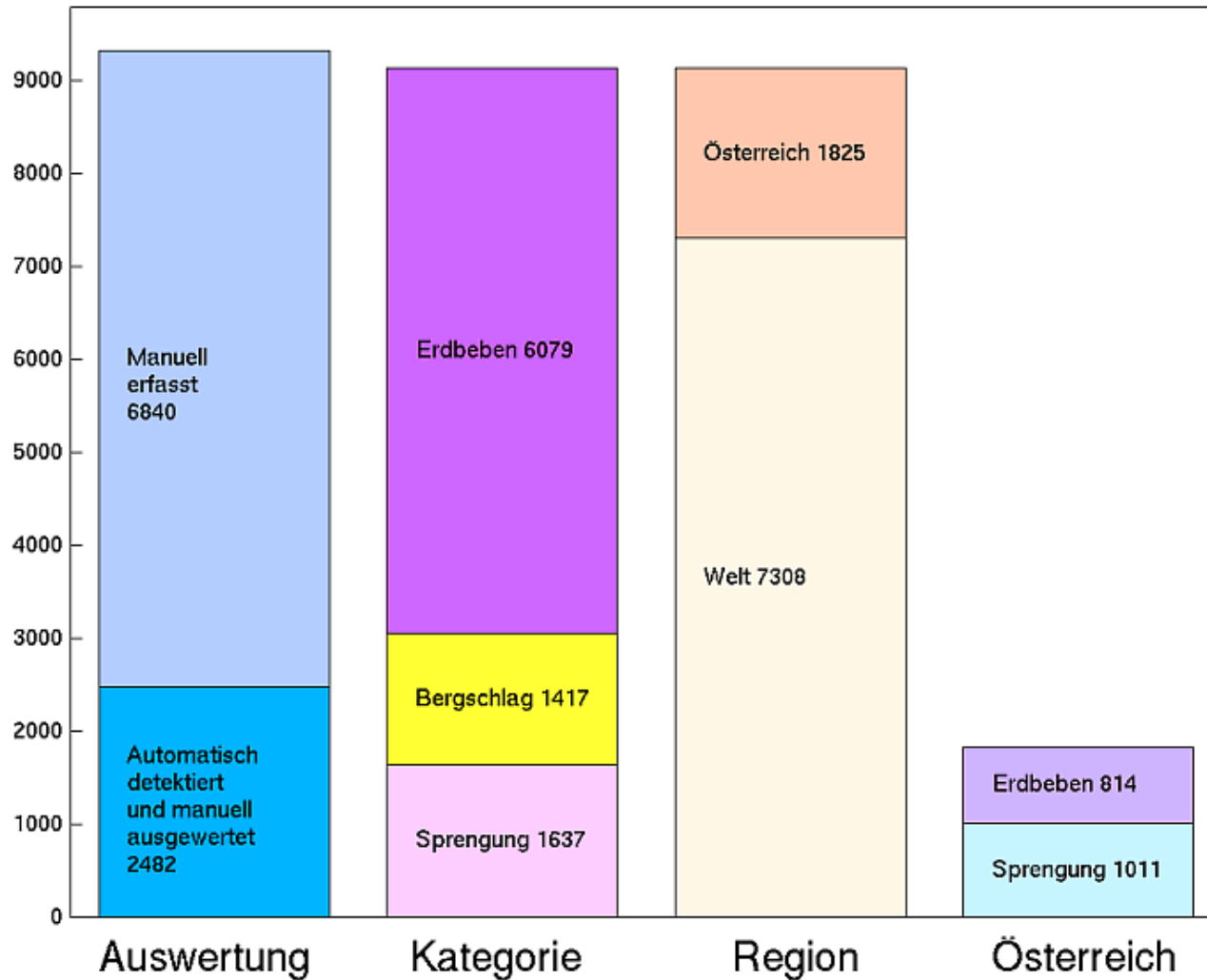


- QuakeML2.0 / Macroseismic Package for data exchange
- email / webservice / webpage ?
- raw data and/or interpretation results ?

# Data processing

- standard antelope processing
- selfwritten magnitude code based on velocity amplitudes (mB)
- redundant data acquisition where possible (Conrad Observatory)
- redundant data forwarding where possible  
(Satelite Backup Vienna/Udine/Bolzano)
- redundant automated processing  
standby machine , no automated failover
- no redundancy for automated products yet
- redundant manual processing  
selfwritten synchronization over antelope orb  
central idserver needed
- synchronize in real-time to displays in Bolzano, Innsbruck

Beben-Statistik für den Zeitraum zwischen 20140101 und 20141231





- data import
  - realtime waveforms CD1.1
  - bulletins
    - meteorological
    - radionuclide
    - events (arid issue)
      - isf2.0 import needed – will use ISC code
- software
  - NDC in a box
  - Seiscomp3
  - Antelope integration where possible

# databases

- metadata – sensors / digitizers
- AEC – Austrian Event Catalogue
- continuous waveforms – since late 1997, ~8T now, ~3G/day
- triggered events for strong-motion instruments
  - still need to convert SMACH data
  - still need to convert pre-97 event data
  - continuous data exchange soon
- event based subsets
- special datasets (EASI, AlpArray)
- macroseismic data – felt reports, maps, MDPs
- historic paper records
- extensions to css3.0 (missing stuff like azimuth gap, rms) – css3.1 compatibility
- gis

nearest places. enclosing polygons. distance to borders

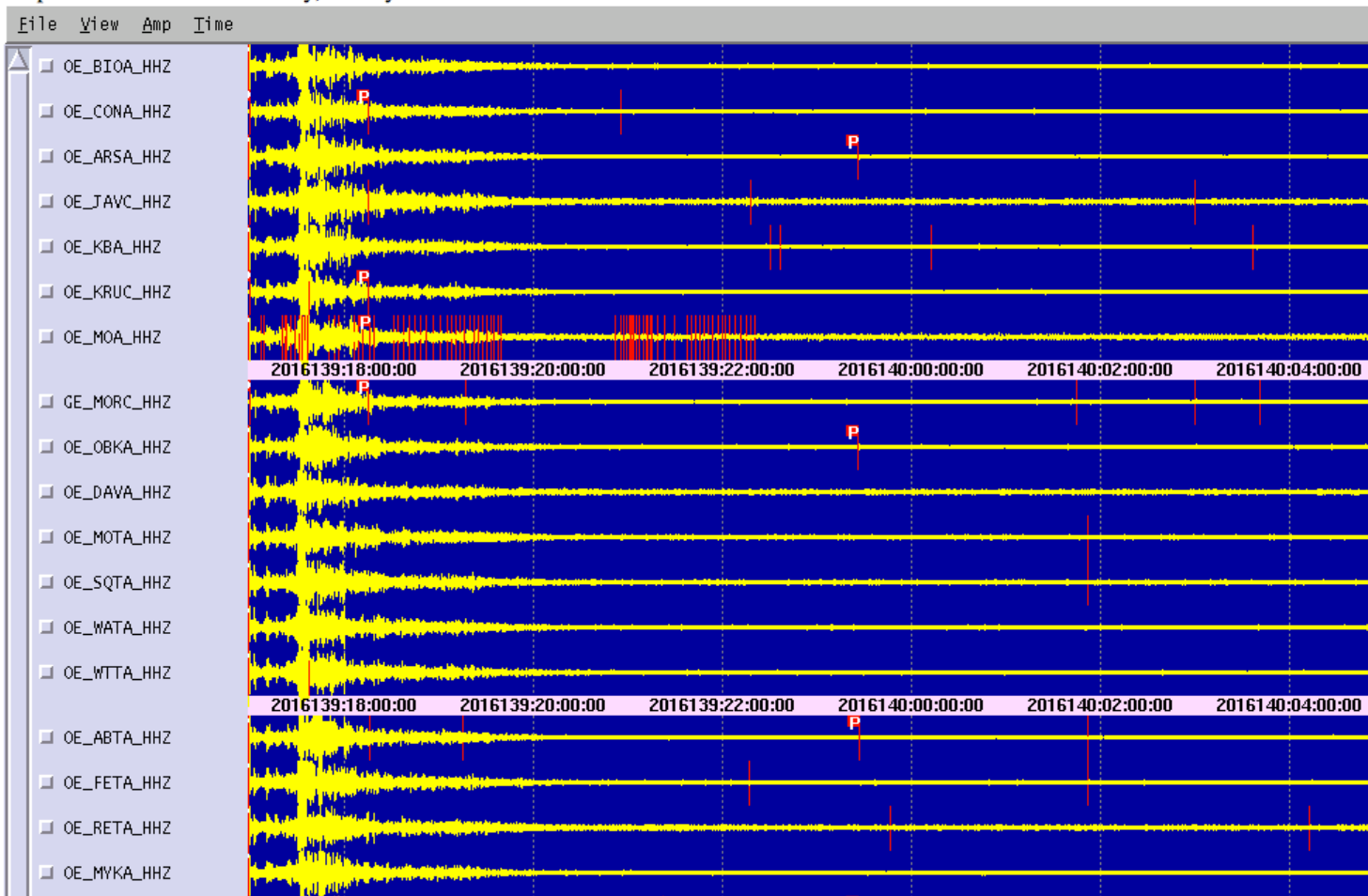


geoweb.zamg.ac.at

Nachricht | FragNebenan      Nachricht | Google      ZAMG

## Österreichische Stationen, 12 Stunden

Graphik aktualisiert um: Thursday, 19-May-2016 04:57:51 UTC



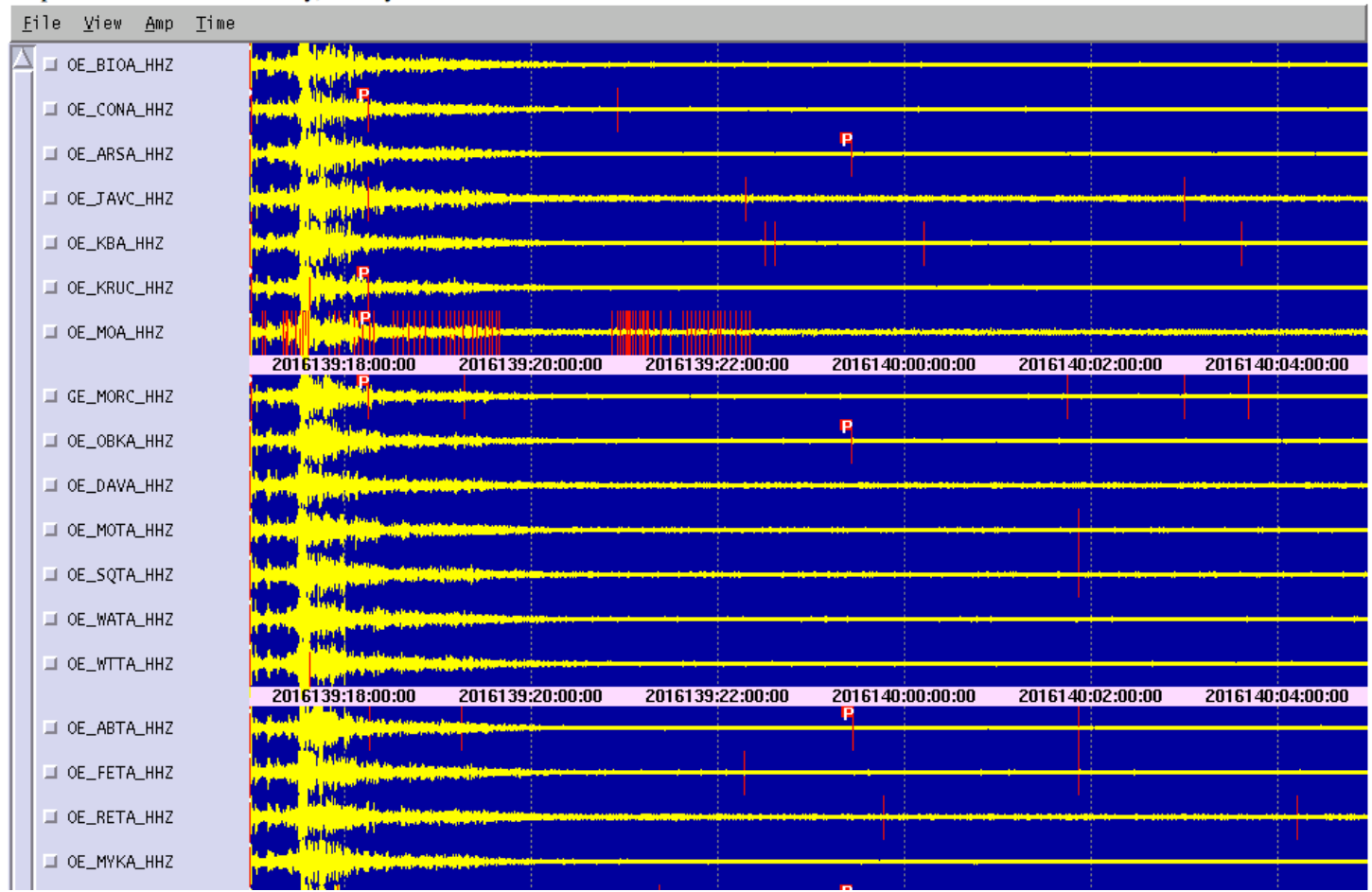


# monitoring

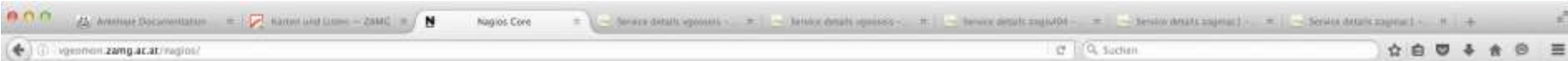


## Österreichische Stationen, 12 Stunden

Graphik aktualisiert um: Thursday, 19-May-2016 04:57:51 UTC



# monitoring



**Nagios®**  
Network Map For All Hosts  
Last Updated: Tue May 17 13:31:17 GMT 2016  
Updated every 60 seconds  
Nagios® Core™ 4.0.8 - www.nagios.org  
Logged in as nagios

- General
  - Home
  - Documentation
- Current Status
  - Tactical Overview
  - Map
  - Hosts
  - Services
  - Host Groups
    - Summary
    - Grid
  - Service Groups
    - Summary
    - Grid
  - Problems
    - Services (Unhandled)
    - Hosts (Unhandled)
    - Network Outages
  - Quick Search:

- Reports
  - Availability
  - Trends
  - Alerts
    - History
    - Summary
    - Histogram
  - Notifications
  - Event Log

- System
  - Comments
  - Downtime
  - Process Info
  - Performance Info
  - Scheduling Queue
  - Configuration

Layout Method: Circular (Marked Up: 3)

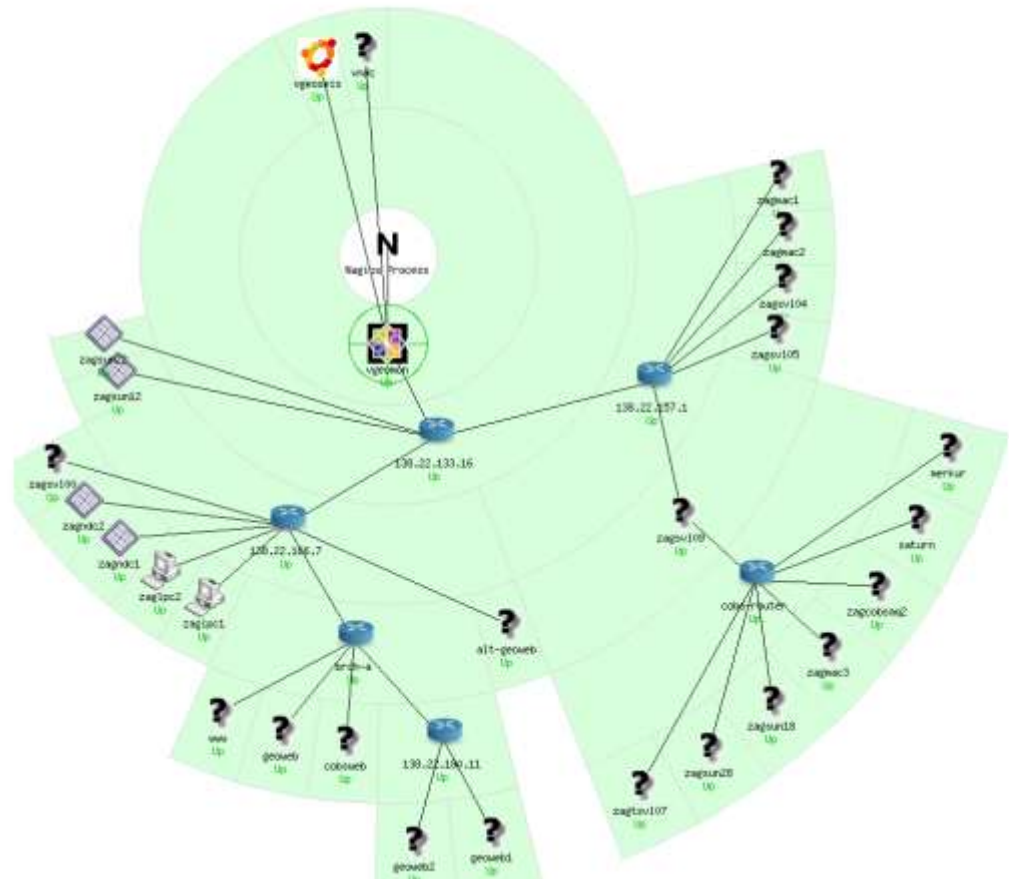
Scaling factor: 0.0

Drawing Layers:  
SEISMO Auswertung  
Server am TRAFIL  
SEISMO Auswertung

Layer mode:  
 Include  
 Exclude

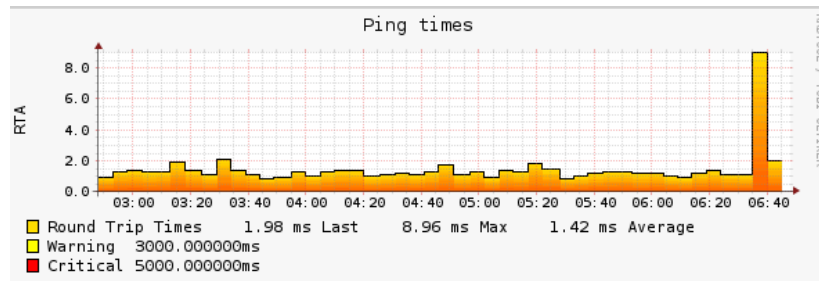
Suppress popup:

Update

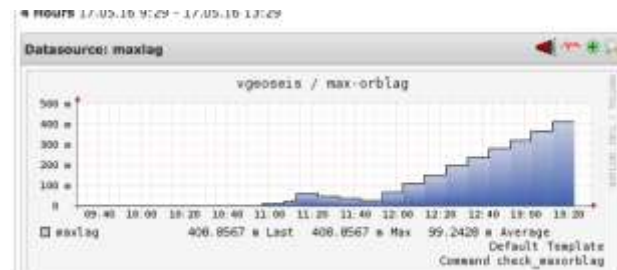
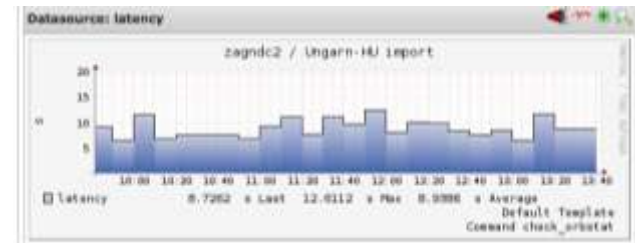


# monitoring

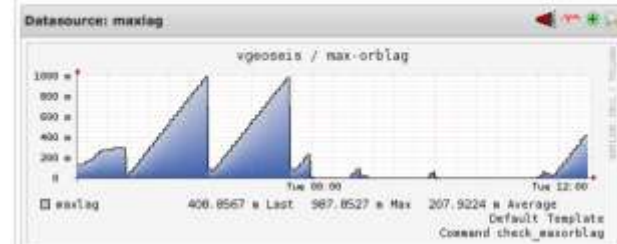
- move from ancient nagios1 to latest version
  - 2 new orb plugins – latency and lag – written in python
  - various other plugins
  - performance data



- use our IT departments 18/7 operations
  - requires much better documentation
  - requires clearer responsibilities
  - wrote plugins to homegrown system



Host: vgeoseis Service: max-orblog  
25 Hours 16.05.16 12:29 - 17.05.16 13:29



# IT

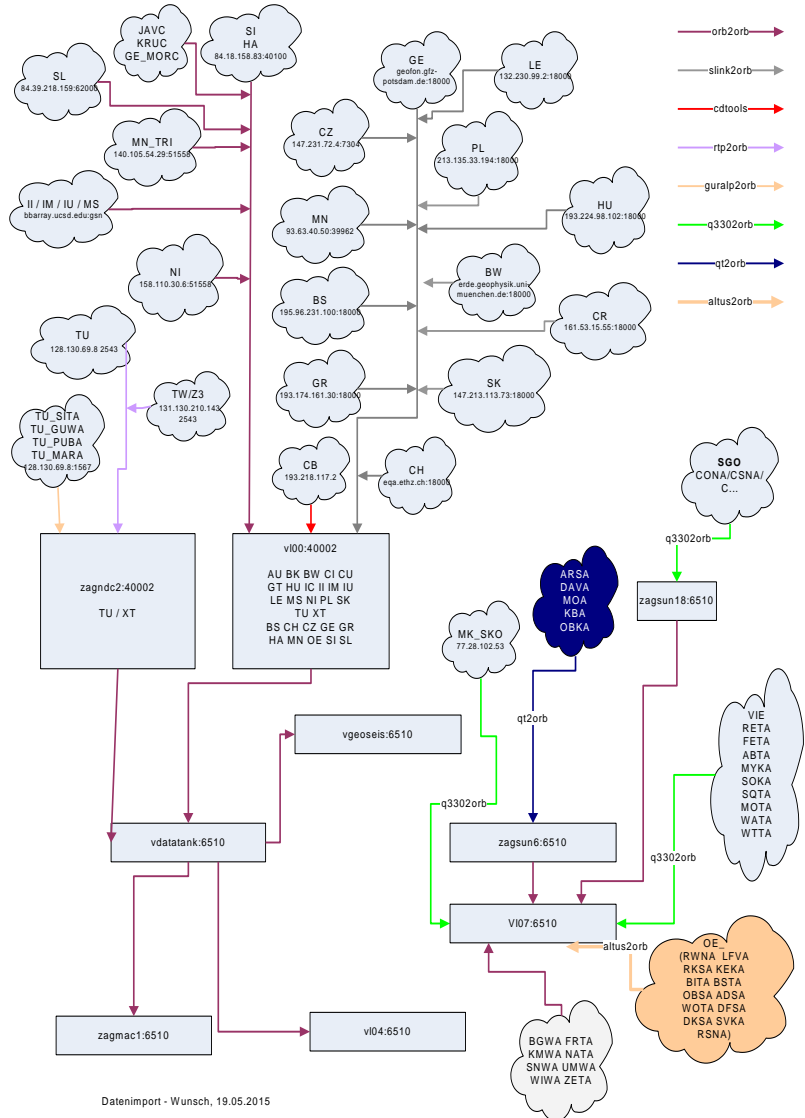


More and more virtualization  
serious problems with NetApp filesystems  
serious problems with filesystem performance on mounted shares  
vmware  
KVM  
virtualbox

Still on Hardware  
old sun(s)  
manual review  
notebooks  
terminals  
display servers

Operating Systems  
still Solaris 8/10  
OSX 10.9 / 10.10 / 10.11  
Linux: CentOS, Ubuntu, OpenSuse

# IT – minimal setup



- more datasources is good!
  - different subnets needed
  - still some machines
  - still different operating systems
  - still different acquisition programs
- > still work to do



new fashion in Austria: „citizen science“

kids develop a smartphone app

data transfer via webservice

FDSN-like service JSON + Geographic Information

database access internally also a webservice

- FDSN Webservices

event – QuakeML1.2 / JSON / Text / CSV

station – StationXML / Text / Dataless ?

dataselect - Seed

- all output available also on files to leverage burden on webserver
- written in Python – standalone cgi scripts for simple integration into load-balanced Apache platform
- new felt-report form is also a new webservice
- develop webservice (and Format) for exchange of macroseismic data including felt-reports



- Erdbeben
  - Aktuelle Erdbeben
  - Karten und Listen
  - Erdbebenmeldung
  - NEWS und Beiträge
  - Ihr Erdbebenbericht
  - Ihr Erdbebenbericht
  - Verhaltensratgeber
  - Erdbeben in Österreich
  - Der Erdbebedienst
  - Historische Erdbeben
  - Erdbebenarchiv
  - Informationsmaterial
  - Live-Seismogramm
- Magnetik
- Angewandte Geophysik
- Conrad Observatorium
- Gravimetrie
- Nationales Datenzentrum
- Geophysik - Forschung
- Produkte und Services
- Lexikon
- Live - Seismogramm
- News
- Team und Kontakte

**Suche**

Webseite durchsuchen

Erweiterte Suche...

Die ZAMG ist eine  
Forschungseinrichtung des



Bundesministerium für  
Wissenschaft, Forschung und Innovation

Geophysik / Erdbeben / Aktuelle Erdbeben / Karten und Listen

## Erdbeben - Karten und Listen

Österreich | Europa | **Welt**

### Erdbeben bei Unzmarkt / Steiermark, M 2.3



<b>Datum:</b>	17. Mai 2016
<b>Herzzeit:</b>	00:52:18 UTC (02:52 MESZ)
<b>Magnitude:</b>	2.3 (ml)
<b>Herdtiefe:</b>	3 km
<b>Epizentrum:</b>	47.15°N, 14.49°O (GoogleEarth)
<b>Entfernungen:</b>	8 km SSO von Unzmarkt 13 km W von Judenburg 23 km NNO von Friesach 24 km O von Murau 61 km NNO von Klagenfurt
<b>Quelle:</b>	ZAMG

### Erdbebenmeldung

Der Österreichische Erdbebedienst der Zentralanstalt für Meteorologie und Geodynamik meldet:

Am Dienstag, den 17. Mai 2016 ereignete sich nachts um 02:52 Uhr MESZ südlich von Unzmarkt, Steiermark, ein Erdbeben der Magnitude 2.3. Es wurde von einigen Personen leicht verspürt.

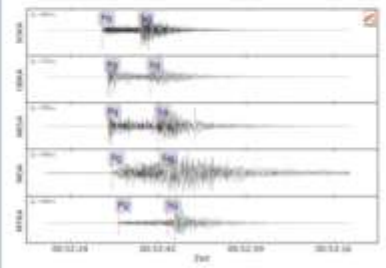
Schäden an Gebäuden sind bei dieser Stärke nicht zu erwarten.

Verfasserin: Mag. Rita Meurers/Seismologin

[Berichten Sie uns über Ihre Erdbebenwahrnehmung](#)

### Seismogramm

Registrierung des Erdbebens mit dem Filterzeit 2016-05-17 00:52:18, Magnitude 2.3



# Presto

early warning system developed by Luca Ela in Naples

free download from <http://www.prestoews.org/>

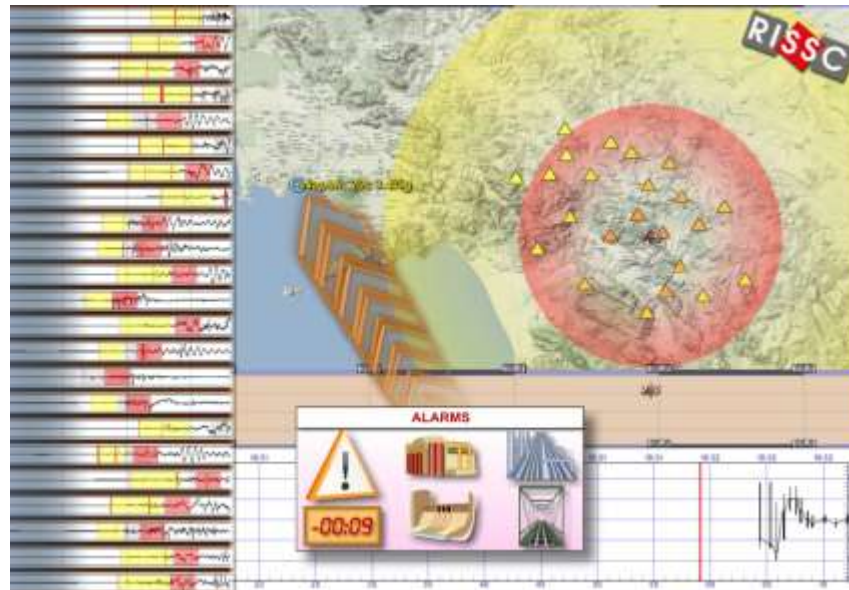
location based on NonLinLoc / data import from Seedlink servers

version 0.2.8 adapted to import data from antelope

running in test mode in Vienna

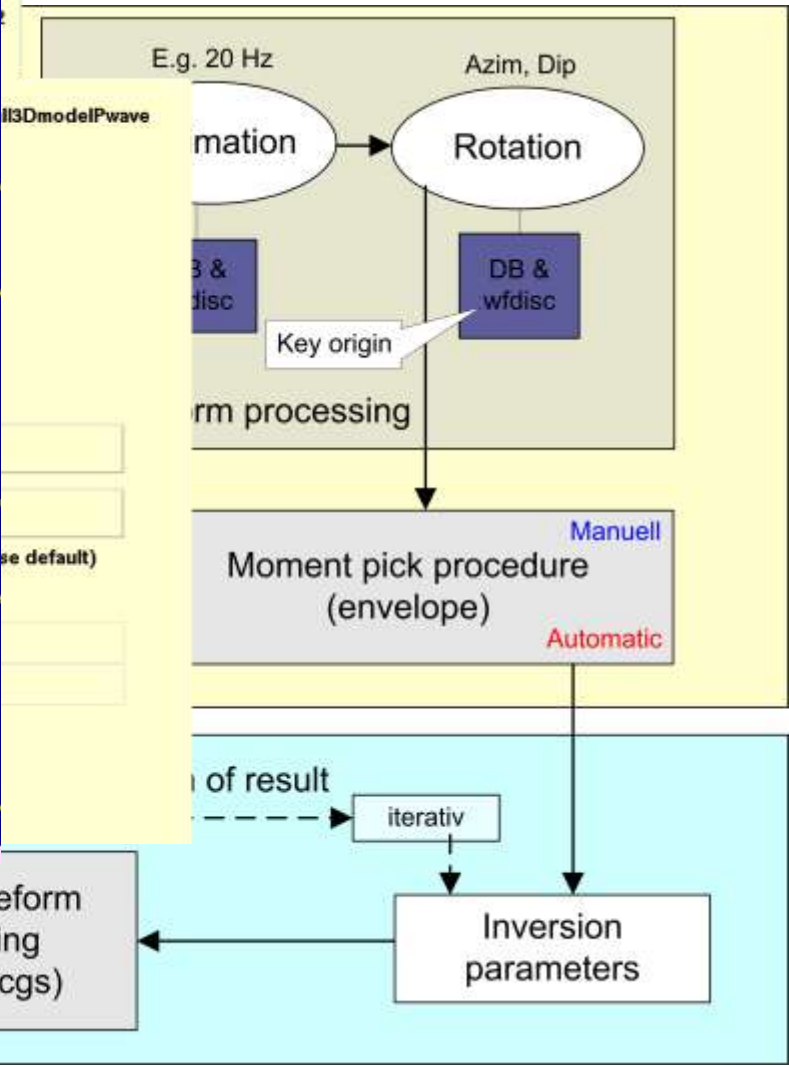
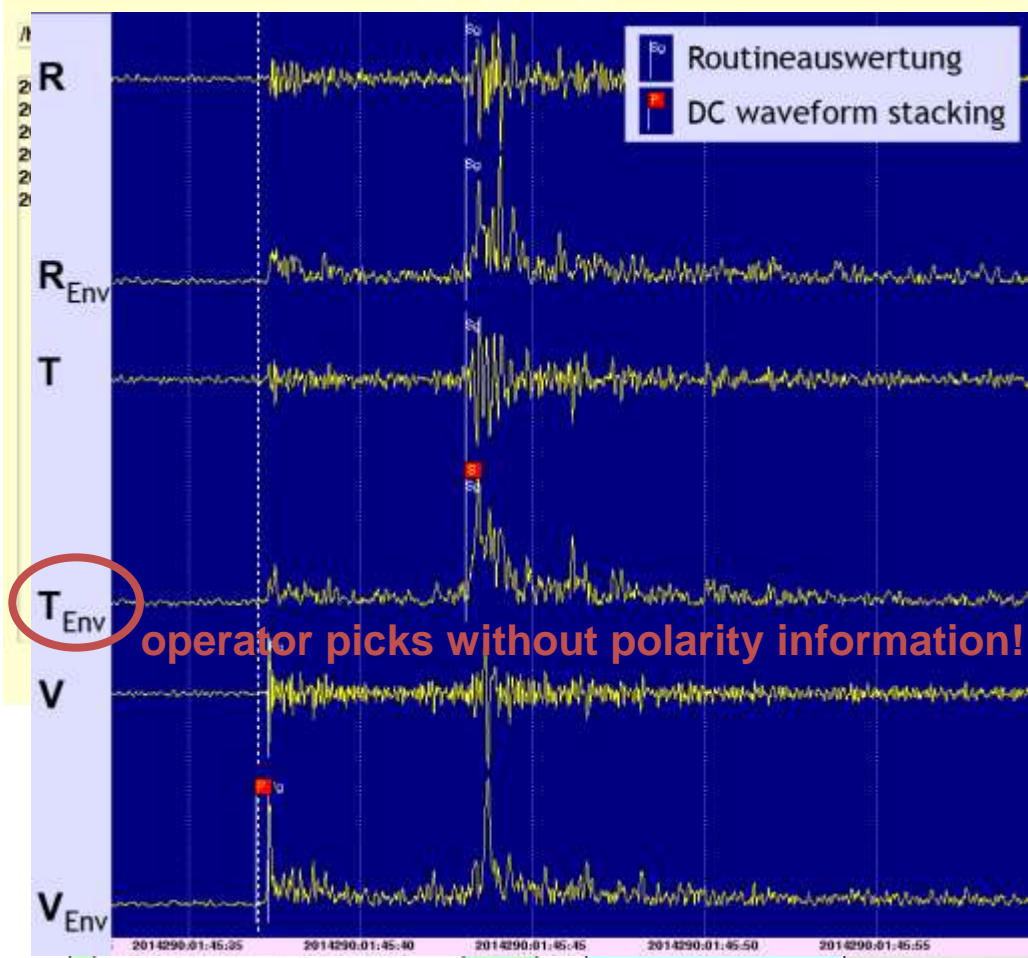
will change to 1.0 soon / use antelope detections

permission to distribute code pending





# trace manipulation – focal mechanism determination



# Future work



- faster location
  - 2 steps, coarse grid for event detection, finer grid for final location
- fast banner on homepage indicating an event
  - like EMSC, only rough region, no magnitude
- faster webpage
  - no more image manipulation - WMS / leaflet / OpenLayers
  - felt report tools
- mysql based webpage – interaction webservice - datascope
- get rid of almost all suns
  - qt2orb only runs on sun, reftek and guralp an issue
- webservices – how about autodrm ?
- continuous data from triggered dataloggersMS

# wishes

son-of-dbpick

dbloc3

trace manipulation in Qt

Dbe / Dbloc2 – plugins still be possible ?

coords – lat/lon – UTM conversion

want to avoid dependency on external tools