Publication and archiving of research data at the Geophysical Instrument Pool Potsdam (GIPP)

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The Geophysical Instrument Pool Potsdam (GIPP)

Mission:
The “Geophysical Instrument Pool Potsdam (GIPP)” of the GFZ “German Research Centre for Geosciences” provides seismic and magnetotelluric instruments and sensors

- Research infrastructure since 1993
- Run by Section 2.2 Deep Geophysical Sounding
- For academic research: GFZ and national and international loans
- Funded by GFZ
- 6+ staff (mainly technical) + apprentice
- Transparent procedures (“rules”), external steering board
Application & Supply Procedure

1. Idea
2. Application
3. Steering Board Evaluation/Recommendation
4. GFZ-Executive Board Decision/Approval
5. GIPP Supply, guidance, training
6. Experiment
Responsibilities & duties

**GIPP responsibilities/duties:**
- Supply of seismological and electromagnetic field equipment
- Packing, preparation
- For temporary experiments (<2yrs)
- Maintenance of equipment
- Market/product analysis; purchases
- Guidance/training of users, assistance
- **archiving of data (partly with GEOFON)**
- Hard- and software-development, company spin-off

**User's responsibilities/duties:**
- Field operation
- Transport/shipping/customs
- Permits
- Consumables
- Fully liable (insurance!)
- **Data delivery**
Seismology

Recorders

219 (1ch) + 280 (3ch)

Sensors

200

GFZ
Helmholtz Centre Potsdam

HELMHOLTZ
Magnetotellurics

Recorder

Sensors & control-boxes

Induction coils magnetometer & elektrodes

Number of units in red
Seismics

Recorders
- GEODE: 264 ch
- CUBE: 219(1ch) + 280 (3ch)
- PEG-40: 192 ch

Sources
- SISSY: >300
- SUMMIT: >270

Sensors
- MARK 1Hz: 200
- 4.5Hz
- 10Hz

Number of units in red
DEPAS

German Pool for Amphibious Seismology
GIPP / GEOFON Data management

- Seismologic, controlled source seismic and magnetotelluric data
- Raw data (time series) from loggers (**level 0**) in several formats (miniSeed, CUBE, Emerald,…)
- Modified data (filtered, re-sampled, cut to time segments) and converted into standard formats (miniSeed, Emerald) (**level 1**)
- Organized in Projects / Experiments (GIPP Experiment Database)
- Experiment, Stations and Files metadata included
- Archived in various levels of completeness (up to data publication with doi and report)

- Seismological data
- Data in miniSeed format cut to time segments of interest (**level 1**)
- Miniseed headers edited to contain station ID, network ID and channel ID.
- Organized in networks (temporary or permanent) from GFZ or other institutes
- Temporary networks can coincide with GIPP experiments
- Network and station metadata included in station.xml files
- Archived in high level of standardization (geofon.gfz-potsdam.de)
FAIR principles

Findable  Accessible  Interoperable  Reusable

Image: wikimedia, SangyaPundir
GIPP Data cycle

Instrument user – Data producer

Experiment → Data

GFZ

GIPP
Application evaluation
Instrument supply
Instrument maintenance
Experiment Database

GEOFON
Dataset curation
Database software
Provide doi
GEOFON web access

GFZ LIS
Data related report
Provide doi

GIPP Archive – GFZ Data services
Dataset curation
Data publications
Provide doi

Data user

Derived work
Processing, modelling, …
Scientific publications

Own work
Processing, modelling, …
Scientific publications
Experiment database
Data publication / reports

Xml files with metadata

Xslt stylesheet
Data publication / reports

Report on the data of project EMERES 2015
(Wide characterization of the PIEN-ICCP and locations to understand the relation between geotectonic features and crustal fluid pathways by imaging the electrical conductivity structure)

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Abstract
The area around Nagy Kőfehérvári is part of the geodynamic active Variscan orogenic belt in Europe, and experiences repeated intrusion of intraplate earthquakes and is characterized by numerous mineral springs and CO2 emissions. These phenomena are usually related to volcanic activity. To better understand the underlying processes, the Egér rift and the Graben Basin are surveyed as a possible location for several scientific drillings.

Microseismicity UT data sense the electrical resistivity of the Earth, a physical parameter that is particularly sensitive to the presence of low-resistivity phases such as aqueous fluids, partial melts or metallic compounds. Fluid phases have electrical conductivities orders of magnitude lower than that of the rock matrix, and relatively small amounts of fluids, when interconnected, can thus decrease bulk rock resistivity by several orders of magnitude. Measurements of electrical resistivity can therefore be used to constrain the volume of subsurface fluids, their interconnectedness and the rheology of the crust and mantle.

Coordinatess: 50° 32' 9.5" N, 21° 45' 34.5" E
Experimental time borders: from 19.02.2015 to 01.05.2015
Keywords: Microseismicity, West Bohemia, Jura, Conventional channels, Prolifer, Earthquakes

1. Introduction

The basement of the western part of the Bohemian Massif (Czech Republic) belongs to the Variscan orogenic belt of Europe, built up by Pre-Permian rocks. The Egér rift, located in this area, is the eastern extension of the European Carpathian orogen (EOCS). The western part of the Egér rift is dominated by ongoing magmatic processes associated in the intra-continental lithospheric mantle. These processes include the occurrence of repeated earthquake swarms of M ≥ 4.5 (e.g. Póth et al., 2014). The eastern region is part of the M 5.4 striking Régensburg-Leipzig active zone. The intersection area between the WS/WS ENE–running Egér rift and the Régensburg-Leipzig zone is called Graben Basin. The main focal area, located close to Nyári Site (7C part of the Graben Basin).

The increased geodynamic activity also involves two main crustal movements: Quaternary volcanism and degassing of CO2 from mineral springs and wet and dry geysers. The high (-3-4)-value of the CO2 dominated gases up to 100% indicates a lithospheric origin (Ludwig et al., 2014). It present the Egér rift is the only known intra-continental region of the EOCS where such deep seated, active lithospheric processes currently occur. However, the geodynamic nature and the implications of these processes still remain enigmatic.

3. Experimental setup and schedule

Microseismicity data were collected during a field campaign in September 2015 (from September 17th to October 17th) along two 50 km long profiles, roughly perpendicular to each other: one running approximately N–S with 23 stations and another one running approximately E–W with 22 stations. The choice of two approximately perpendicular profiles was made due to the peculiar geological setting in the study area. Since the area of interest is located at the intersection of the Wülfrath–Kugel Fault (WKF), with a left-lateral strike-slip extension, and the Egér Graben (EGR), striking ENE–WSW, we tried to cross these structures at an angle with both our profiles.

3.1 Station locations

The following tables contain a list of all measured UT stations with starting and ending measurement times, station location (altitude, longitude, and latitude) and available data types.

<table>
<thead>
<tr>
<th>Site</th>
<th>Startdate</th>
<th>Enddate</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Altitude</th>
<th>Data type</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR</td>
<td>2015-01-23</td>
<td>2015-05-25</td>
<td>49.87232</td>
<td>12.01298</td>
<td>128.13229</td>
<td>✓</td>
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<td>WKF</td>
<td>2015-01-23</td>
<td>2015-05-25</td>
<td>50.44144</td>
<td>12.20879</td>
<td>281.02394</td>
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</tr>
<tr>
<td>EGR</td>
<td>2015-01-22</td>
<td>2015-05-25</td>
<td>49.87232</td>
<td>12.20879</td>
<td>121.30464</td>
<td>✓</td>
</tr>
</tbody>
</table>

Figure 1: Geological map.
GIPP Data cycle

Instrument user – Data producer

Experiment

Data

Data user

Own work
Processing, modelling, …
Scientific publications

GFZ

GIPP
Application evaluation
Instrument supply
Instrument maintenance
Experiment Database

GEOFON
Dataset curation
Database software
Provide doi
GEOFON web access

GFZ LIS
Data related report
Provide doi

GIPP Archive – GFZ Data services
Dataset curation
Data publications
Provide doi

Derived work
Processing, modelling, …
Scientific publications

Instrument Persistent IDentifier (PID)
calibration of sensors
Instrument SensorML files

<?xml version="1.0" encoding="UTF-8"?>
  <gml:identifier codeSpace="uniqueID">11708/DO79FEE0-820F-4B85-884C-FA29F850EAF5</gml:identifier>
  <gml:identification>
    <gml:identifierList>
      <gml:identifier>
        <gml:Term definition="http://sensorML.com/ont/sensorextension/definition/Program.html">
          <gml:label>Program</gml:label>
          <gml:value>grippe</gml:value>
        </gml:Term>
      </gml:identifier>
      <gml:identifier>
        <gml:Term definition="http://miwg.org/ont/loop/definition/sensorID.html">
          <gml:label>Code</gml:label>
          <gml:value>MS-1008</gml:value>
        </gml:Term>
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        </gml:Term>
      </gml:identifier>
      <gml:identifier>
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          <gml:value>MARK L-40C-3D</gml:value>
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      <gml:identifier>
        <gml:Term definition="http://sensorML.com/ont/sensorextension/definition/URL.html">
          <gml:label>URL</gml:label>
          <gml:value>http://secc20122.gfz-potsdam.de/gipn/mark14us/view/2</gml:value>
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  </gml:identification>
</gml:PhysicalComponent>
Outlook

- Optimize workflow for data publication
- Integrate SensorML metadata into handle.net Persistent Identifiers
- Improve integration with GEOFON database
- Report templates for heterogeneous seismic experiments