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WP7 – Task 7.3:

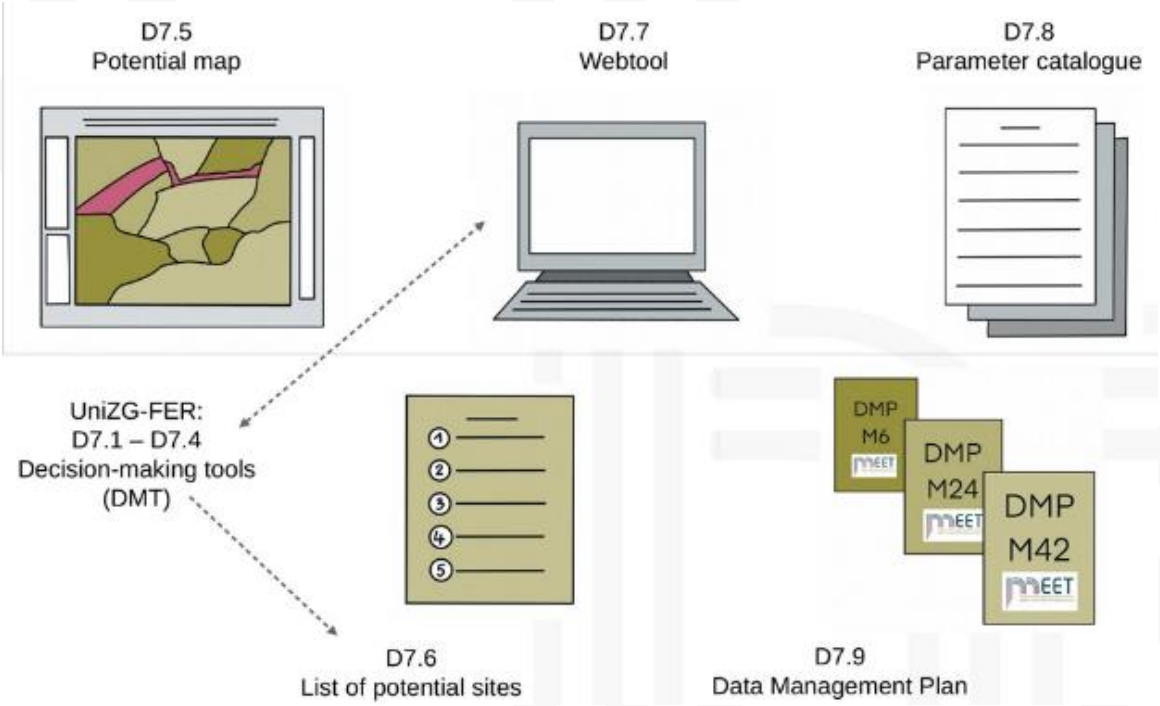
GIS-analysis and visualization on European scale to locate and initiate promising EGS projects

Bianca Wagner – Geoscience Centre, University of Göttingen, Germany, bwagner1@gwdg.de

Richu Mary Shelly, Claudia Malzer – Göttingen State and University Library, Germany

Sebastian Schrage, Simon Maedge – Institute of Computer Science, University of Göttingen, Germany

Deliverables of Task 7.3



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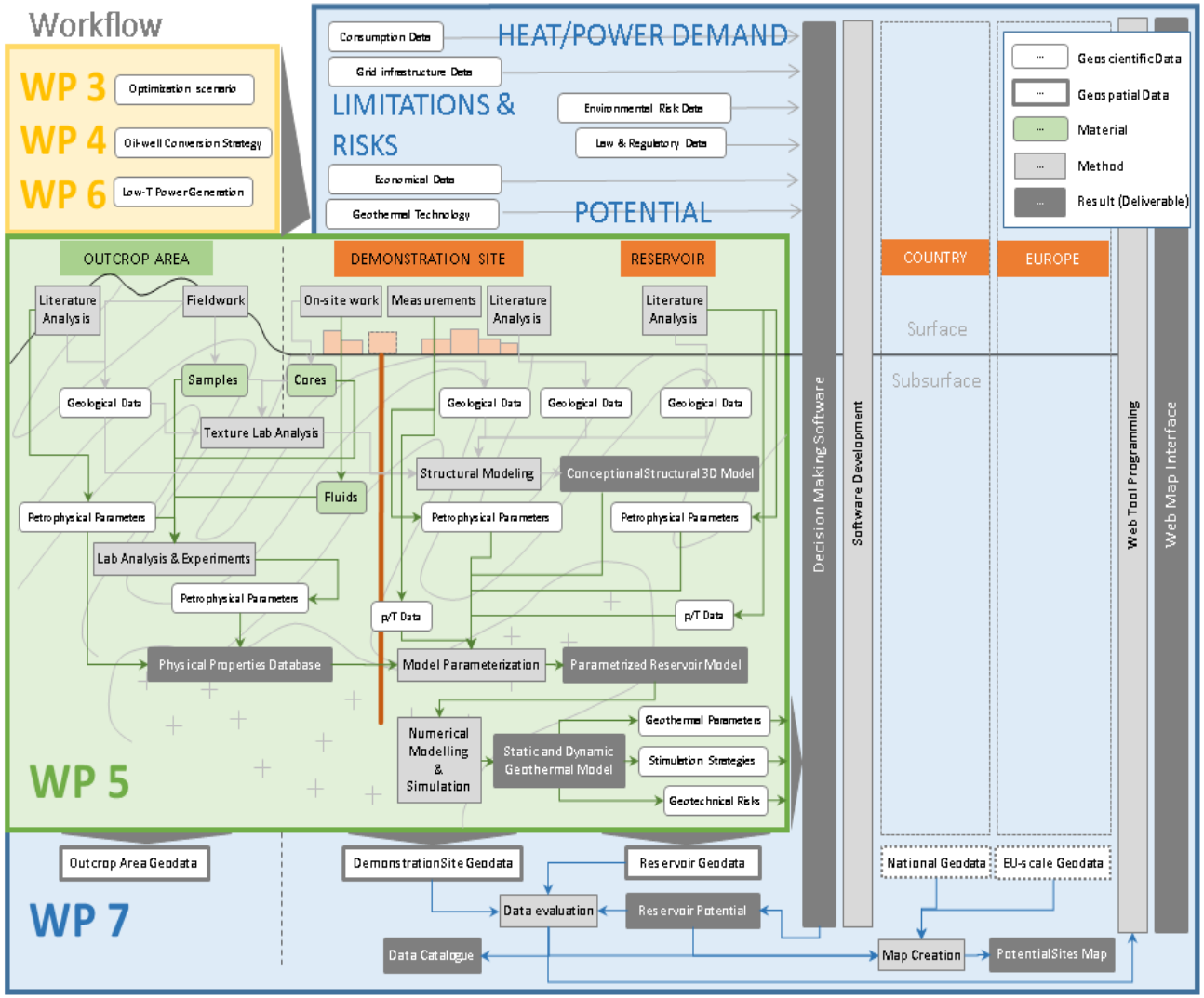
WP7 – Deliverable 7.8:

Database of relevant spatial datasets for further GIS analyses on regional to local scale

Bianca Wagner, Sebastian Schrage, Simon Maedge

Main objective



- Multidisciplinary
- Experience
- Workflows
- Geodata
- Re-Usability

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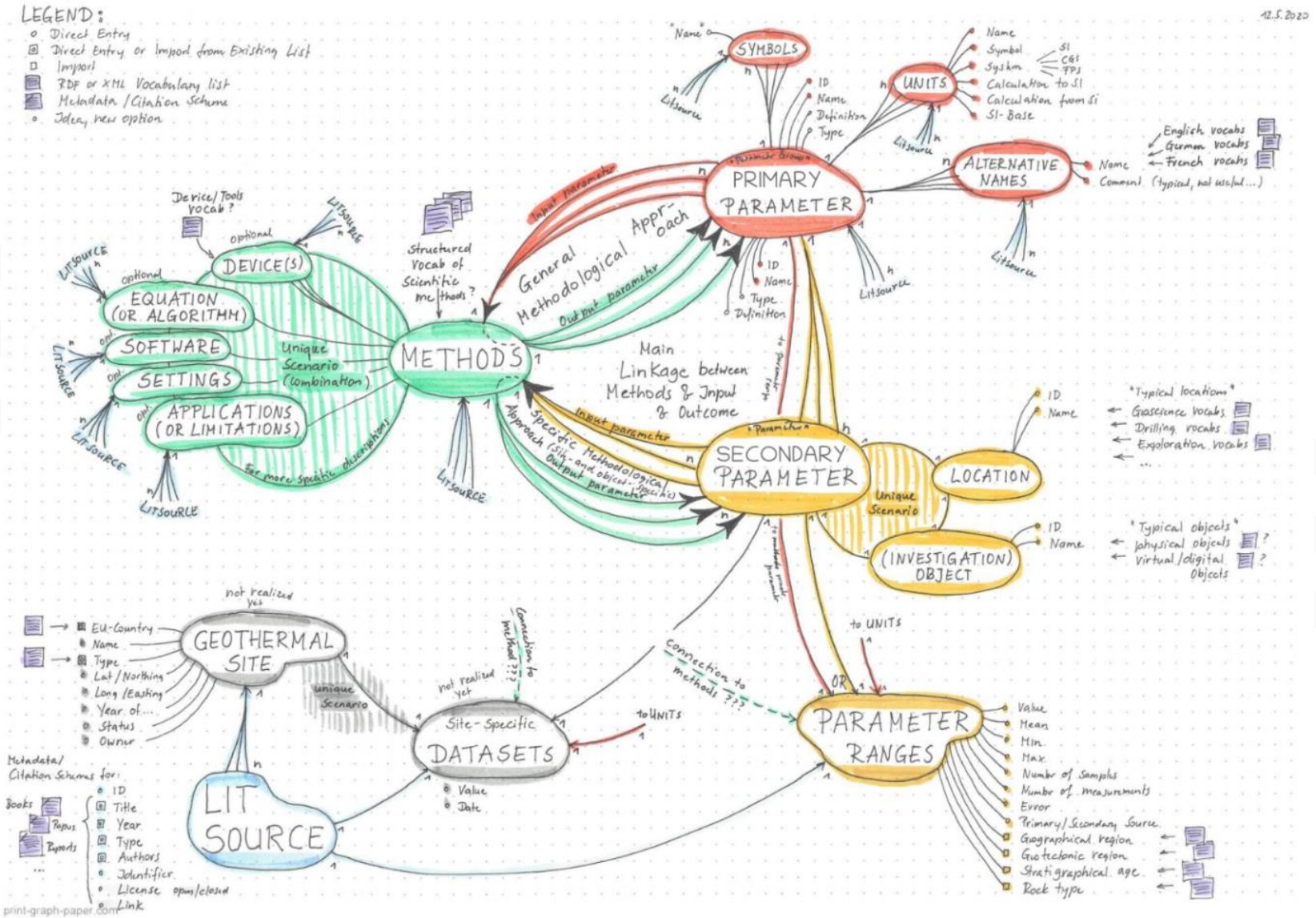
First steps



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Core concept - Graph

General Terms:	**Node**	*Edge*	**Node**
Software Terms:	**Instance**	*Object Property*	**Instance**
DB-Example:	**Parameter**	*Is described by*	**Geodata**

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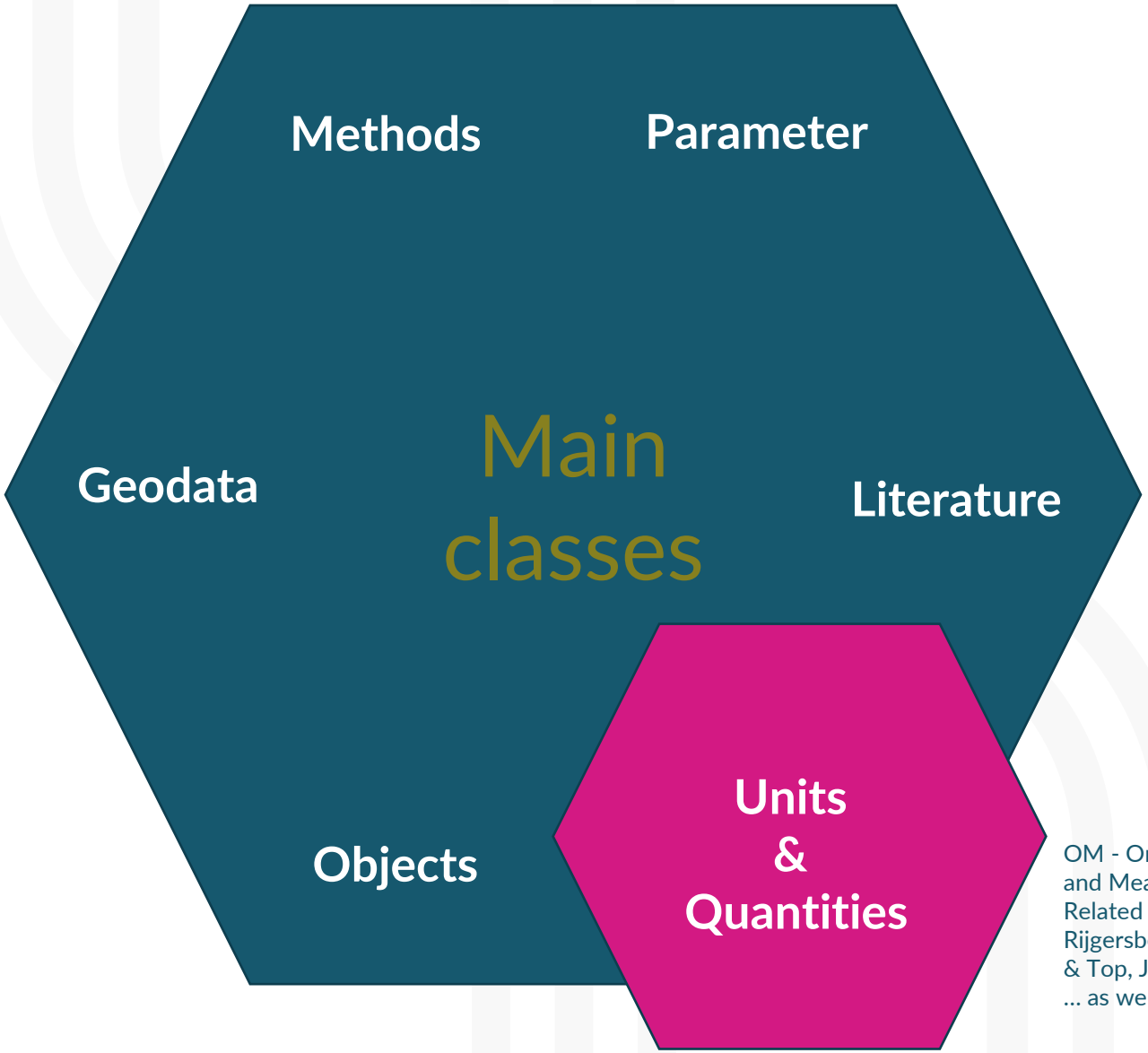
Core concept - Classes



OM - Ontology of Units and Measure and Related Concepts
Rijgersberg, H, van Assem M. & Top, J. (2013)
... as well as OM 2

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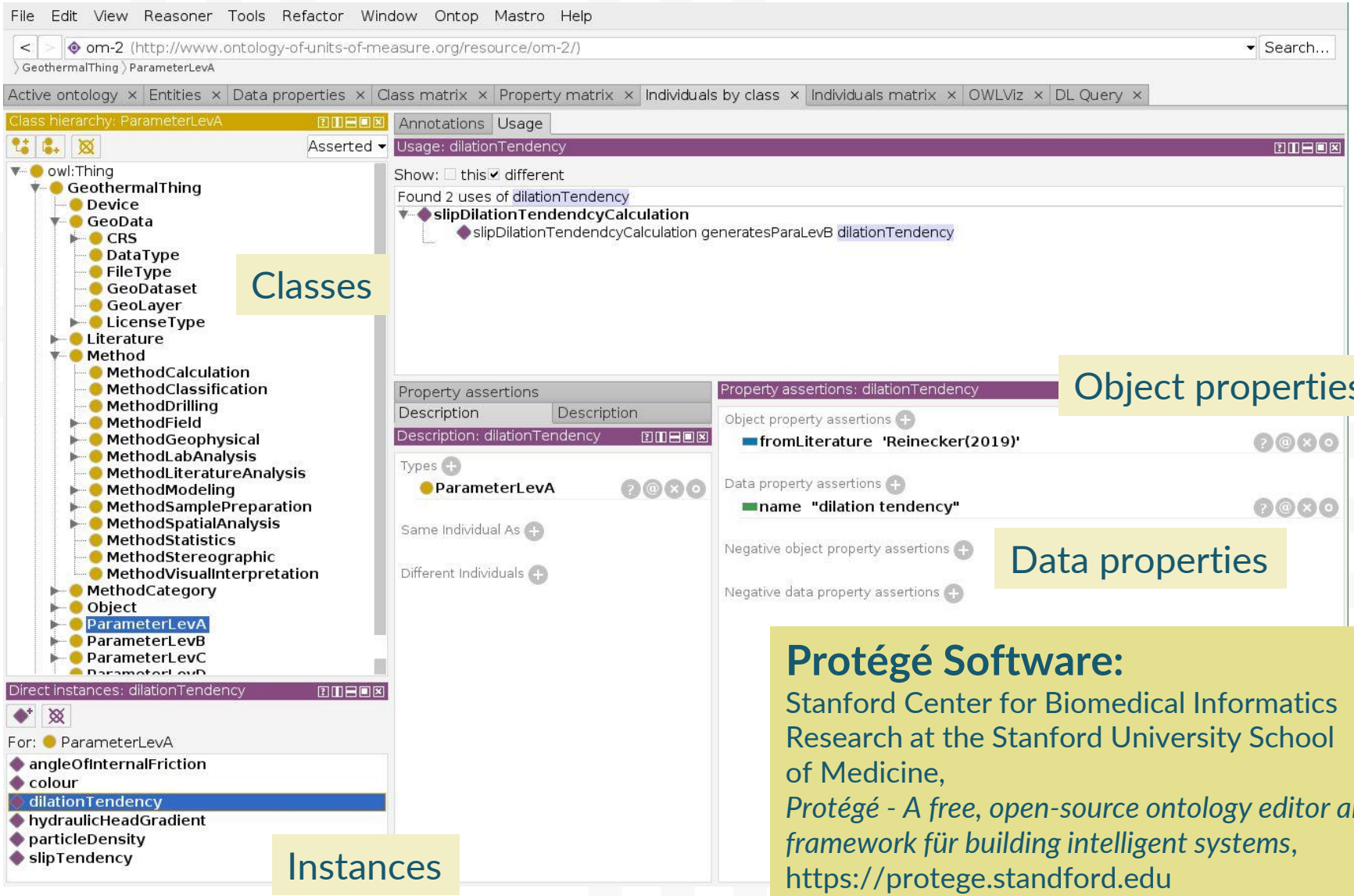
Graph Database (Ontology)



Protégé Software:
Stanford Center for Biomedical Informatics Research at the Stanford University School of Medicine,
Protégé - A free, open-source ontology editor and framework für building intelligent systems,
https://protege.standford.edu

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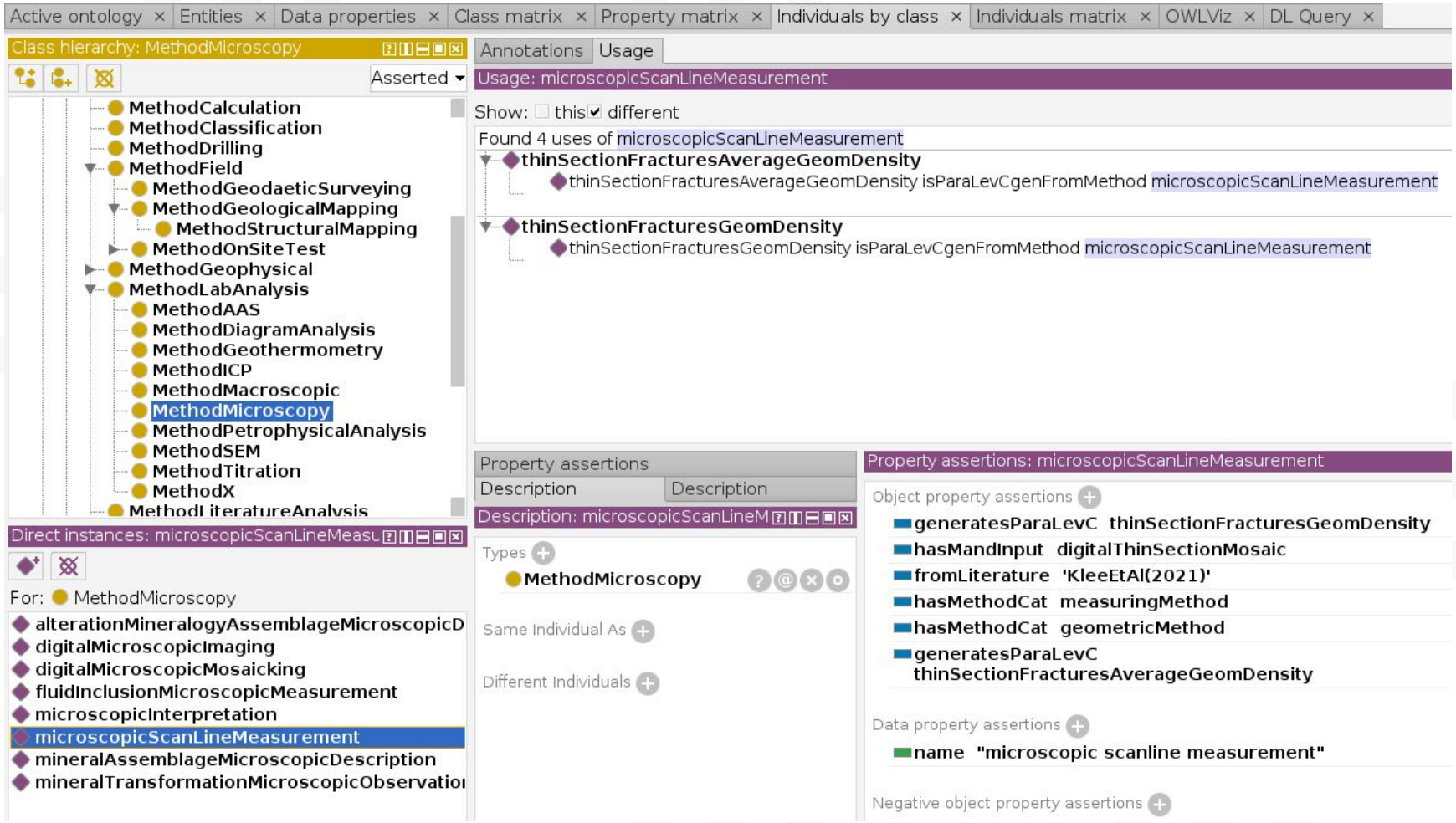
Class „Method“



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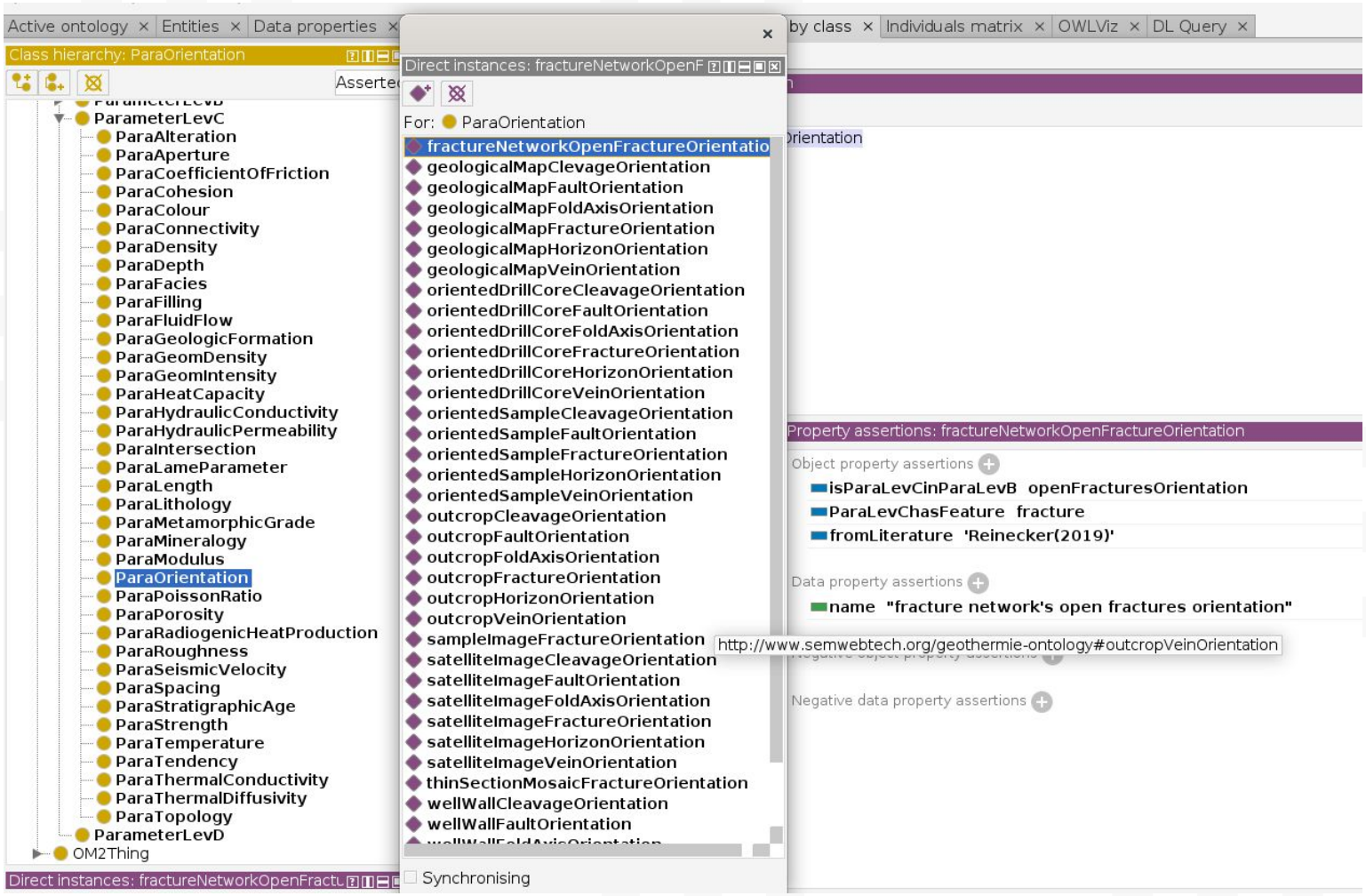
Class „Parameter“



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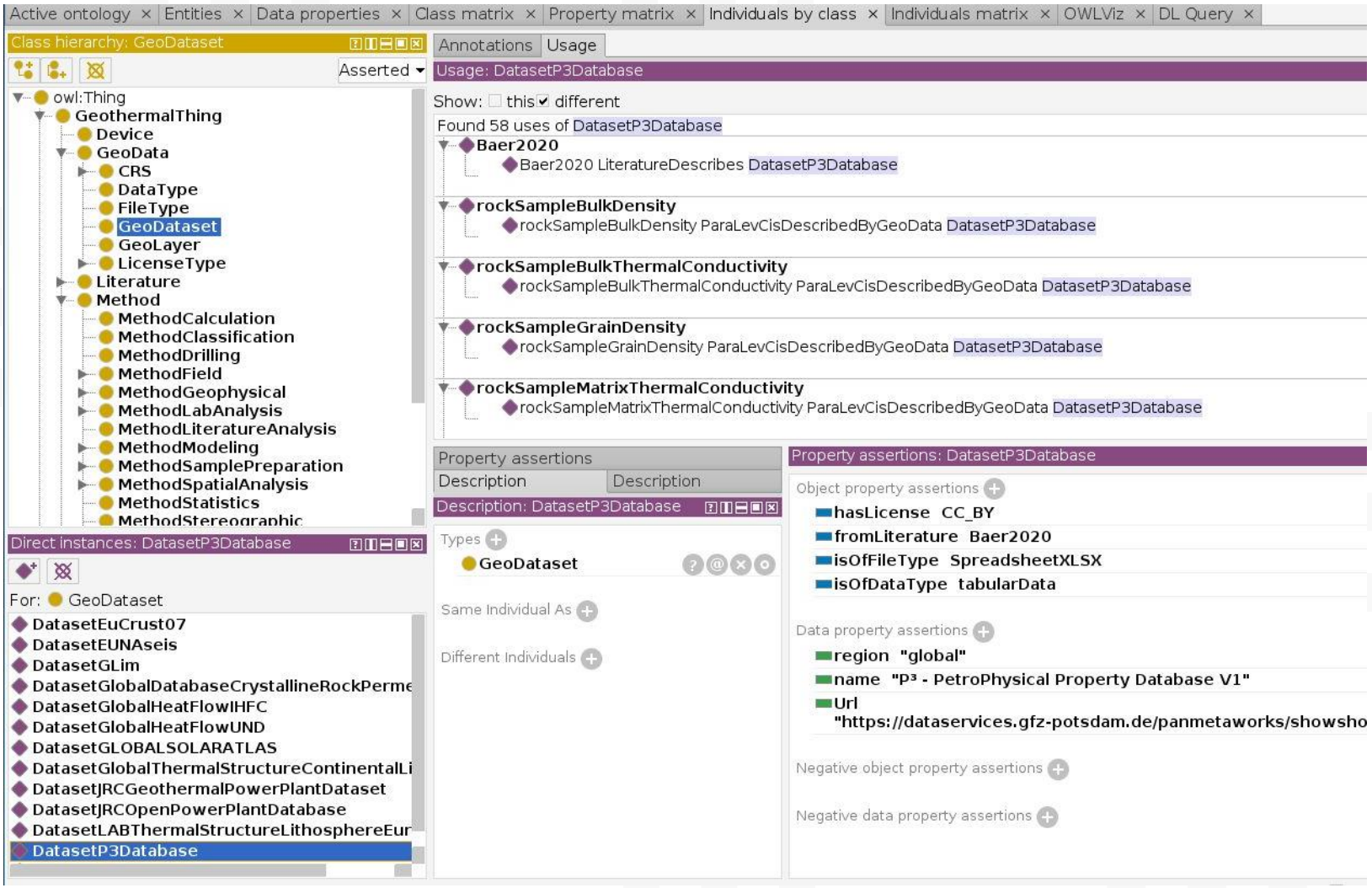
Class „GeoData“



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Web-based Visualization

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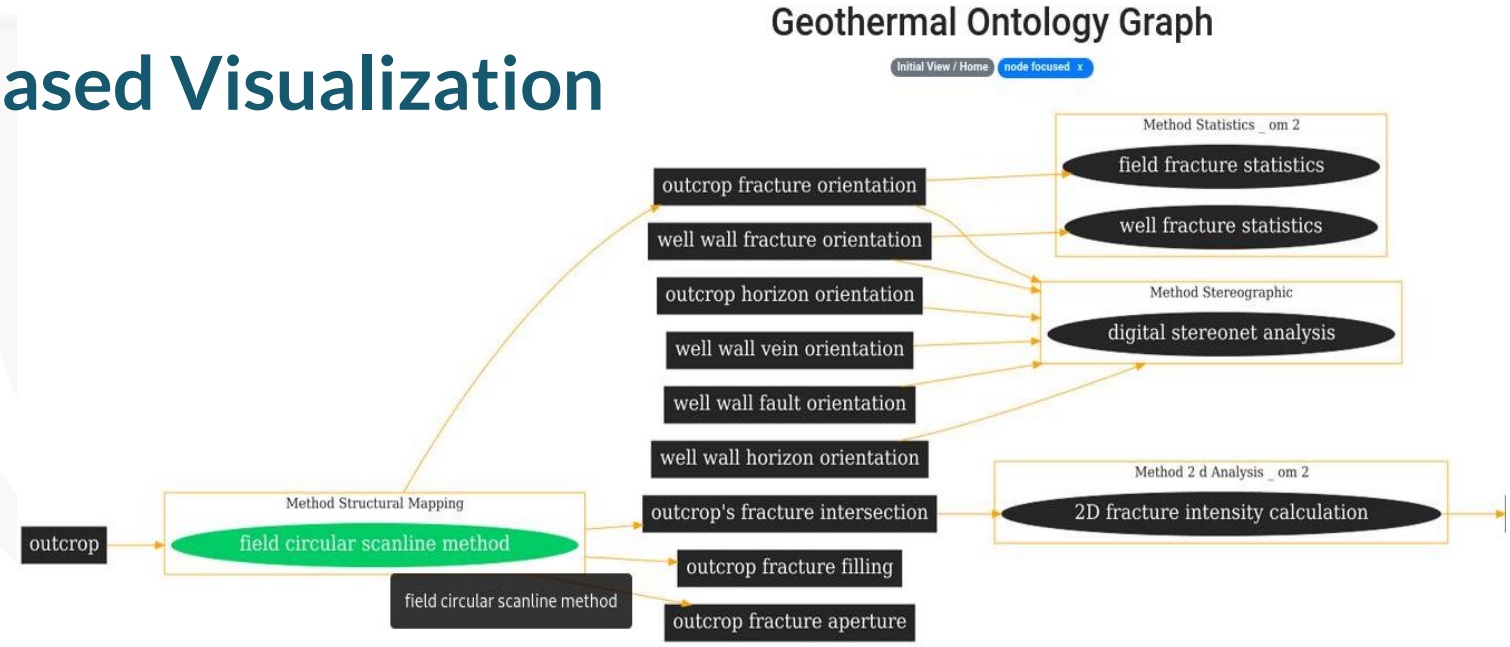
Web-based Visualization



Further information about *field circular scanline method*

generates Para Lev C	outcrop fracture orientation
generates Para Lev C	outcrop ' s fracture intersection
generates Para Lev C	outcrop fracture aperture
generates Para Lev C	outcrop fracture filling
name	field circular scanline method
type	Method Structural Mapping

Literature sources

Ford, Katherine, Wagner, Bianca, Leiss, Bernd, Zeuner, Max, Floch, Julien, De Ceris Lorraine, Sosa, Graciela **Applying Variscan Metasediments as an EGS Reservoir - A Conceptual 3D-Structural Model as a First Approach**, 2021

Hannah Watkins and David Healy and Clare E. Bond and Robert W. H. Butler **Implications of heterogeneous fracture distribution on reservoir quality; an analogue from the Torridon Group sandstone, Moine Thrust Belt, NW Scotland**, 2018

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Real-time presentation:

… starting Java & Tomcat

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Future usage

- *Interested in hosting & implementation (Associations, Platforms, …)*
- *Interested in further development*
- *Interested in searching & utilizing*

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Accessiblity

- *MEET Deliverable 7.8 Report*
- *Ontology & Web application on Gitlab: https://gitlab.gwdg.de/simon.maedge/geothermal-db*
- *Protégé Software: https://protege.standford.edu*

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Thank you for your attention!

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WP7: Web-Based Map Tool and Recommendations for Further Operation

Claudia Malzer; University of Göttingen, malzer@sub.uni-goettingen.de

Bianca Wagner; University of Göttingen, bwagner1@gwdg.de

Agenda

Background & Purpose	3
System Design	6
Technical Realization	11
Outlook	20

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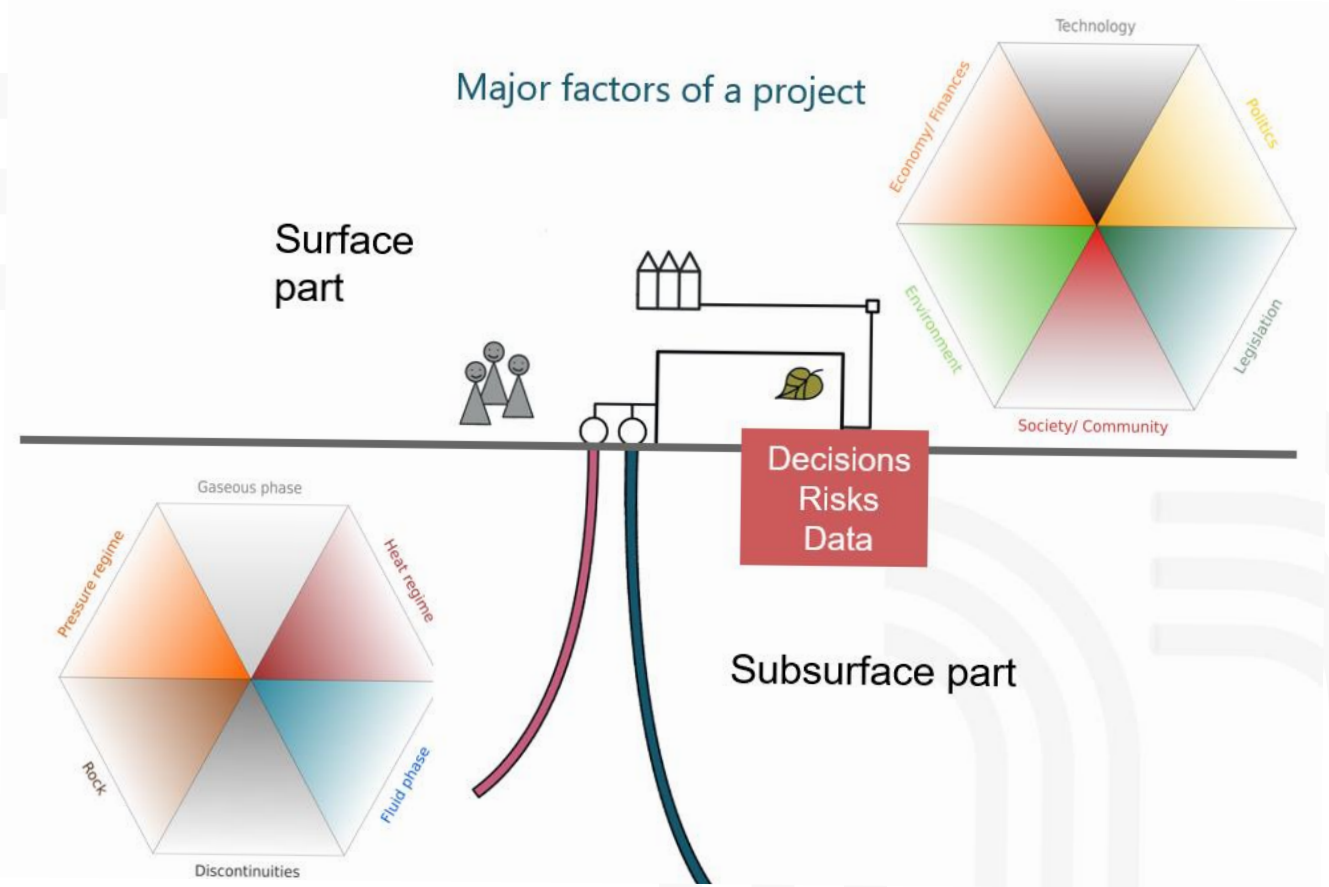
Background & Purpose

The web-based map viewer within the European Horizon 2020 project MEET is intended as a one-stop solution for the wide spectrum of stakeholders that are interested in deep geothermal exploration and project development.

Major Factors of a Geothermal Project

Surface and Subsurface Parameters



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Status quo and Goals

Why do we need a European Geothermal Viewer?

Status quo:

- Vast number of map viewers and geodata sets about geothermal energy all across the Web
- Focus mostly on specific geological factors

Goals:

- Include a variety of factors that are of interest to a broad spectrum of stakeholers of a geothermal project
- Not only geological factors but also national policies related to geothermal energy, carbondioxide emission rates, links to country-specific viewers, etc.
- Easy extensibility

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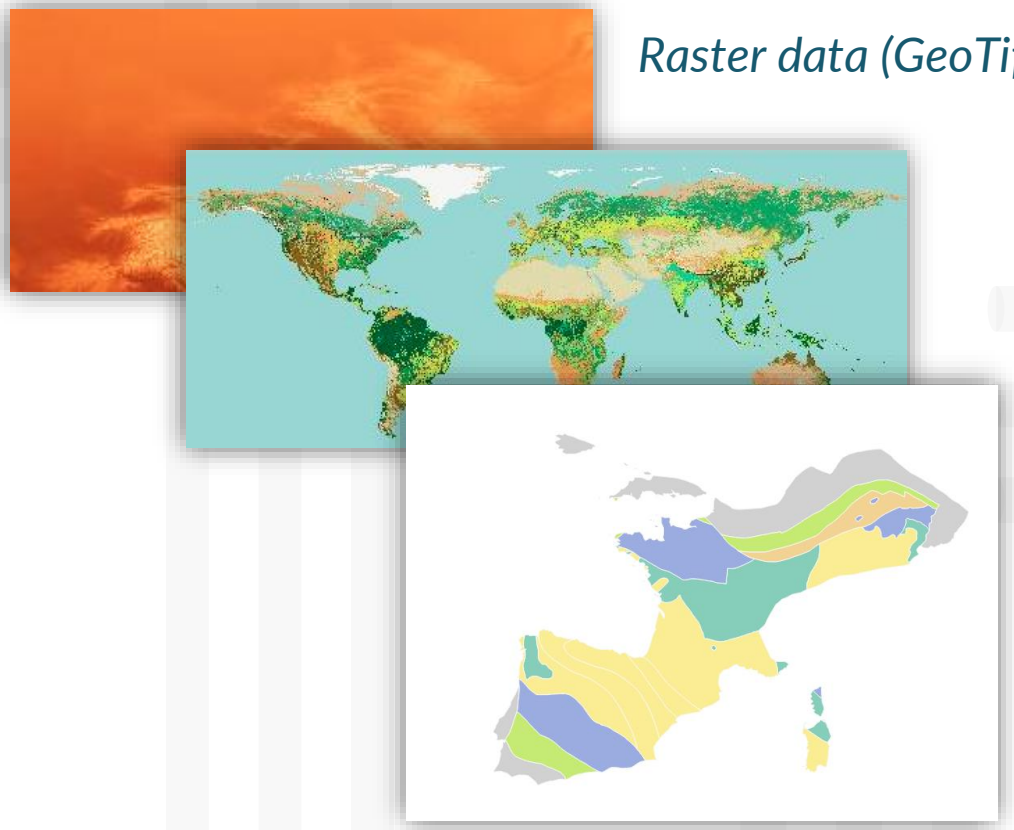
System Design

Thematic and Technical Concept

Thematic Categorization

Multiple data layers (raster and vector data) in eight major categories

- General
- Geology
- Geothermics
- Hydrogeology
- Infrastructure
- Power Grid
- Land and Soil
- Environment



Raster data (GeoTiffs)

Vector data (Shapefiles imported into PostGIS)

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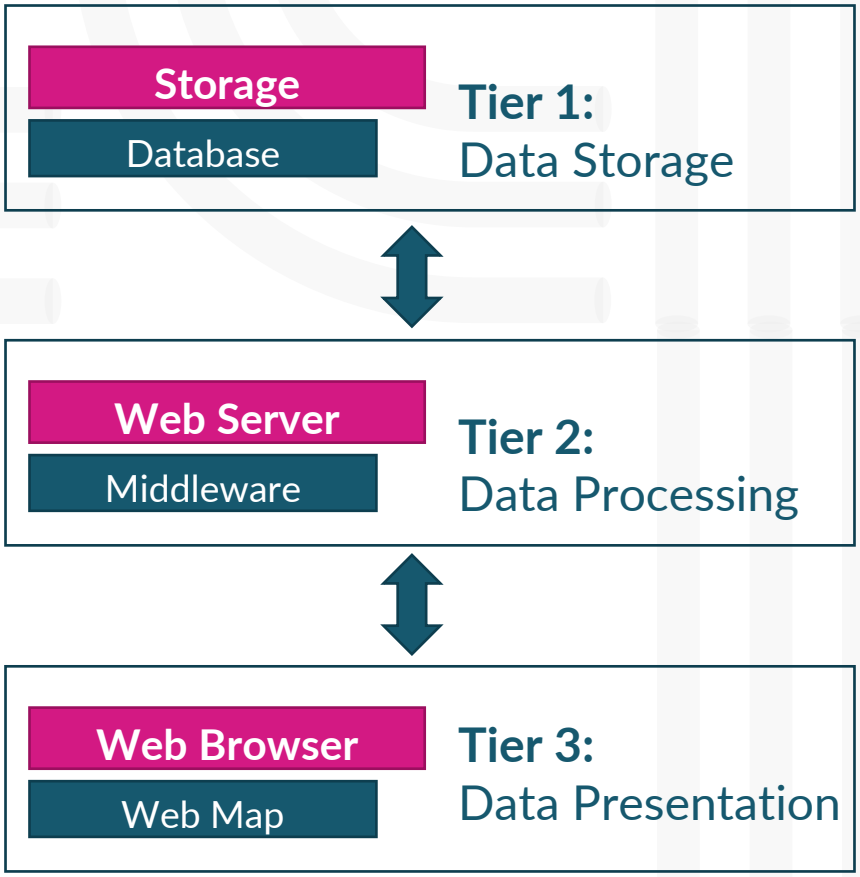
Basic Architecture

Conceptual design with three tiers



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Software Selection

Focus on widely-used and performant OpenSource software

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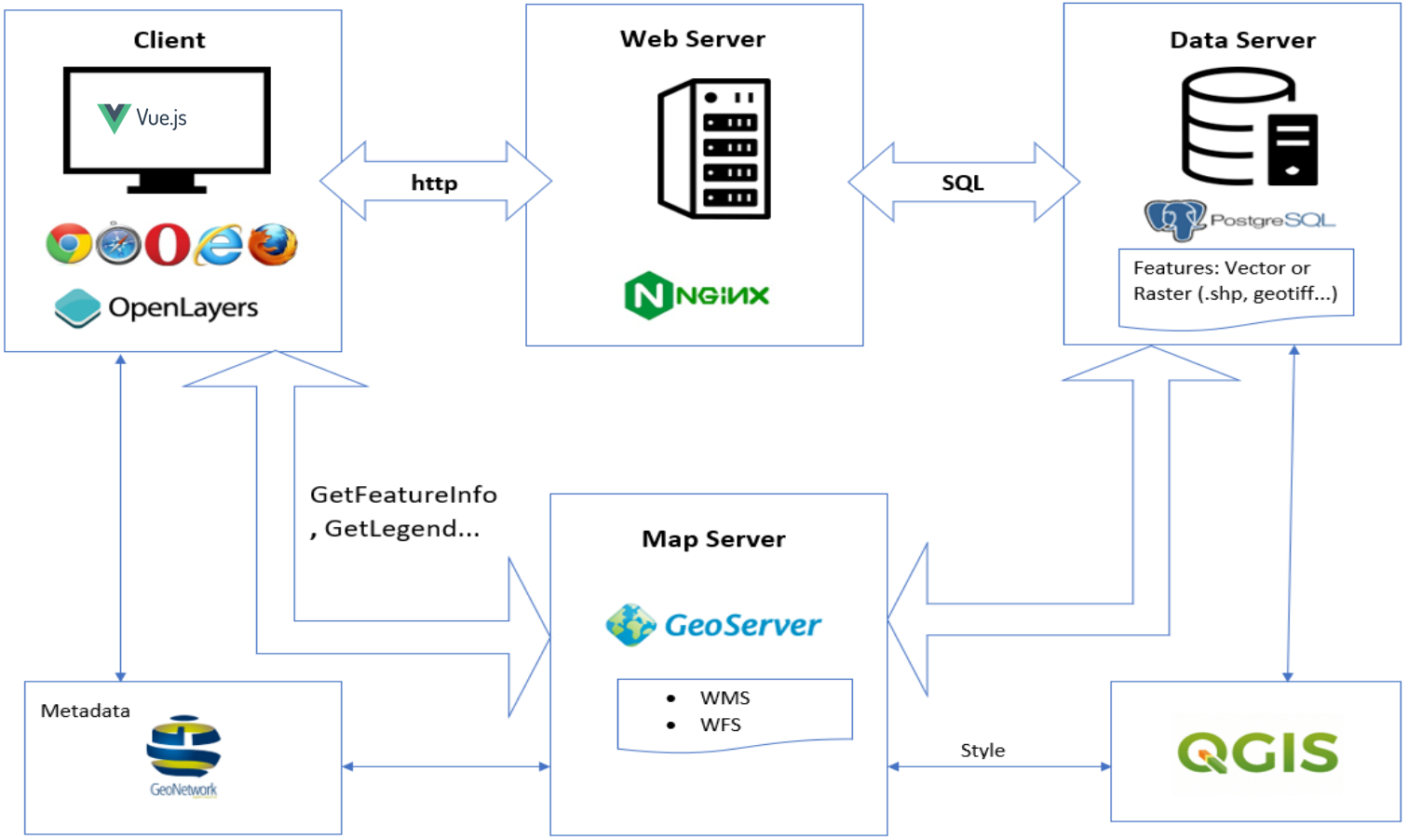
Final System Architecture

All running services are connected and orchestrated via Docker



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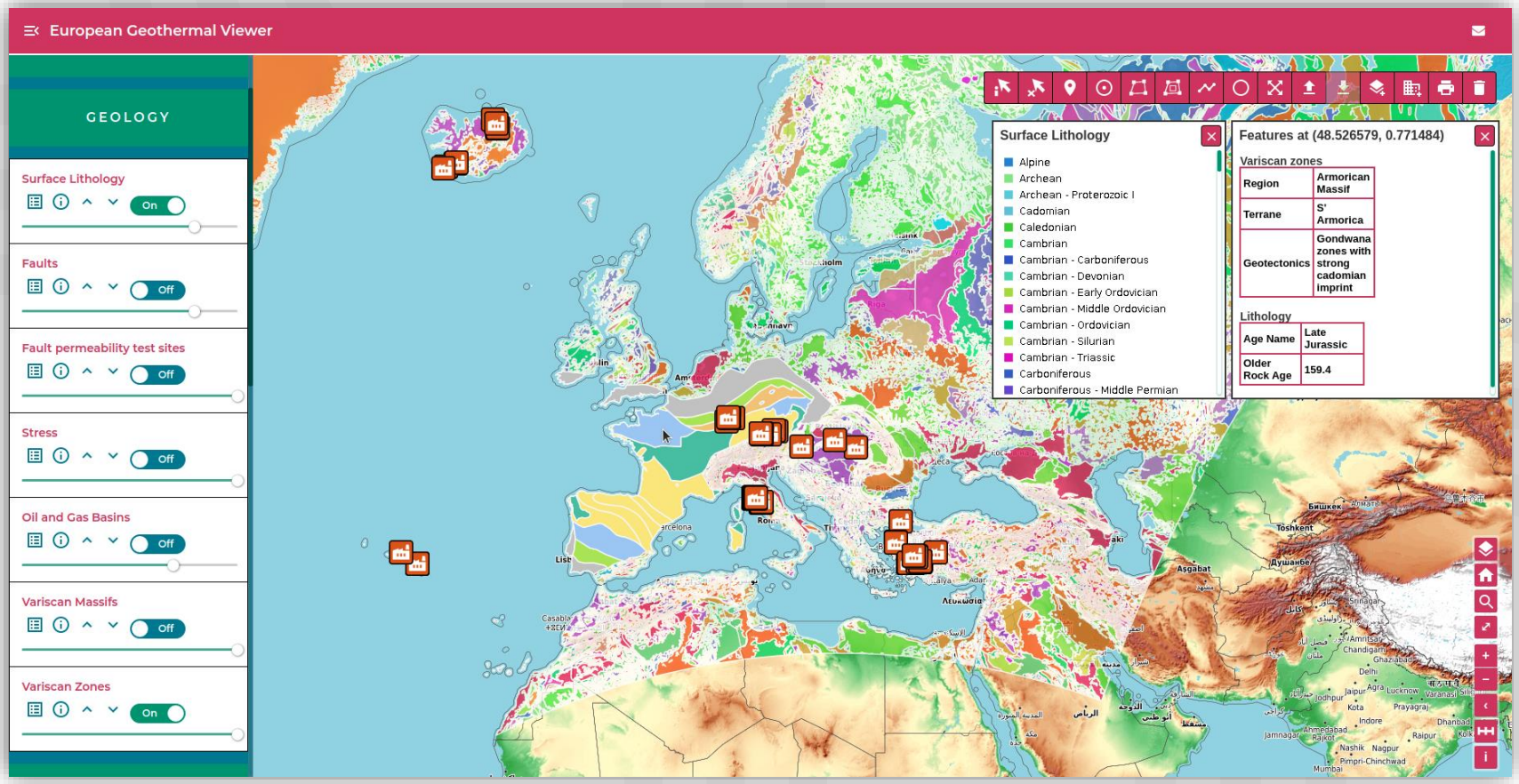
Technical Realization

Implementation and Functionalities

Overview: User Interface

Sidebar with categorized layers, toolbar, map control bar, interactive map and information panels



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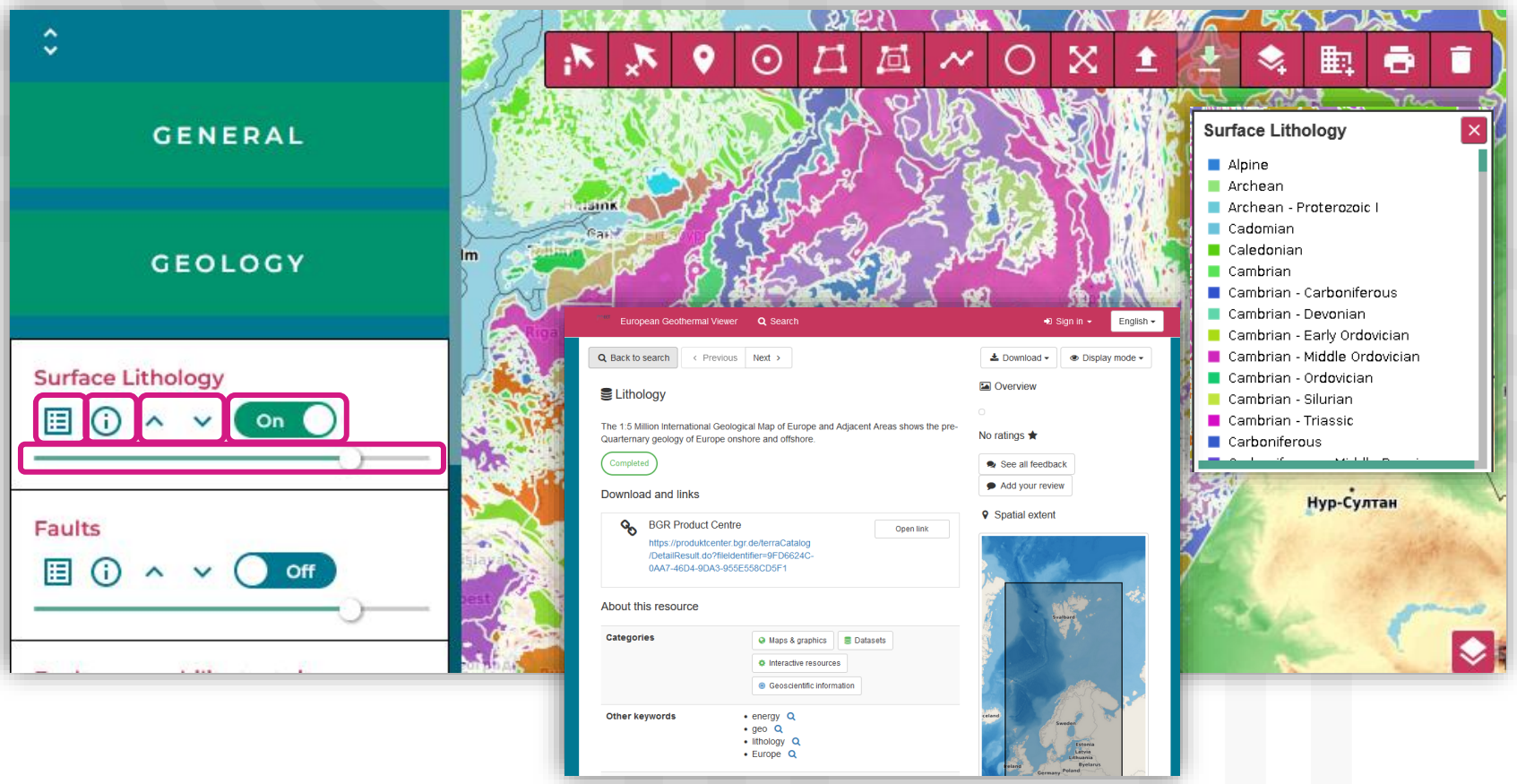
Layer Functionalities

View legend, link to metadata page, move up/down, set visibility on/off, set opacity



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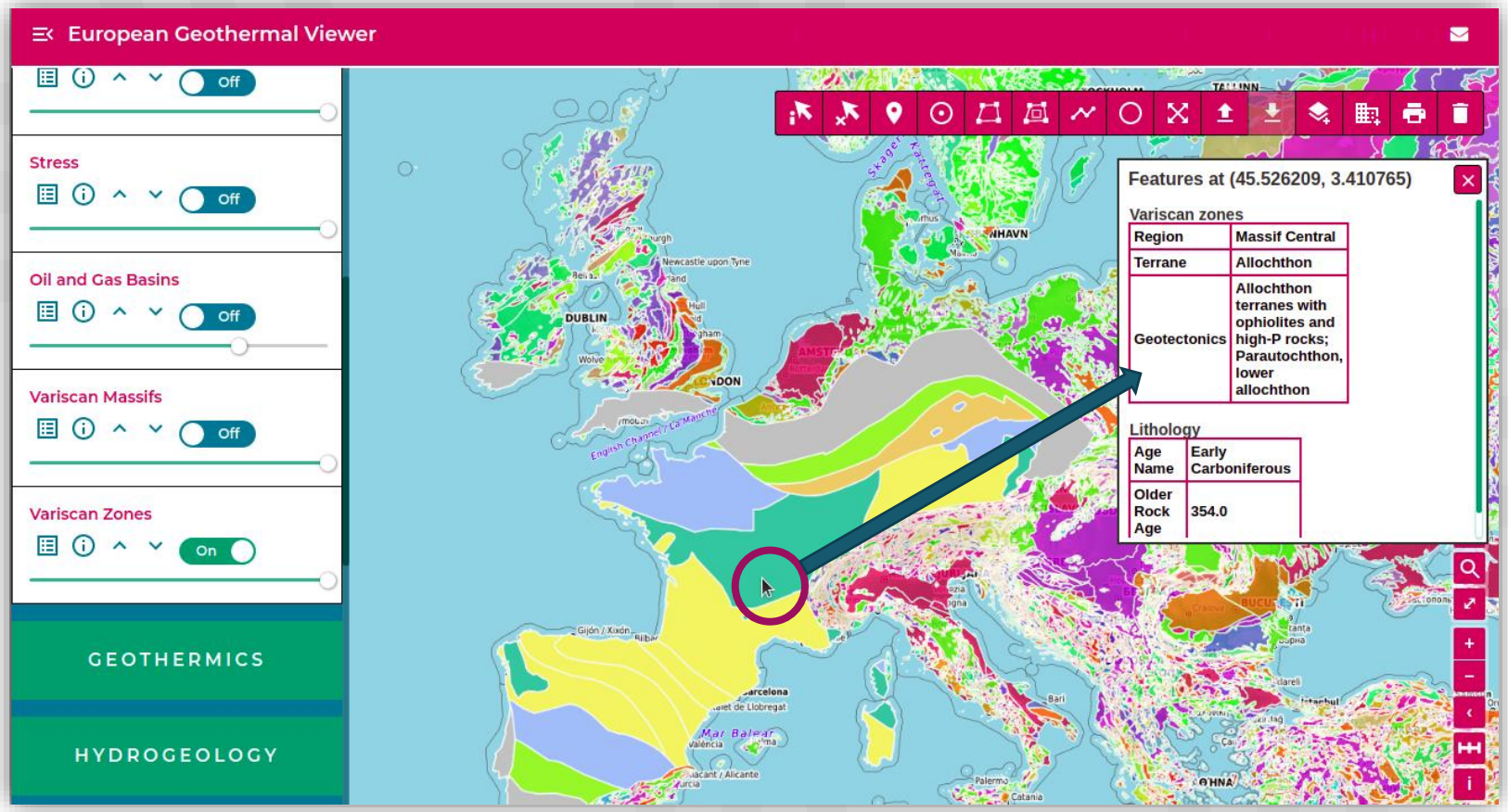
Layer Interactions

Display Feature Attributes on Mouse Click



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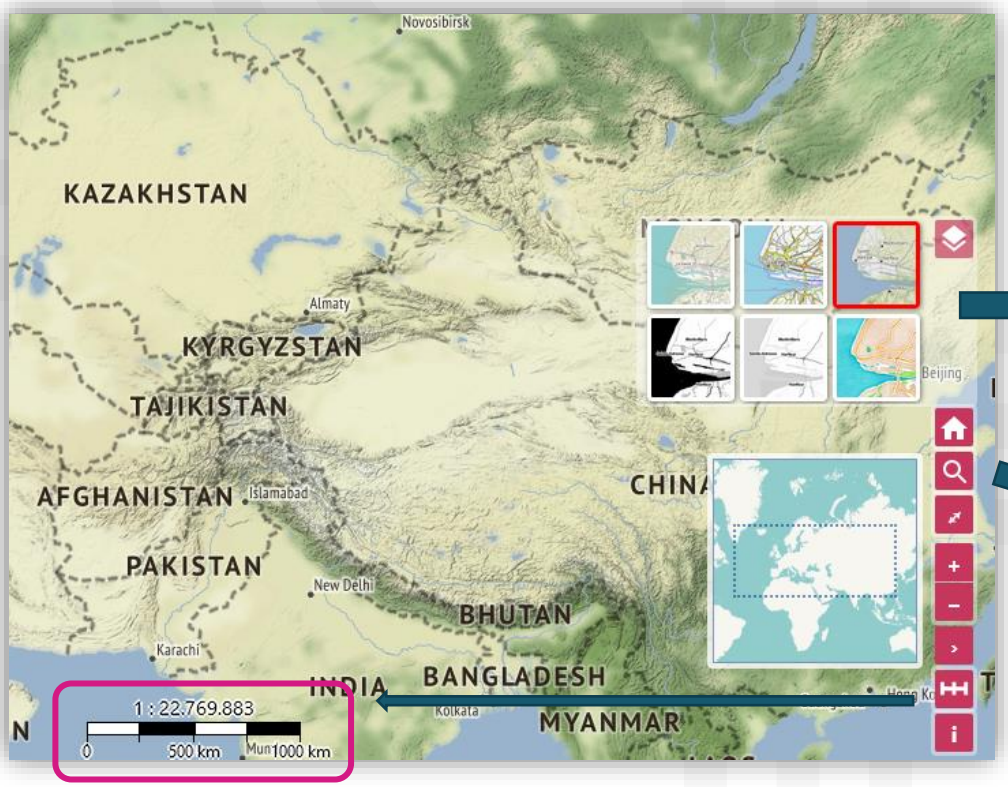
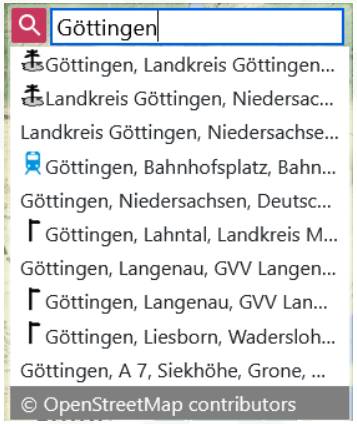
Map Controls

Scale bar, global overview, zoom, fullscreen, geocode/search, recenter, alternative basemaps



Topographic Map
TerrainMap
OpenStreetMap
Dark Map
Light Map
WaterColor



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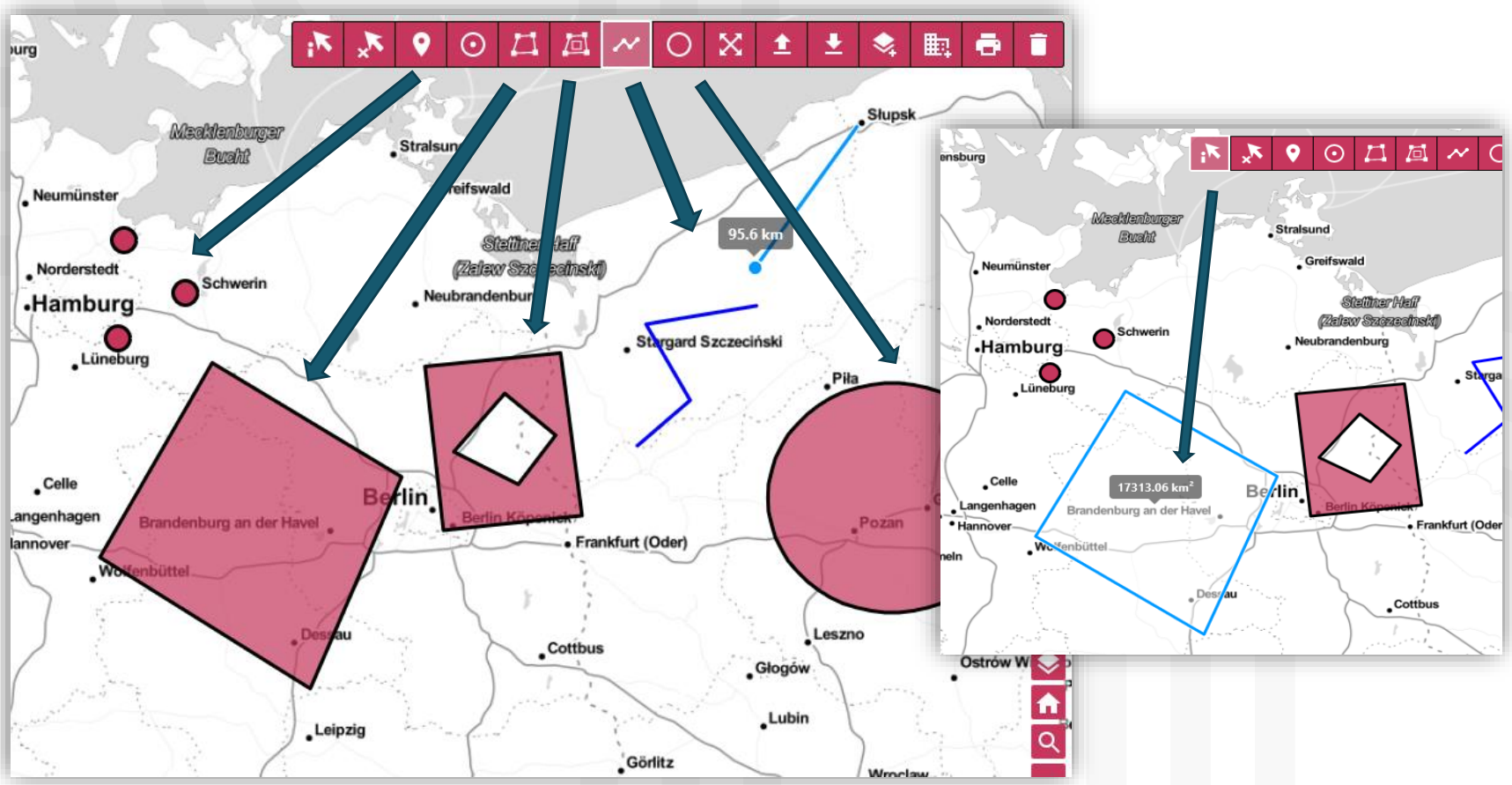
Toolbar: Drawing and Measuring

Draw own sketches and measurements which can be exported/imported as GeoJSON



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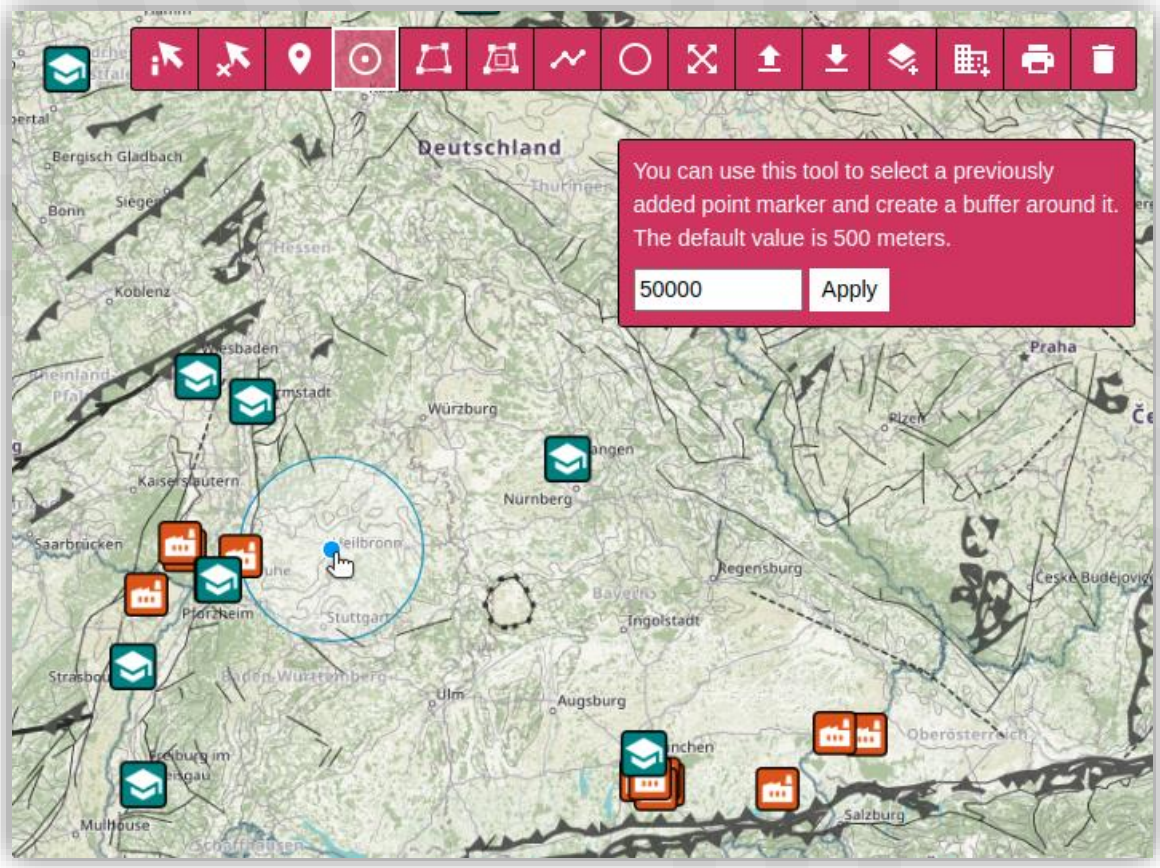
Toolbar: Buffer Point

Display a radius with custom distance in meters around a drawn point



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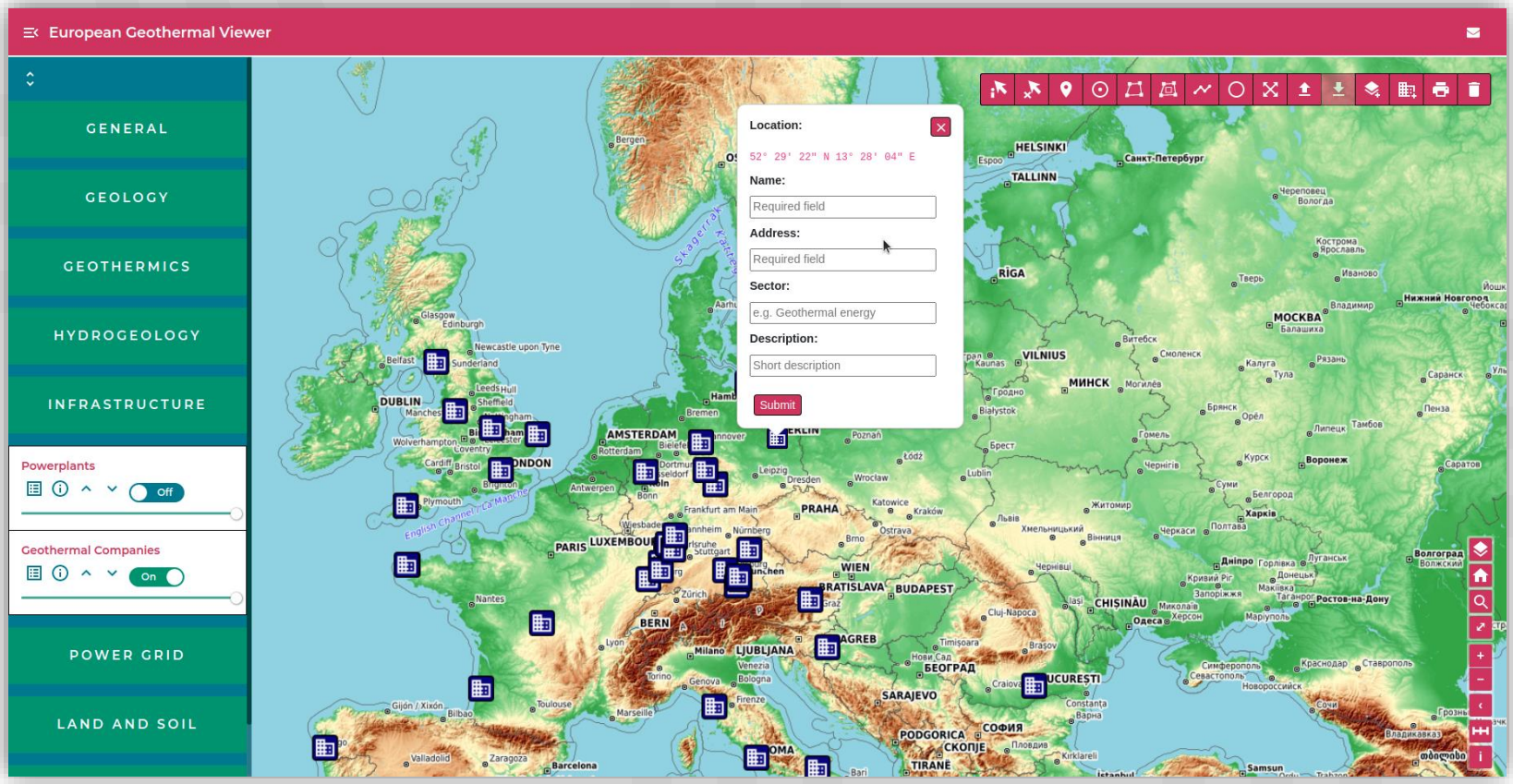
Toolbar: Add Your Company

Add location and information about your own geothermal company to the map



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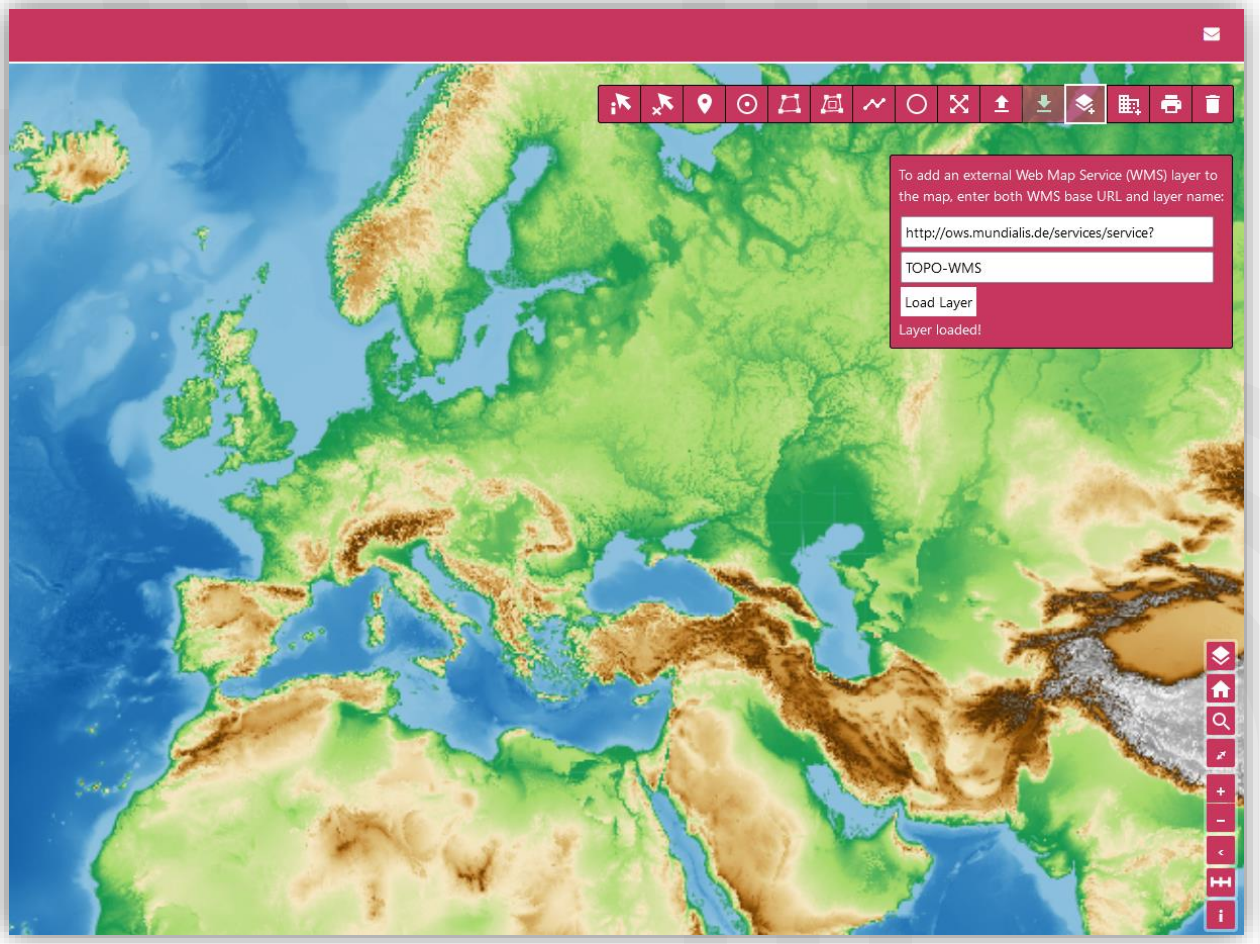
Toolbar: Add External Layer

Supports Web Map Service (WMS) Endpoints



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Outlook

Future of the Geothermal Viewer

Summary and Open Questions

Online availability currently only in form of a temporary demo version

- The **European Geothermal Viewer** includes information about various topics related to geothermal energy and hereby addresses the broad spectrum of stakeholders in geothermal projects
- The viewer is based on **open-source** technology and modern frameworks (Vue.js) which make extensions and further development easier
- New data layers or categories could be added in the future
- **Open Questions: Future Hosting and Maintenance**

Temporary URL for demonstration:

http://c100-074.cloud.gwdg.de/meetmap/

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Questions?

Temporary URL for demonstration:

http://c100-074.cloud.gwdg.de/meetmap/