European Antelope Users Group 2023 – Vienna, Austria

GeoSphere Austria

# Antelope @ ZAMG

**software for datacenter operation at GeoSphere Austria**

**Seismological Service**
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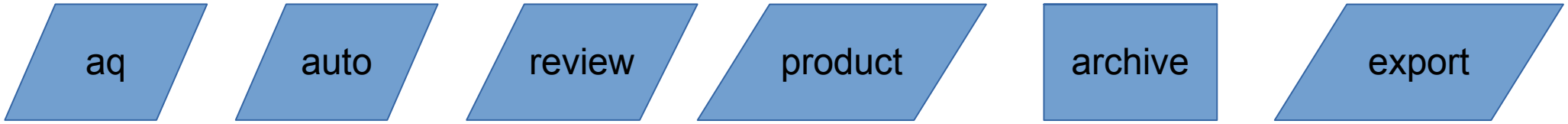
June 5, 2023

# data processing scheme




**acquisition**
- q3302orb
- orb2orb
- slink2orb – statefile not working
- rtp2orb
- emsc2db and such

**automatic prcessing**
- orbassoc – duplicate events
- orbevproc – homegrown magnitude
- manual review
- orbwfmeas

**manual review**
- dbloc2 – rely on plugins
- dbpick – no time for traceview

**products**
- alerts / bulletins
- shakemap
- macroseismic processing
- evinfo
- miniseed required for most ObsPy based stuff

**archive**
- orb2wf
- link_SDS
- pqlx / ObsPy

**export**
- bulletins
- orbserver / ringserver
- webservices

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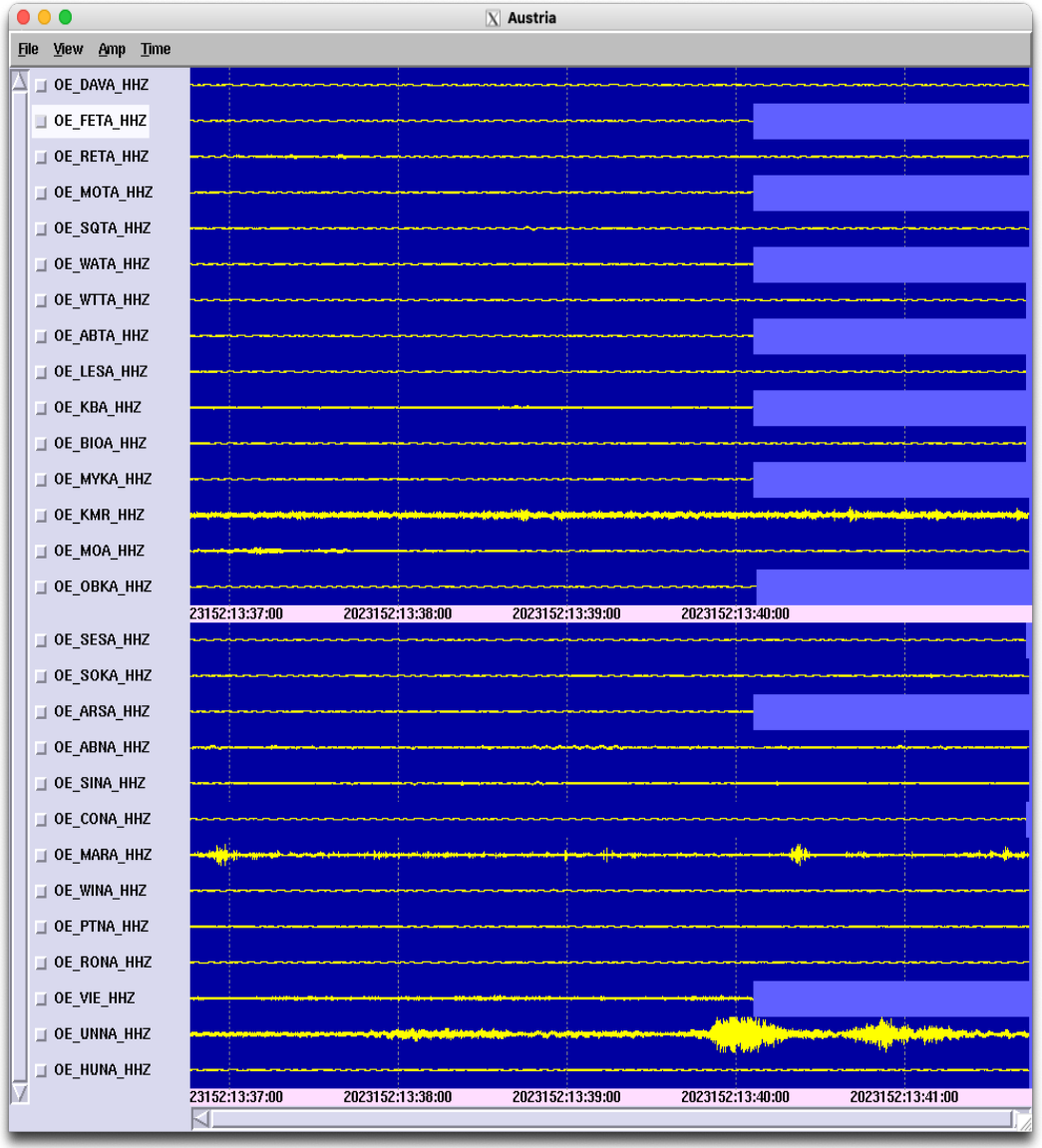
# organize data acquisition - split_pf / sort_pf

**split_pf**

- split data acqusition / data exchange into different instances
- sorts by expressions on site table (lat, lon, distance, name)
- only a subset of stations is affected during failures / maintenance
  - orb2orb (connections)
  - q3302orb (dataloggers)
  - slink2orb (stalist)
  - rtexec (slink2orb)
- supports  backup connection (alternate path to datalogger)

**sort_pf**

- sorts by expressions on site table (lat, lon, distance, name)
  - orbrtd
  - orbmonrtd_dep
  - rtd soon



# monitoring

GeoSphere Austria

## dlmon

Graphik aktualisiert um: Sunday, 04-Jun-2023 07:59:00 UTC

File Views Windows

| dlname | runtm | dr | A: | B: | temp | volt | lat | lon | elev | gpss | gps | pll | cltncy | dltncy |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KM_KMI | 40d23h25m09s | | | | 35C | 13.2V | | | | | | L | 05s | 00s |
| OE_ADSA | 38d15h06m50s | | | | 41C | 13.4V | 47.578 | 14.458 | 637m | | | L | 04s | 00s |
| OE_BGWA | 14h22m36s | | | | 28C | 15.5V | 48.218 | 16.363 | 231m | | | L | 00s | 00s |
| OE_BITA | 40d23h25m13s | | | | 39C | 13.3V | 47.261 | 11.406 | 594m | | | L | 03s | 00s |
| OE_BSTA | 40d23h24m57s | | | | 22C | 13.5V | | | | | | L | 05s | 00s |
| OE_DFSA | 40d23h25m01s | | | | 27C | 13.6V | 46.677 | 15.036 | 1000m | | | L | 04s | 00s |
| OE_DKSA | 40d23h25m10s | | | | 33C | 13.3V | 46.678 | 15.036 | 1089m | | | L | 04s | 00s |
| OE_FRTA | 40d23h24m49s | | | | 26C | 15.6V | 47.153 | 11.348 | 992m | | | L | 00s | 01s |
| OE_GUKA | 102d16h07m03s | | | | 30C | 13.6V | 46.875 | 14.289 | 688m | | | L | 08s | 00s |
| OE_HATA | 40d23h25m03s | | | | 20C | 13.7V | 47.282 | 11.511 | 666m | | | L | 00s | 01s |

- simple website

## Nagios

Nagios®

General
- Home
- Documentation

Current Status
- Tactical Overview
- Map (Legacy)
- Hosts
- Services
- Host Groups
  - Summary
  - Grid
- Service Groups
  - Summary
  - Grid
- Problems
  - Services (Unhandled)
  - Hosts (Unhandled)

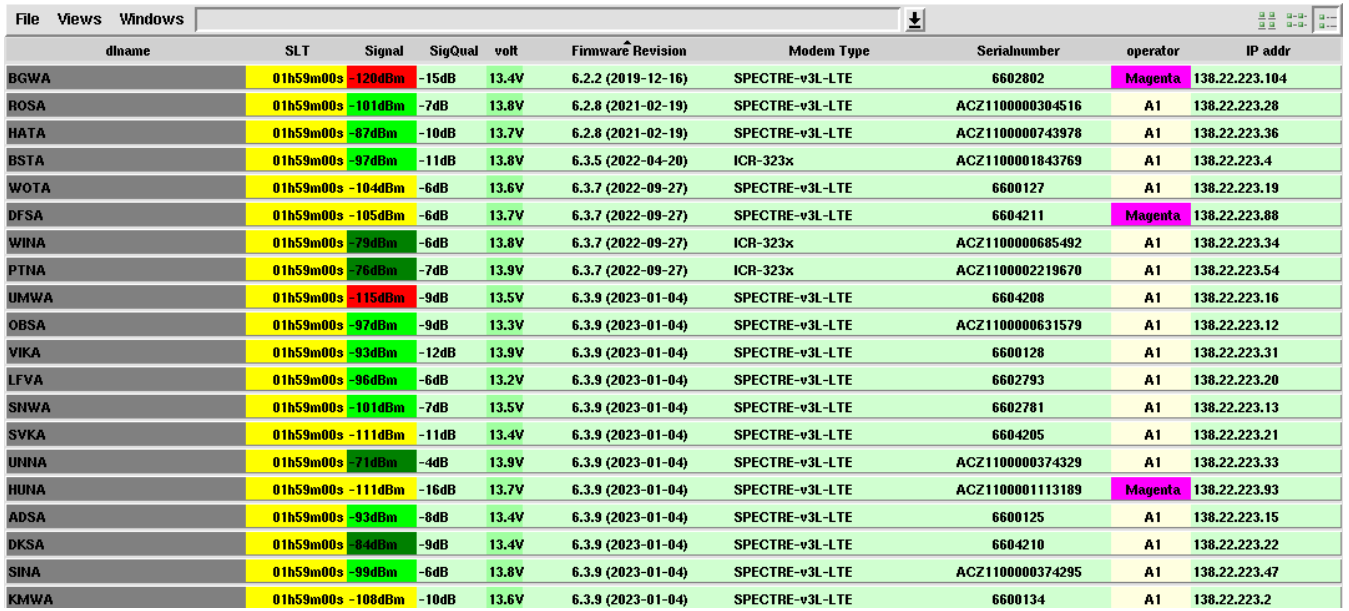
| | | |
|---|---|---|
| LMSA | Datenerfassung | OK |
| | Modem Spannungsversorgung | OK |
| | Modem Temperatur | OK |
| | Modem Traffic | OK |
| | Signal Quality | OK |
| | Signal Strength | WARNING |
| MARA | Datenerfassung | OK |
| | Modem Spannungsversorgung | OK |
| | Modem Temperatur | OK |
| | Modem Traffic | OK |
| | Signal Quality | OK |
| | Signal Strength | WARNING |
| MOA | Datenerfassung | OK |
| MOTA | Datenerfassung | OK |

- homegrown checks
- longtime history
- distributed monitoring
- email alerts

# Expand dlmon with calls to arbitrary functions

configuration

```
sources     &Arr{
ADSA 138.22.223.15,138.22.223.71
m_ss,m_sq,m_vlt,m_temp,m_fw,m_type,m_sn,m_op,m_ip
...
commands &Arr{
m_ss   snmpget -v2c -Ov -Oq -c public $addr CONEL-MOBILE-MIB::mobileSignalStrength.0 # Conel SmartStart modem signal stregth in dBm
...
```




| dlname | SLT | Signal | SigQual | volt | Firmware Revision | Modem Type | Serialnumber | operator | IP addr |
|---|---|---|---|---|---|---|---|---|---|
| BGWA | 01h59m00s | -120dBm | -15dB | 13.4V | 6.2.2 (2019-12-16) | SPECTRE-v3L-LTE | 6602802 | Magenta | 138.22.223.104 |
| ROSA | 01h59m00s | -101dBm | -7dB | 13.8V | 6.2.8 (2021-02-19) | SPECTRE-v3L-LTE | ACZ1100000304516 | A1 | 138.22.223.28 |
| HATA | 01h59m00s | -87dBm | -10dB | 13.7V | 6.2.8 (2021-02-19) | SPECTRE-v3L-LTE | ACZ1100000743978 | A1 | 138.22.223.36 |
| BSTA | 01h59m00s | -97dBm | -11dB | 13.8V | 6.3.5 (2022-04-20) | ICR-323x | ACZ1100001843769 | A1 | 138.22.223.4 |
| WOTA | 01h59m00s | -104dBm | -6dB | 13.6V | 6.3.7 (2022-09-27) | SPECTRE-v3L-LTE | 6600127 | A1 | 138.22.223.19 |
| DFSA | 01h59m00s | -105dBm | -6dB | 13.7V | 6.3.7 (2022-09-27) | SPECTRE-v3L-LTE | 6604211 | Magenta | 138.22.223.88 |
| WINA | 01h59m00s | -79dBm | -6dB | 13.8V | 6.3.7 (2022-09-27) | ICR-323x | ACZ1100000685492 | A1 | 138.22.223.34 |
| PTNA | 01h59m00s | -76dBm | -7dB | 13.9V | 6.3.7 (2022-09-27) | ICR-323x | ACZ1100002219670 | A1 | 138.22.223.54 |
| UMWA | 01h59m00s | -115dBm | -9dB | 13.5V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | 6604208 | A1 | 138.22.223.16 |
| OBSA | 01h59m00s | -97dBm | -9dB | 13.3V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | ACZ1100000631579 | A1 | 138.22.223.12 |
| VIKA | 01h59m00s | -93dBm | -12dB | 13.9V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | 6600128 | A1 | 138.22.223.31 |
| LFVA | 01h59m00s | -96dBm | -6dB | 13.2V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | 6602793 | A1 | 138.22.223.20 |
| SNWA | 01h59m00s | -101dBm | -7dB | 13.5V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | 6602781 | A1 | 138.22.223.13 |
| SVKA | 01h59m00s | -111dBm | -11dB | 13.4V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | 6604205 | A1 | 138.22.223.21 |
| UNNA | 01h59m00s | -71dBm | -4dB | 13.9V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | ACZ1100000374329 | A1 | 138.22.223.33 |
| HUNA | 01h59m00s | -111dBm | -16dB | 13.7V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | ACZ1100001113189 | Magenta | 138.22.223.93 |
| ADSA | 01h59m00s | -93dBm | -8dB | 13.4V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | 6600125 | A1 | 138.22.223.15 |
| DKSA | 01h59m00s | -84dBm | -9dB | 13.4V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | 6604210 | A1 | 138.22.223.22 |
| SINA | 01h59m00s | -99dBm | -6dB | 13.8V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | ACZ1100000374295 | A1 | 138.22.223.47 |
| KMWA | 01h59m00s | -108dBm | -10dB | 13.6V | 6.3.9 (2023-01-04) | SPECTRE-v3L-LTE | 6600134 | A1 | 138.22.223.2 |

needs expanded parameter file for dlmon

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# CTBT – bulletins

reb2db

- new default schema css3.1 to allow for large (arrival) IDs used at CTBT
- few other changes to follow format specifications used at CTBT
- unfortunately, databases in css3.1 cannot be used with dbloc2

db2orbpf - python script to export databases to an orb

- similar to dbevent2orb / dborigin2orb
- database format changes possible
- can be called from within dbloc2

we still use our homegrown support for non-seismic data from CTBT

- ctbtmet2db
- ctbtrrr2db
- ctbtxmlrrr2db
- support for mail_parser (import handlers)
- schema ctbto1.2 with tables for arr/rrr/met

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# emsc / usgs / other

**emsc2db / usgs2db**

- -p proxy (default per requests library is to use env variables)
- orb output
  - -P prefix
  - -o <prefix>/db/<table> to orb
  - -O <prefix>/pf/orb2dbt to orb
  - -s schema
  - -A archive everything (like dborigin2orb)
  - -B write magnitude to origin.mb, helps with orb_quake_alarm

**fdsntxt2db**

- retrieve event information from FDSN-like servers supporting only text format (e.g. INGV)

**gfzrss2db**

- some datacenters do not yet provide FDSN-like event information

# ObsPy

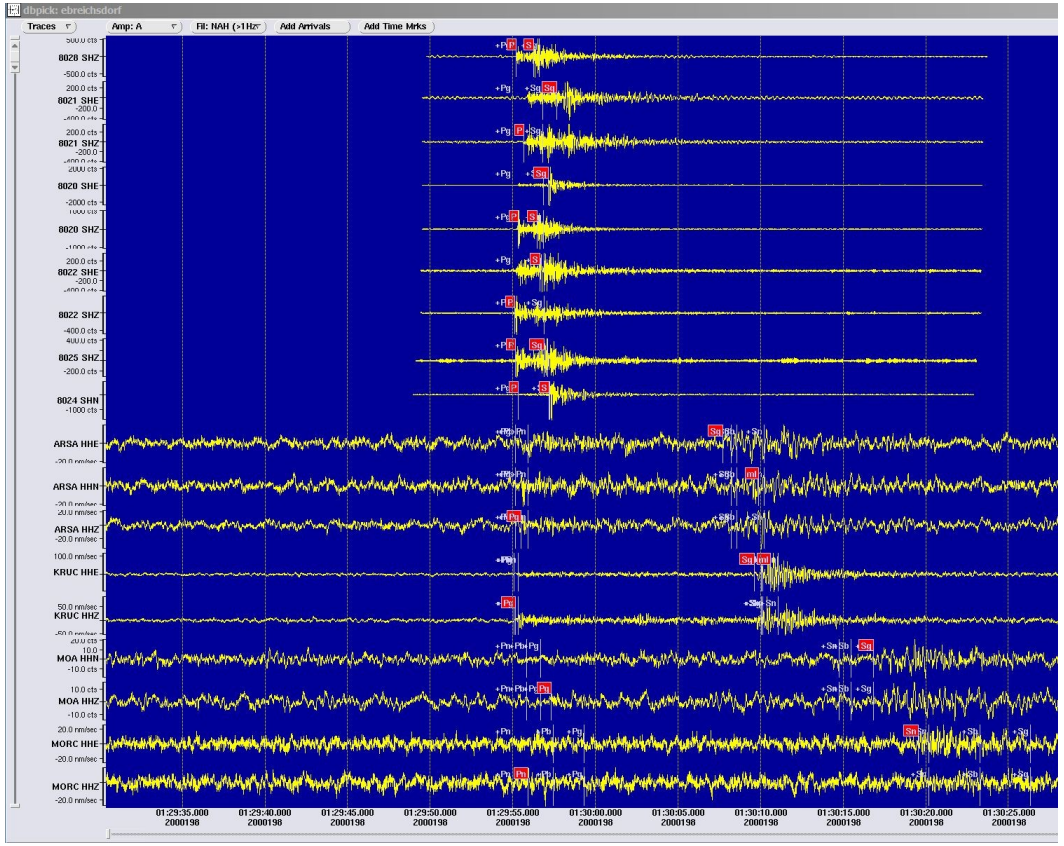
ObsPy bindings for Antelope
Motivated by the availability of legacy data

2 libraries for import / export, written in Python
(obspy2db / db2obspy)
still unclear if it should be object-oriented
metadata not yet supported

simple but effective scripts for import and export
gives immediate access to all formats supported by ObsPy
current version saves waveforms to miniseed only

SEISAN format for station metadata not supported,
simple import tool added

still some work needed – help is appreciated!



# Archive / QC

**archive**

save waveforms with orb2wf ( ~40G daily)

db2msd after 5 days

nightly cronjob to archive

duplicate waveforms on second computer (~1 month)

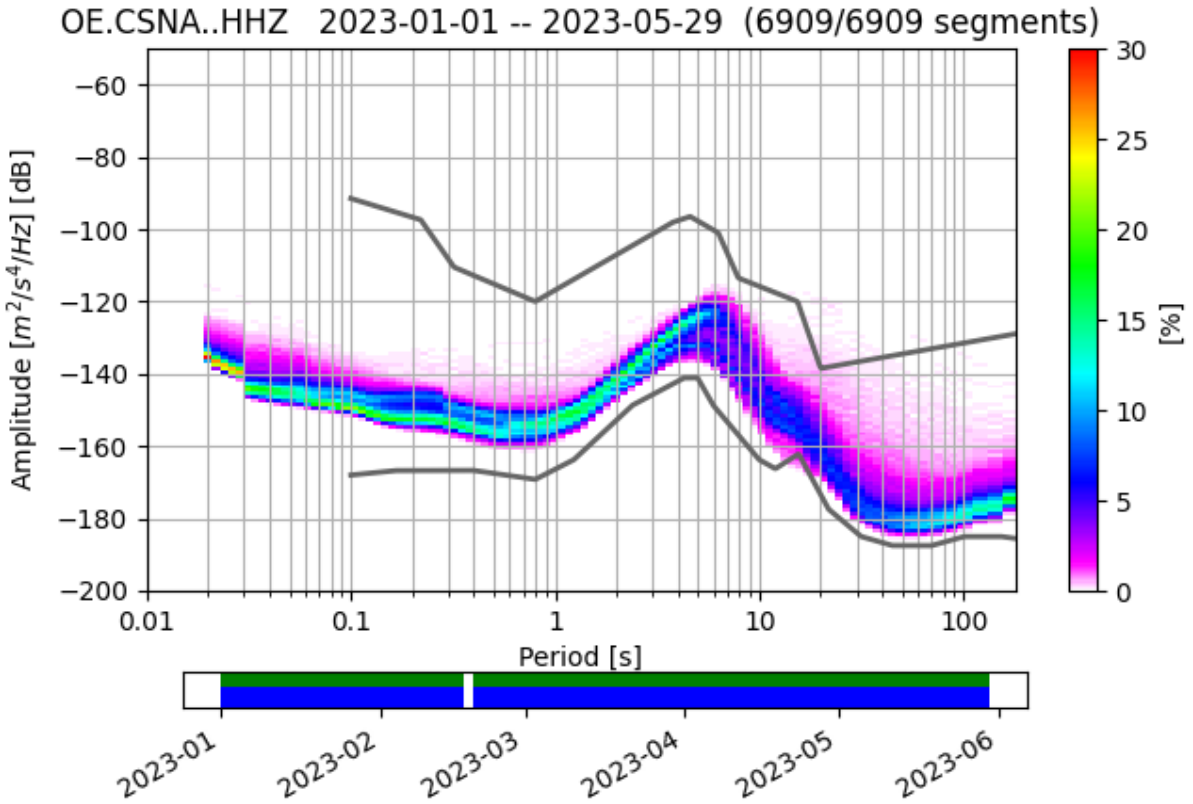
**QC**

overview plots with ObsPy

PPSD with ObsPy

monitor age and size of archive with nagios

monitor IDs with Nagios (overflow of wfid)



# export automatic solutions and manual updates

send_alerts - Python script to distribute automatic lo alarms and updates

- relies on ***dbnew2orb*** for data transport
- initial location produced on one machine
- manual review on opter computer(s)
- all combined into one database

*orb2dbt -overwrite*

- check if alarm criteria match

write to alarm table

or

- this is an update

of an event found in the alarms table

→ send update

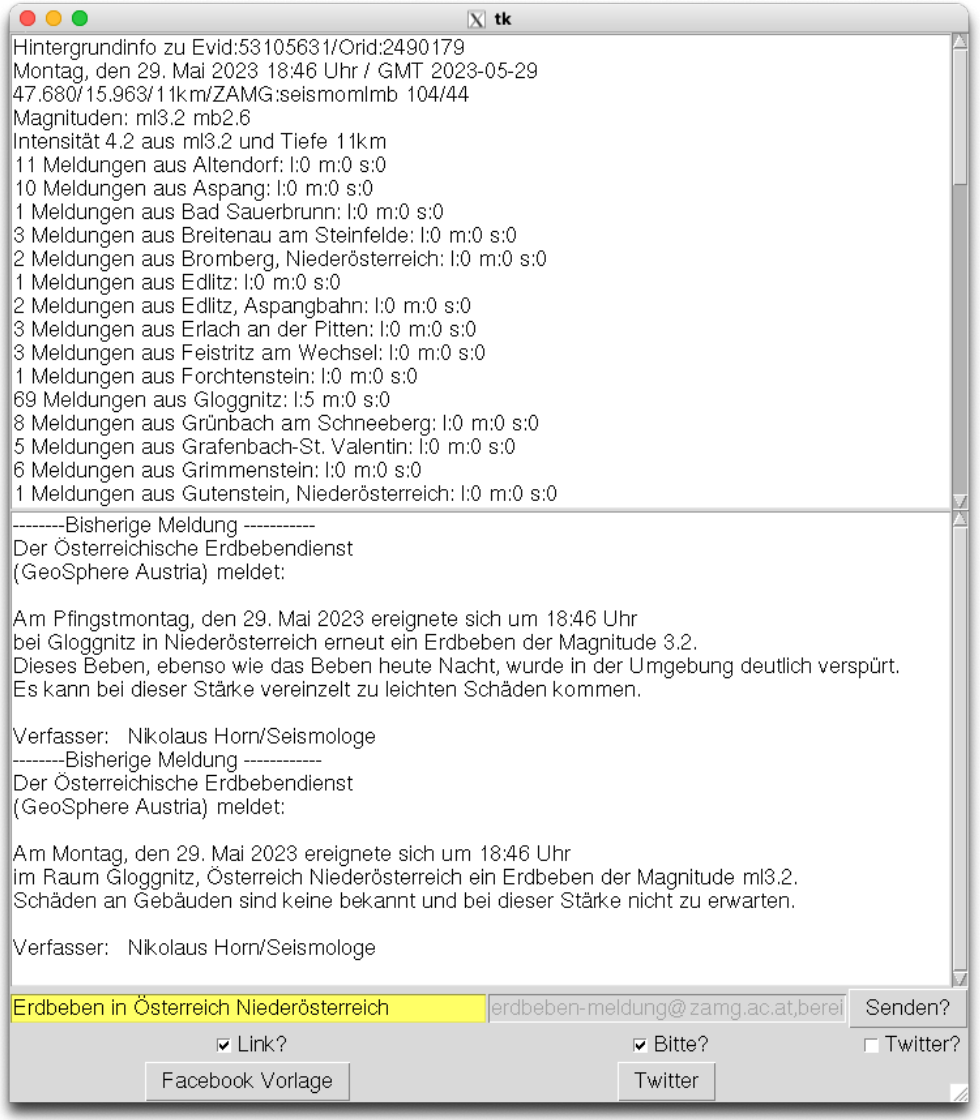
- use *evid* to identify event
- therefore we need a central idserver

# event info

Python script to distribute press releases

- checks felt reports
- template adjusted according to
  - location, time
  - magnitude
  - pseudo-intensity
- saves report in alarm table
- uses alternate template for
  - facebook – copy text to clipboard
  - twitter – tweet directly
- *table alarms* used

for various other purposes



# Twitter

Python script to send tweets based upon python-twitter

- adds link to website with event details
- image recycled from website
  - uses „requests“ to check if image already present on website
- template adjusted according to
  - location
  - magnitude
  - pseudo-intensity
- no interaction needed

# GeoSphere website

still based on dbrecenteqs

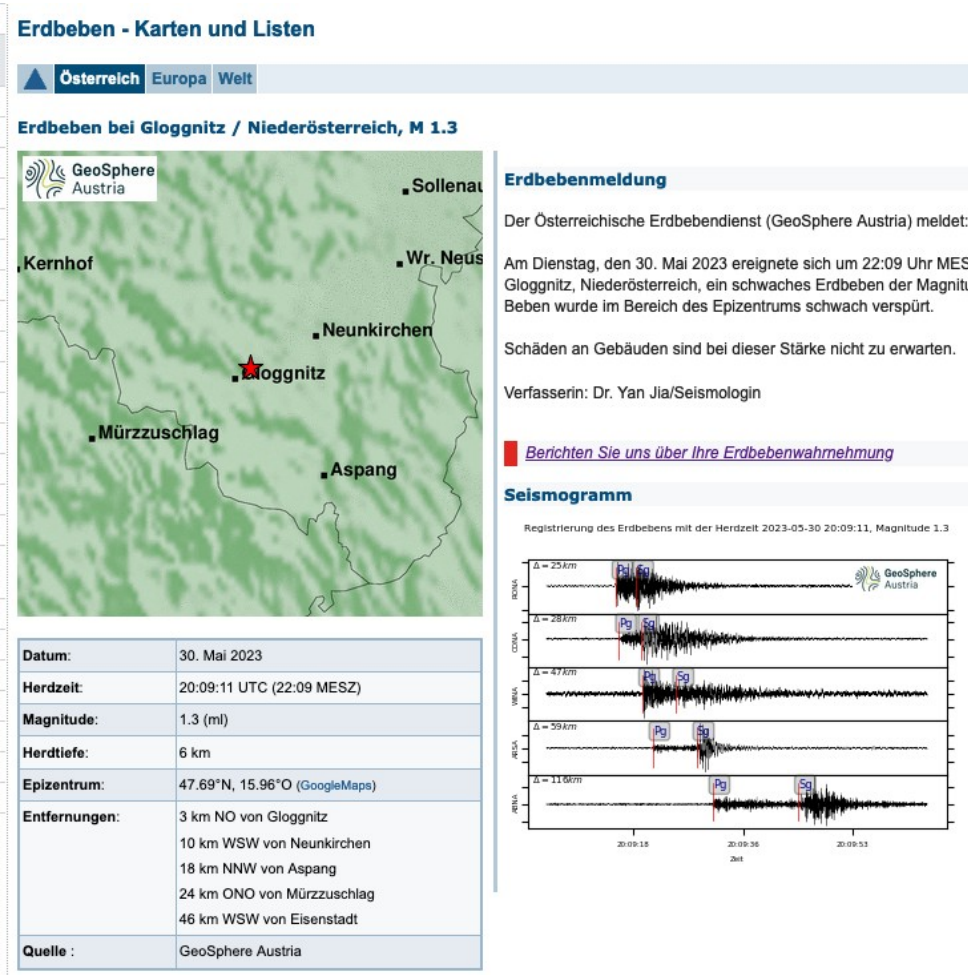
- static image produced with gmt
- waveforms from up to 5 austrian stations
- optional press release
- different databases for
  - nearby cities
  - cities and regions for maptitle
  - cities on different zoomlevels
- links on main site

all events in Austria

all events

last highlighted event in Austria

last highlighted event worldwide



# emails

motivation

- proper support of german ümlauts needed
- some links are long and/or ugly
- smoothens transition from ZAMG to GeoSphere Austria
- outlook sometimes a bit strange

new Python library to send emails with embedded links

**zamg.mailutils**

- based on Python libraries preinstalled with Antelope
  - smtplib
  - email.mime
  - email.header
- text version optionally produced from html version
- optionally one email per recipient
- separator for multiple recipients configurable
- setup from site.pf can be overridden in parameter file

Der Österreichische Erdbebendienst
(GeoSphere Austria) meldet:

Am Dienstag, den 30. Mai 2023 ereignete sich um 22:09 Uhr MESZ
bei Gloggnitz, Niederösterreich, ein schwaches Erdbeben der Magnitude 1,3.
verspürt.

Schäden an Gebäuden sind bei dieser Stärke nicht zu erwarten.

Verfasserin: Dr. Yan Jia/Seismologin

Die aktuellen Informationen über das Ereignis finden Sie auf der Website
des Österreichischen Erdbebendienstes.

Der Erdbebendienst ersucht die Bevölkerung um Rückmeldung betreffend
die Auswirkungen des Erdbebens über eine der folgenden Möglichkeiten:
· Web-Formular
· App QuakeWatch Austria
· Post an folgende Adresse (Porto zahlt Empfänger):
Österreichischer Erdbebendienst
GeoSphere Austria - Bundesanstalt für
Geologie, Geophysik, Klimatologie und Meteorologie
Hohe Warte 38
A-1190 Wien

Aus ZAMG und GBA wurde mit dem 1. Jänner 2023 die
GeoSphere Austria. Alle unsere bisherigen
Dienstleistungen bleiben gleich.

# AEC – austrian earthquake catalogue

**all events with ml**

updated from review database

interactive script for manual update for older events

pre-searched geographical search

- country
- province
- district
- seismic region

quality parameters

100k events

134k origins

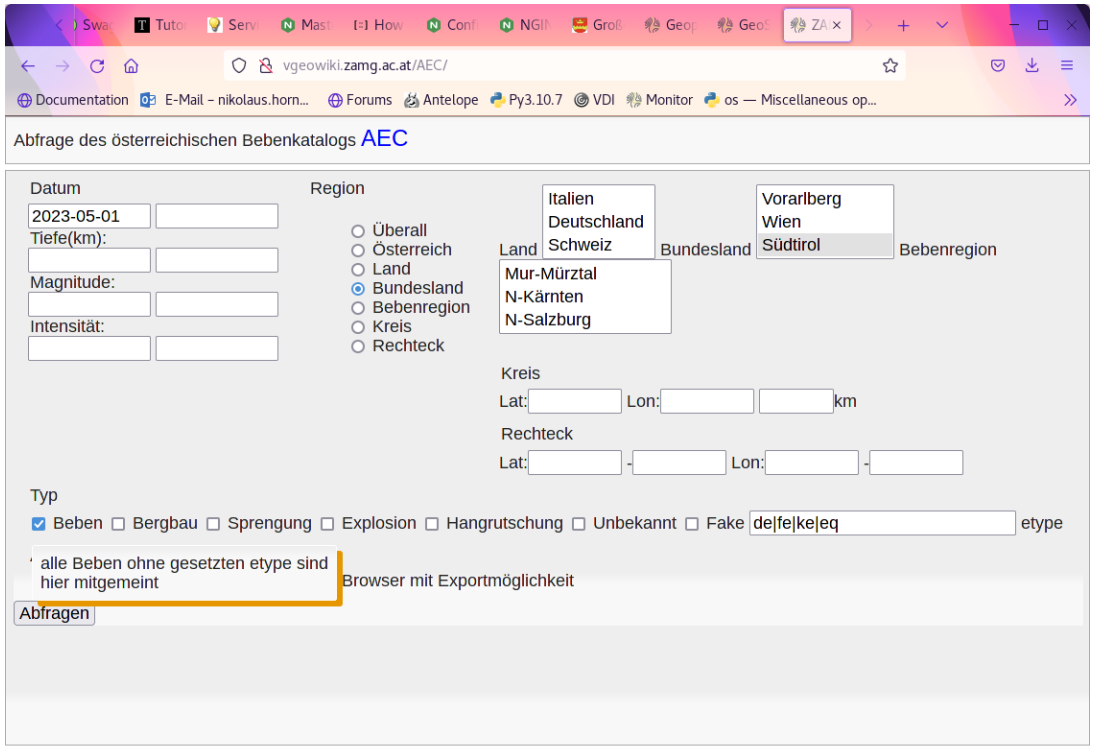
233k netmags

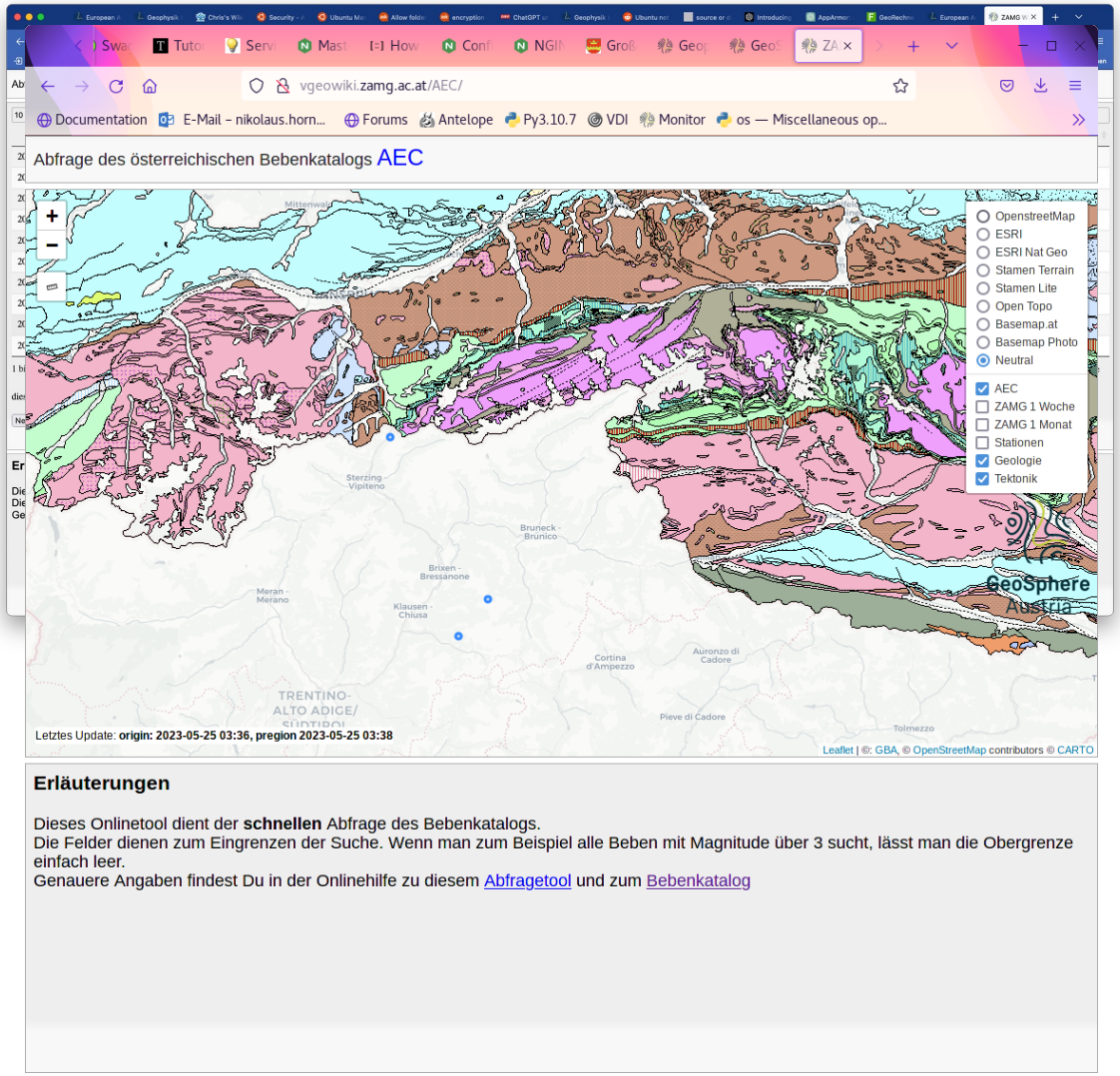
1.3M stamags

**additional tables for**

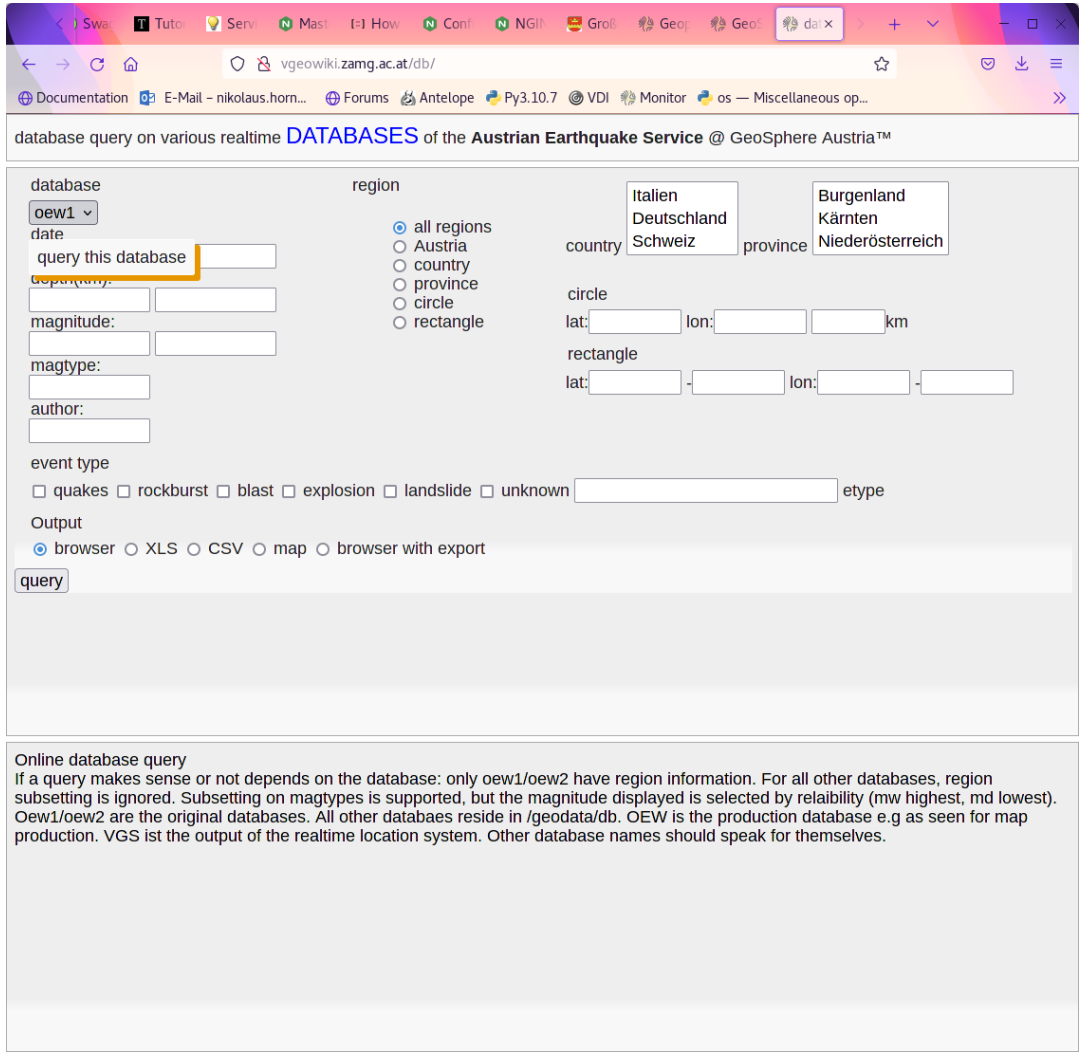
- macroseismic information
- quality control

# AEC query


vgeowiki.zamg.ac.at/AEC/
Abfrage des österreichischen Bebenkatalogs AEC
Datum
2023-05-01
Tiefe(km):
Magnitude:
Intensität:
Region
Überall
Österreich
Land
Bundesland
Bebenregion
Kreis
Rechteck
Land
Italien
Deutschland
Schweiz
Bundesland
Vorarlberg
Wien
Südtirol
Bebenregion
Mur-Mürztal
N-Kärnten
N-Salzburg
Kreis
Lat: Lon: km
Rechteck
Lat: - Lon: -
Typ
Beben Bergbau Sprengung Explosion Hangrutschung Unbekannt Fake
de|fe|ke|eq
etype
alle Beben ohne gesetzten etype sind hier mitgemeint
Browser mit Exportmöglichkeit
Abfragen
Erläuterungen
Dieses Onlinetool dient der schnellen Abfrage des Bebenkatalogs.
Die Felder dienen zum Eingrenzen der Suche. Wenn man zum Beispiel alle Beben mit Magnitude über 3 sucht, lässt man die Obergrenze einfach leer.
Genauere Angaben findest Du in der Onlinehilfe zu diesem Abfragetool und zum Bebenkatalog


vgeowiki.zamg.ac.at/AEC/
Abfrage des österreichischen Bebenkatalogs AEC
OpenstreetMap
ESRI
ESRI Nat Geo
Stamen Terrain
Stamen Lite
Open Topo
Basemap.at
Basemap Photo
Neutral
AEC
ZAMG 1 Woche
ZAMG 1 Monat
Stationen
Geologie
Tektonik
Letztes Update: origin: 2023-05-25 03:36, pregion 2023-05-25 03:38
Leaflet | ©: GBA, © OpenStreetMap contributors © CARTO
Erläuterungen
Dieses Onlinetool dient der schnellen Abfrage des Bebenkatalogs.
Die Felder dienen zum Eingrenzen der Suche. Wenn man zum Beispiel alle Beben mit Magnitude über 3 sucht, lässt man die Obergrenze einfach leer.
Genauere Angaben findest Du in der Onlinehilfe zu diesem Abfragetool und zum Bebenkatalog

# online database query




fast ineractive query
**very** fast thanks to cached geographical search

output formats

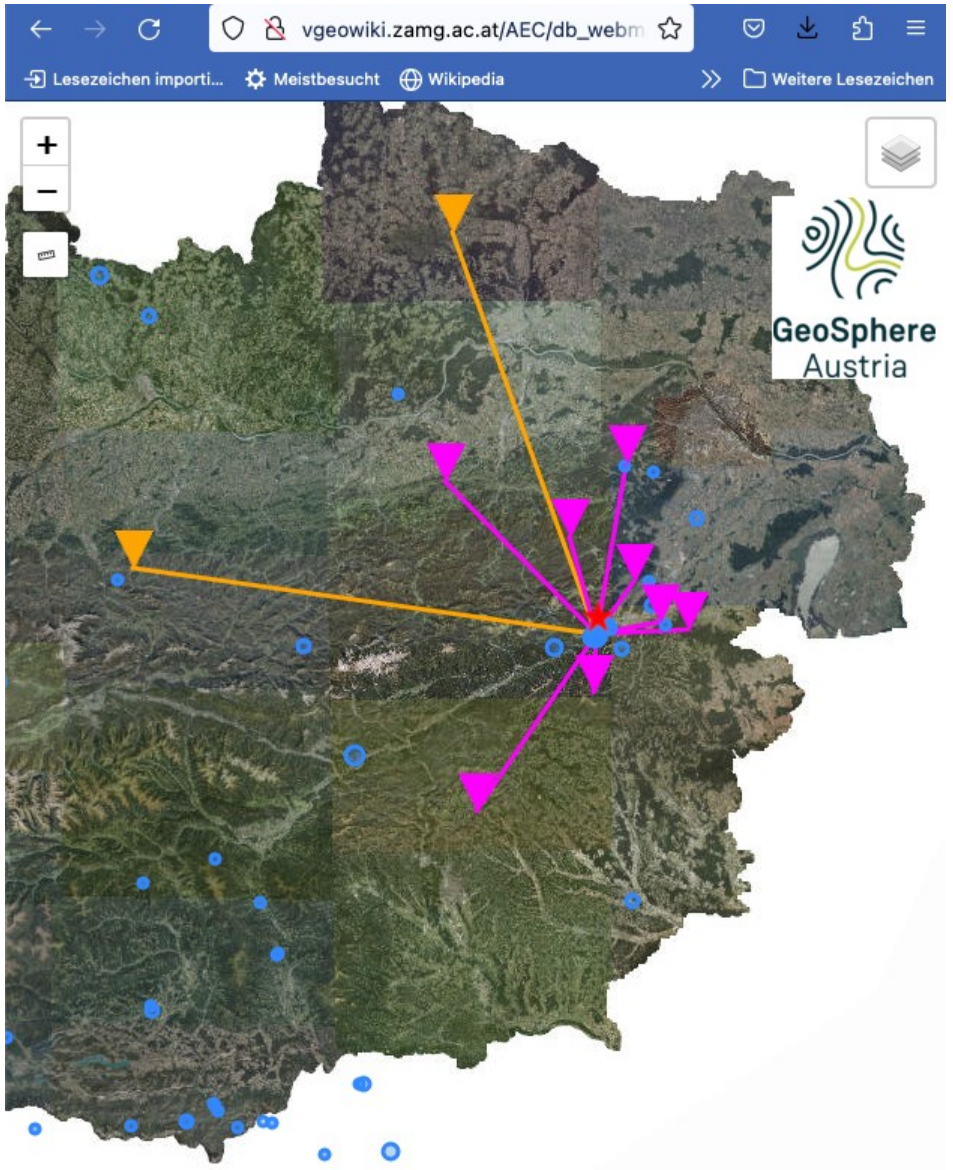
- table
- Excel (xlwt, some bizarre problems fixed)
- CSV
- homegrown interactive map based on leaflet
  - easy to embed external webservices
- JavaScript libraries **Data Tables** and extension **Buttons** → PDF, CSV, Excel, printer, clipboard

# webdbevents

## webdbevents

CGI based alternative to dbevents

- webserver needed
- webserver needs to have access to database
- overlays easy to embed
- various maps
- ruler
- dbloc2 plugin to open URL in browser: dbopen_url



# dbopen_url

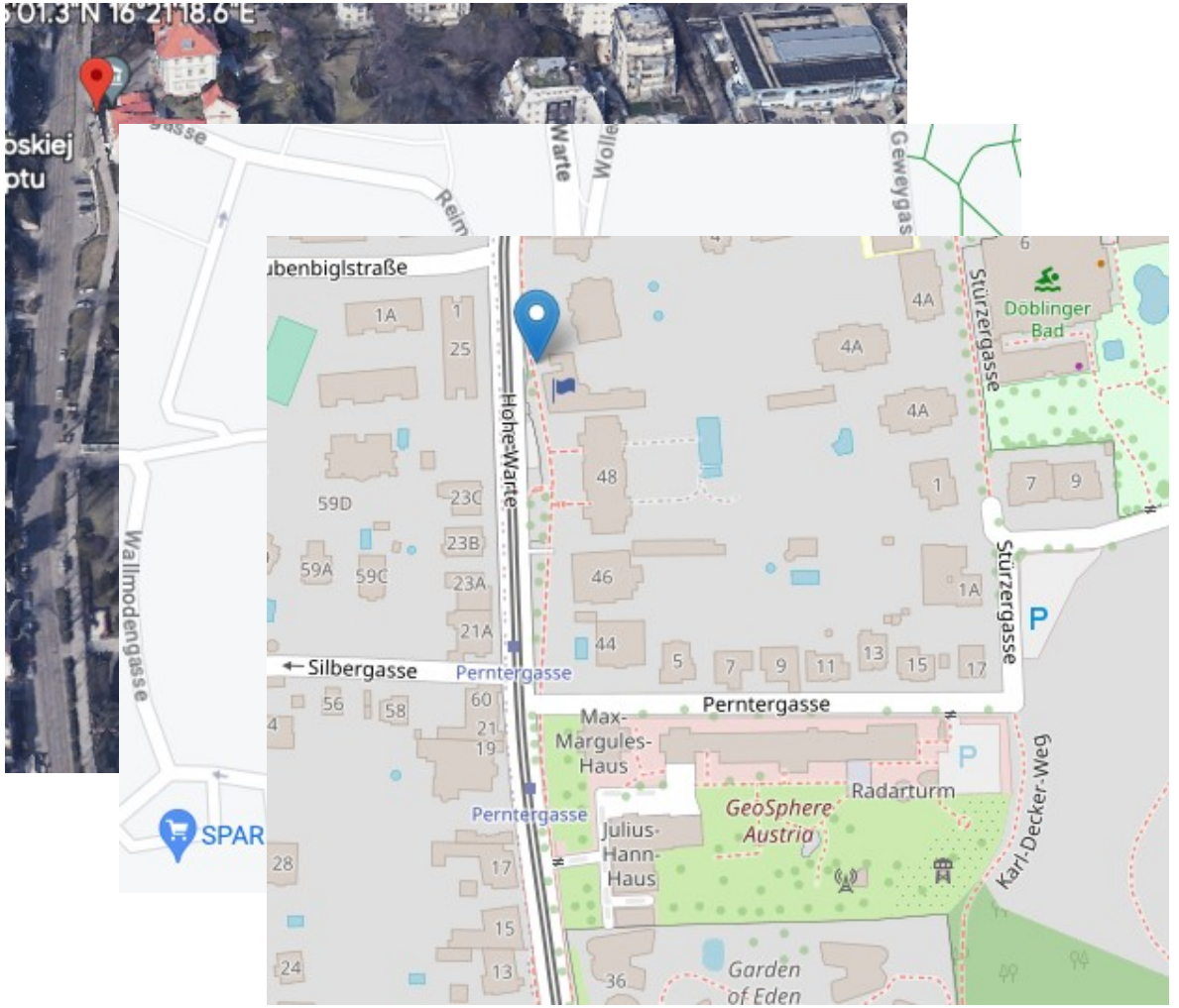
**dbopen_url**

to be called from

- commandline
- dbe
- dbloc2

default parameterfile comes with templates for

- earth.google.com
- www.google.com/maps
- www.openstreetmap.org



# leaflet based webmaps

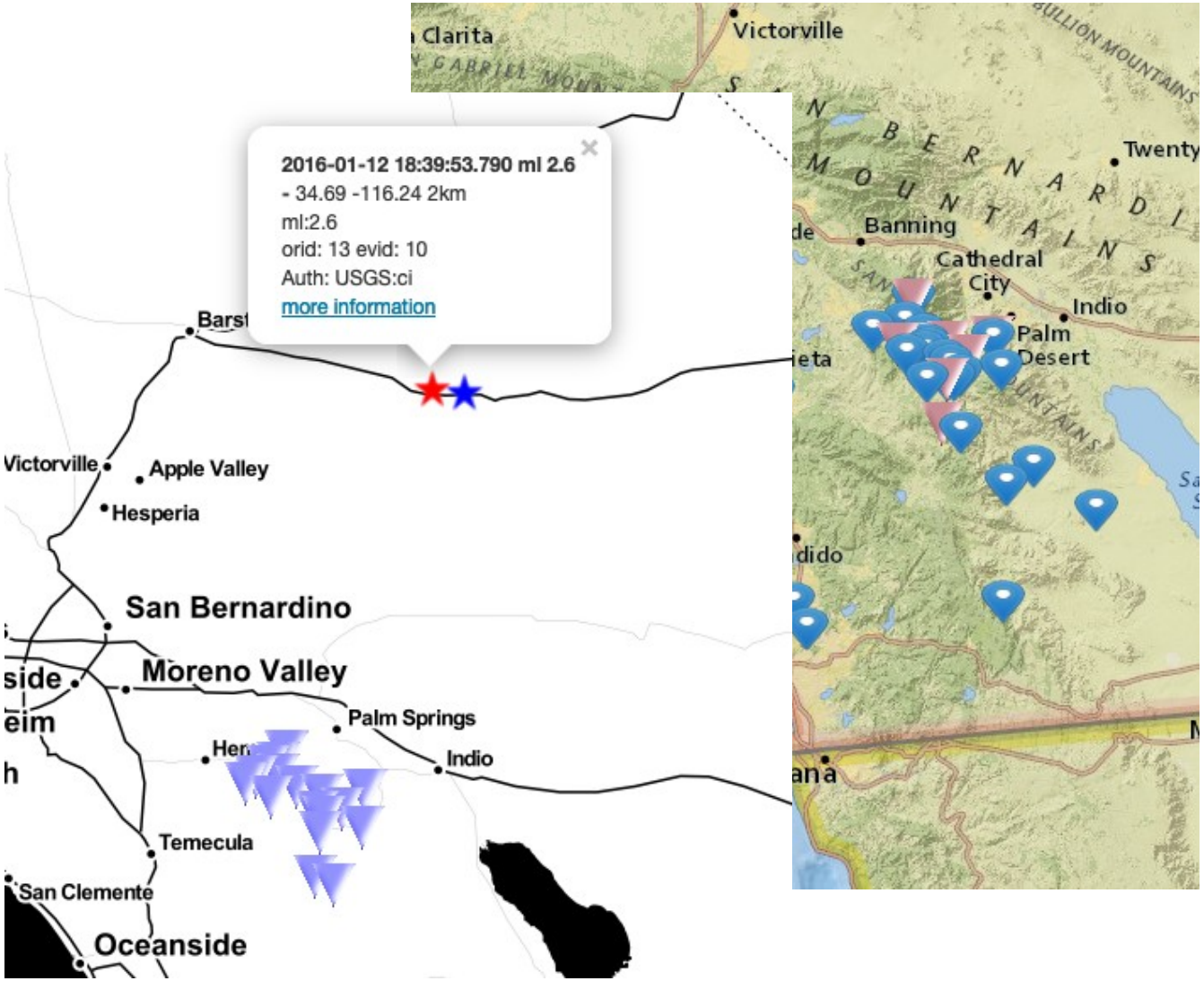
interactive webmaps based on leaflet
java script libraries via CDN
symbols courtesy GeoSphere

**web_stamap**

- group stations by search expression

**web_evmap**

- stations used
- all stations
- event information for prefor on separate page



# webservices

**five+ years mobile app**

**display events**

- our data data provided with FDSN-like webservices (JSON)
- delete events by setting special etype
- data from our website transferred to webserver via dbnew2orb

**collect felt reports**

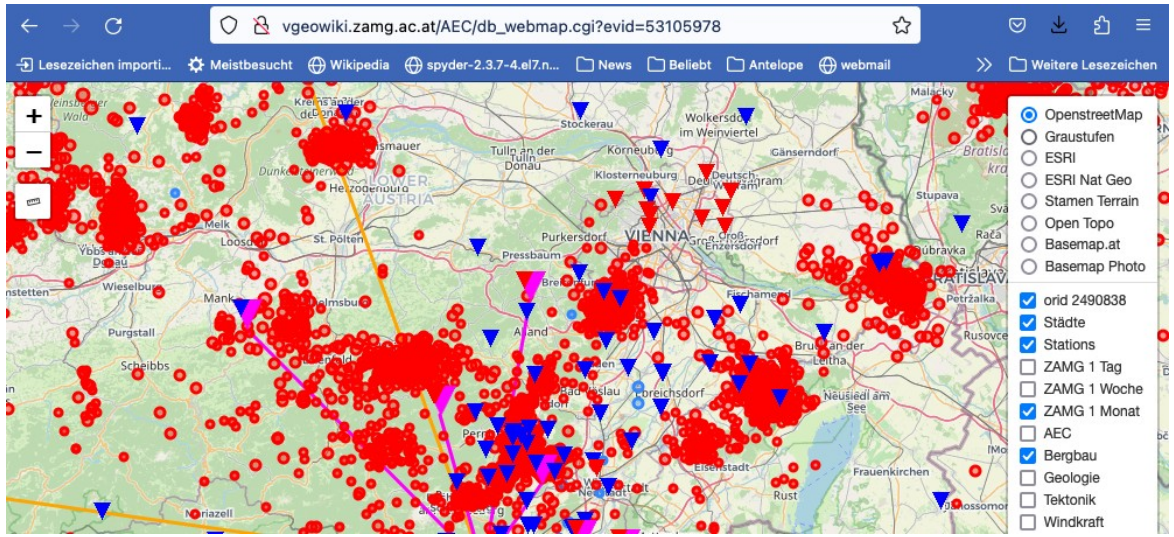
- data provided to us as webservice
- distributed via orb

**homegrown FDSN-webservices**

- Python modules cgi, cgitb, json, xml.dom, xml.etree
- event – QuakeML, JSON
- station – stationXML, text. db2stationXML not really flexible
- dataselect – diskspace on server an issue

**JSON-files as background layers for webmaps**

- station
- events
- measurements
- macroseismic data



# unsorted other stuff

**pydoc disappeared some versions ago**
but there's help: *python -m pydoc*

**the Python interface crashes when reading NON-UTF8 strings**
need to iterate over all fields

**ttgrid_show had disappeared**
but there's help: ttgrid_info should do the same

**orbassoc not trivial with variable station density**

**slink2orb needs fixes**

**my life is easier with references in parameter files**

```
User    &Arr{
Institution     &ref(site,Institution)
arrival_menu_items &ref(dbloc2,User{arrival_menu_items})
```

**would be nice to have support for references in  pfe**

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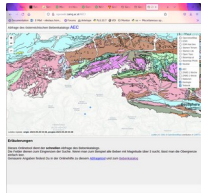
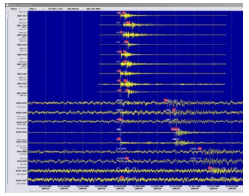
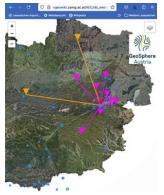
# interested?
# repo with internal stuff open upon request!







**Seismological Service**
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