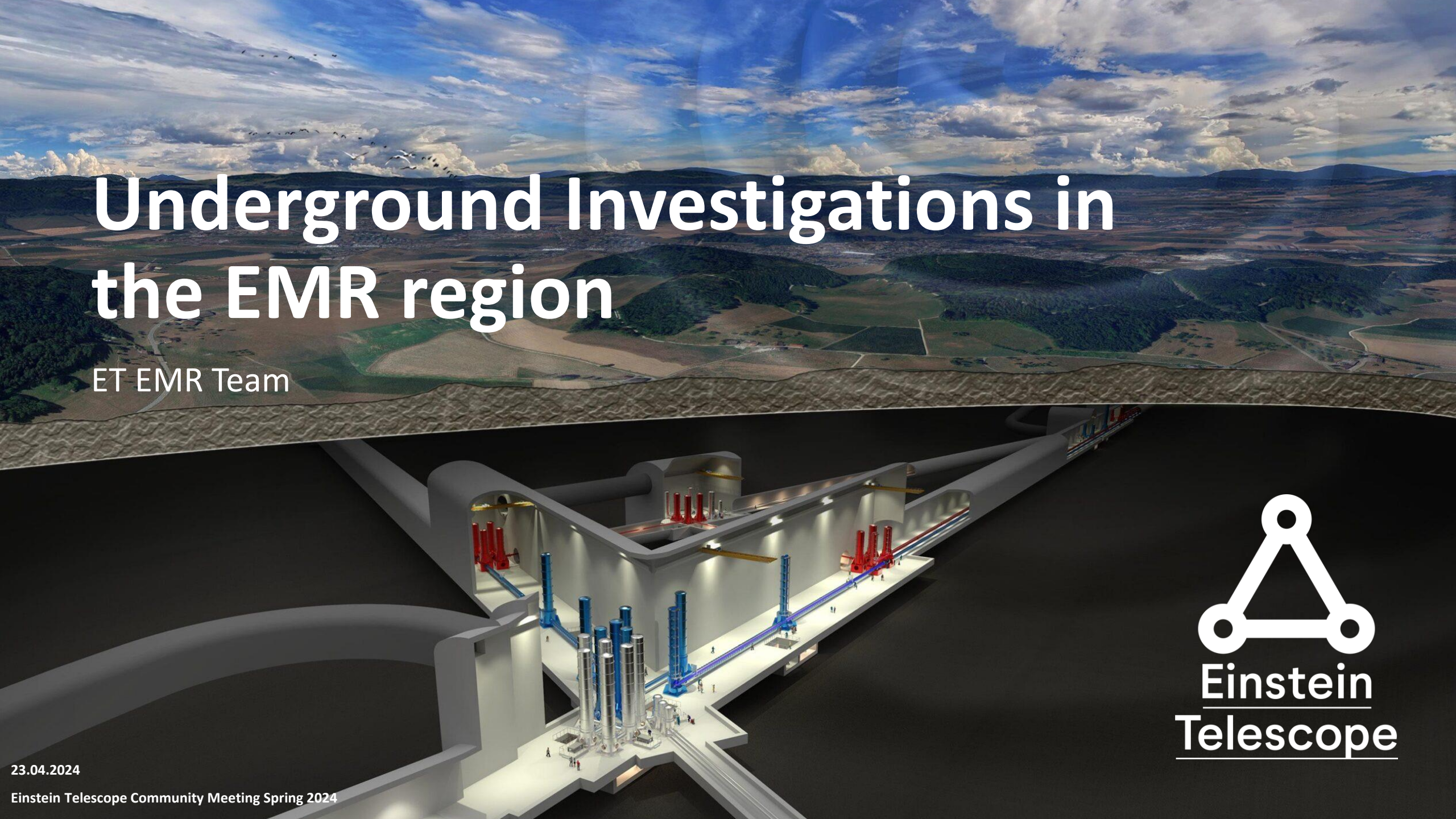
Underground Investigations in the EMR region

ET EMR Team



Einstein Telescope

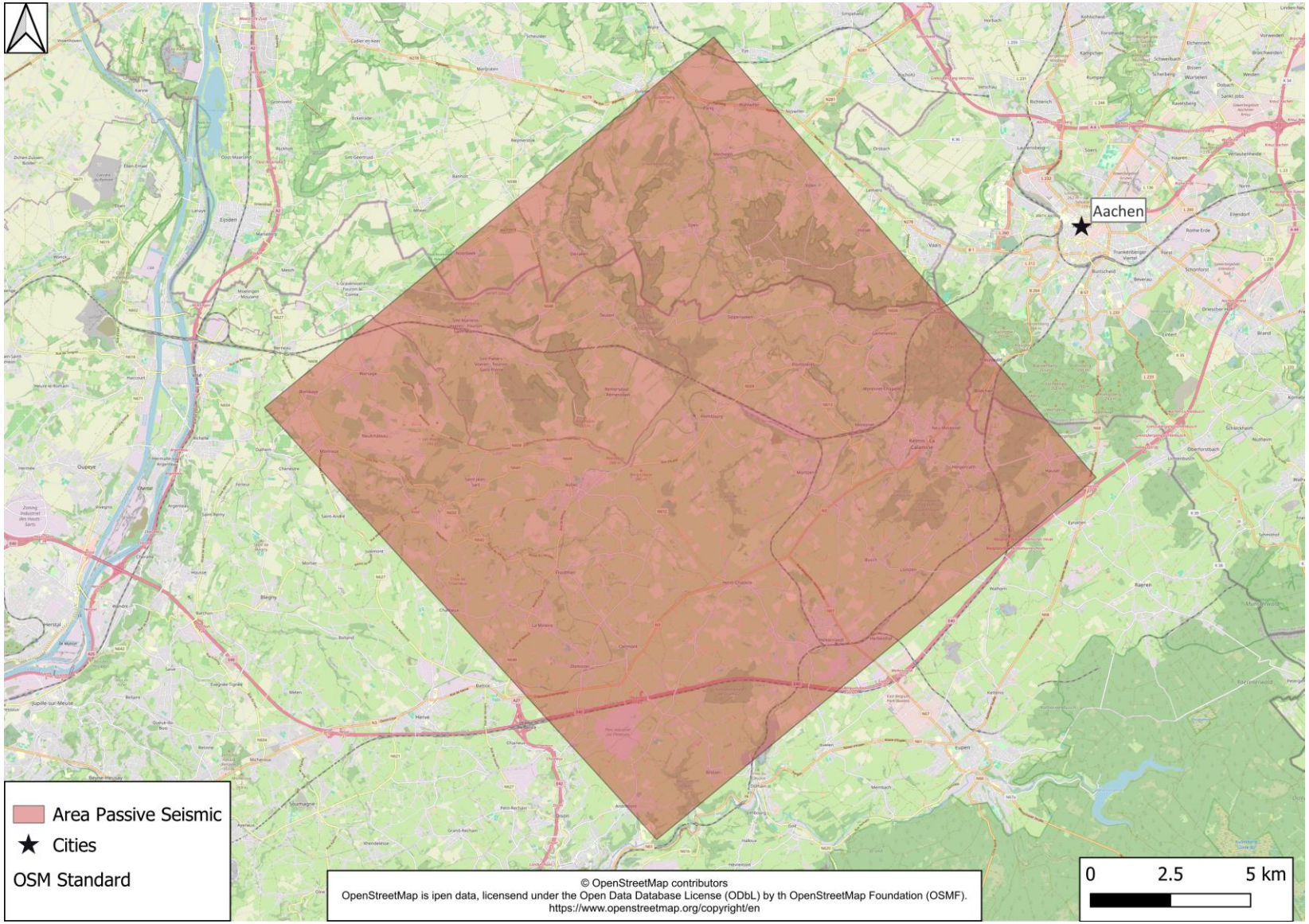
23.04.2024

Einstein Telescope Community Meeting Spring 2024

Work in EMR region

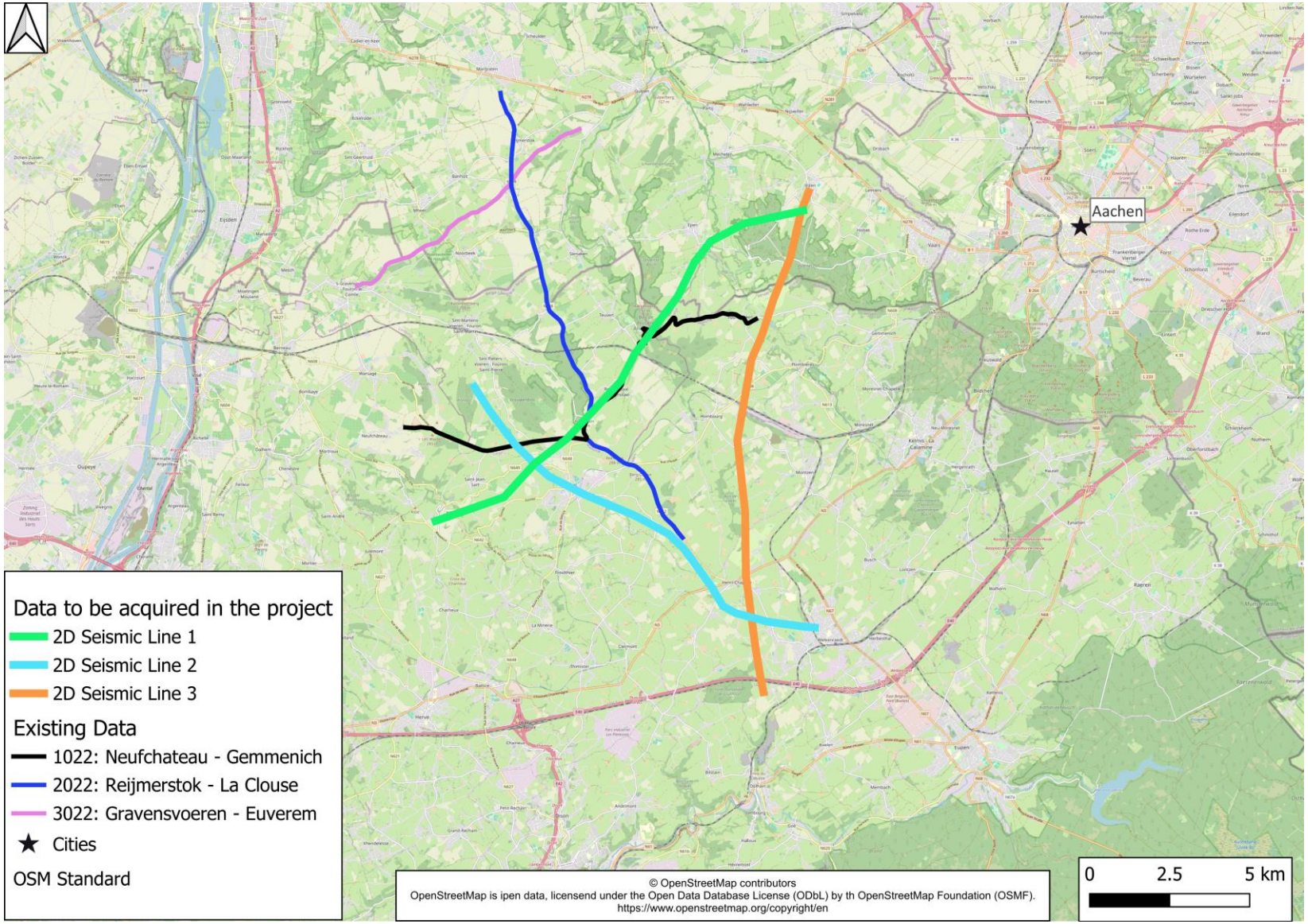
- All activities planed irrespectively to ET geometry
- Passive seismic survey to monitor the entire area of investigation
- Active seismic surveys
- Boreholes for detailed, local information
- Geomechanical tests for rock strength characterisation

Passive Seismic survey: Planned



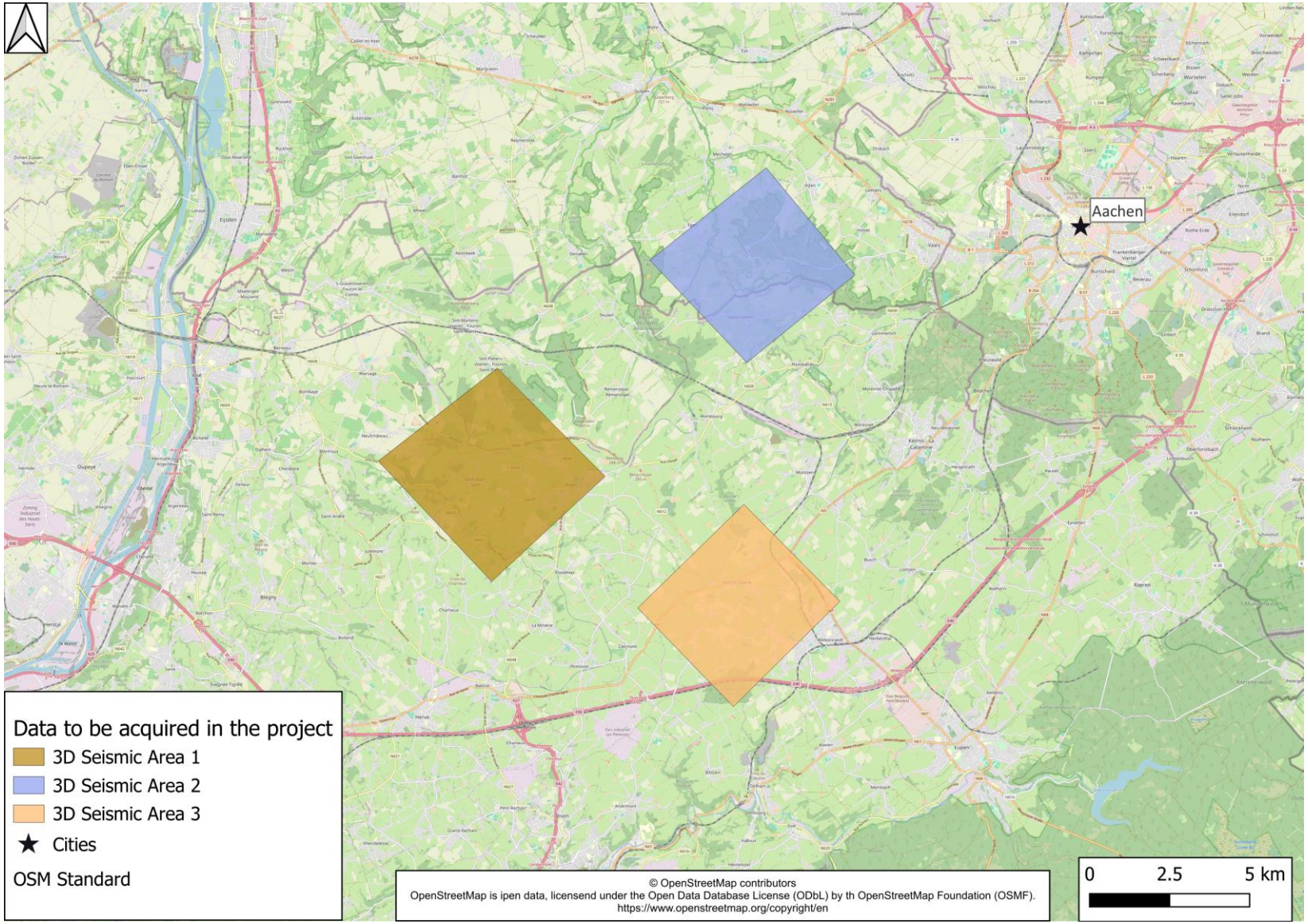
- Cover entire area of investigation
- Delineate Val Dieu block with Vp and Vs data
- Also useable to investigate surface noise

Active 2D Seismic survey: Done & under discussion



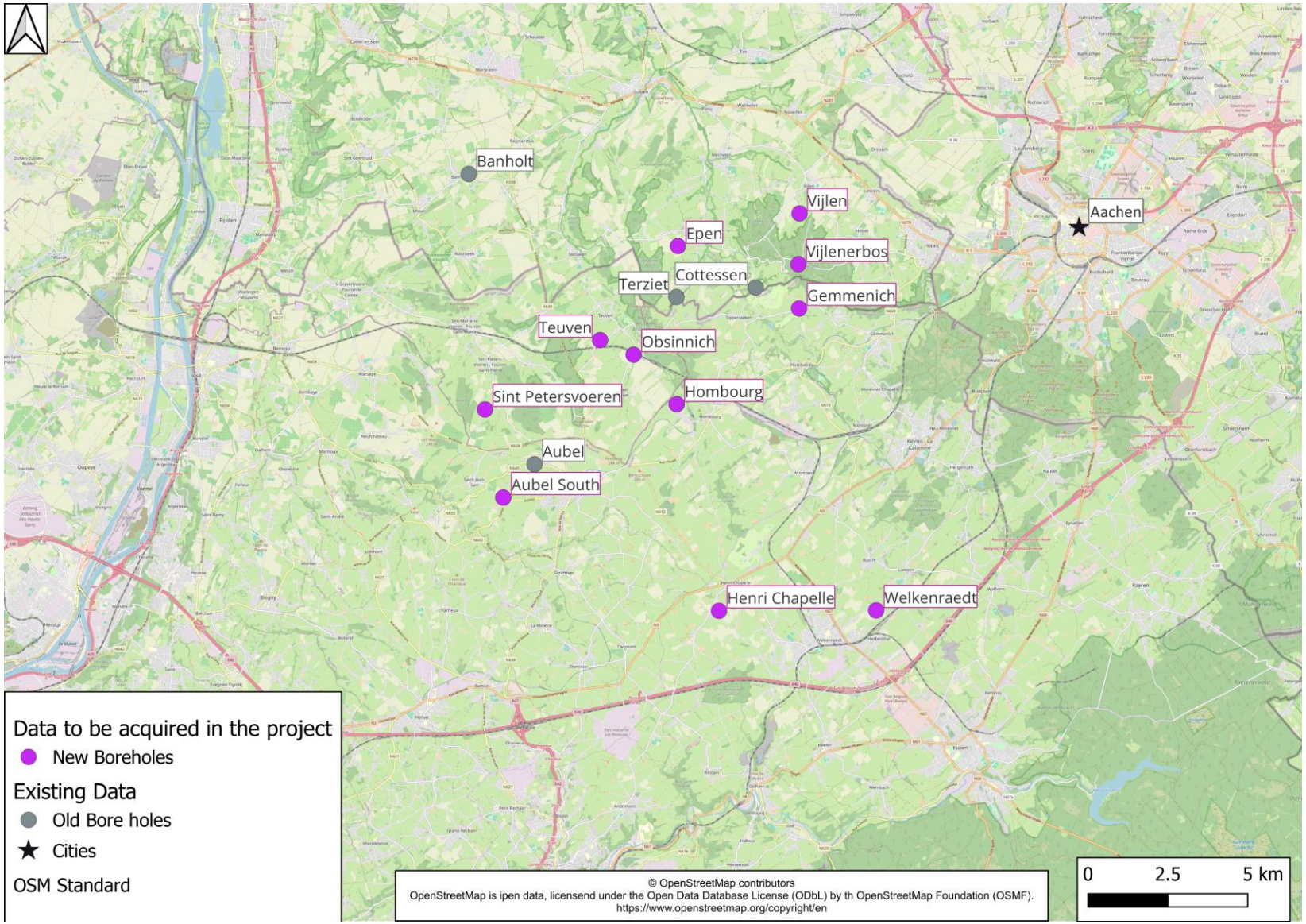
- Underground large scale structures
- Link potential corner points
- Connect boreholes

Active 3D Seismic survey: Under discussion



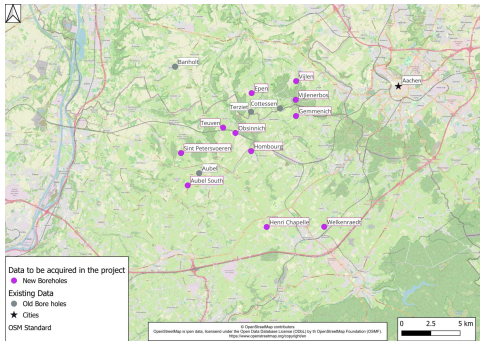
- Around potential corner points
- Link potential corner points
- Connect boreholes

Boreholes: Done & Planned

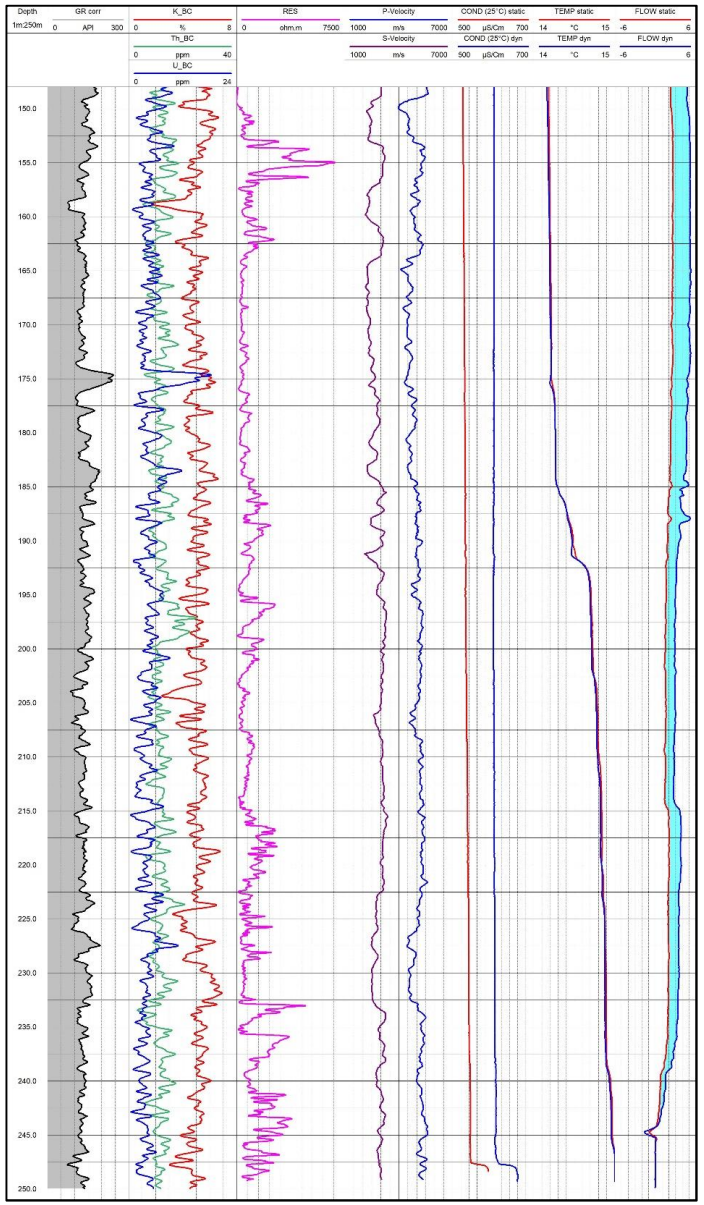


- Investigate lithology in suitable depth for ET
- Testing and lab samples
- Use of boreholes for monitoring
  - Seismometer and magnetic
  - Piezometer
- Phase 1: now – 09/24
- Phase 2: in planning

Boreholes: Done & Planned

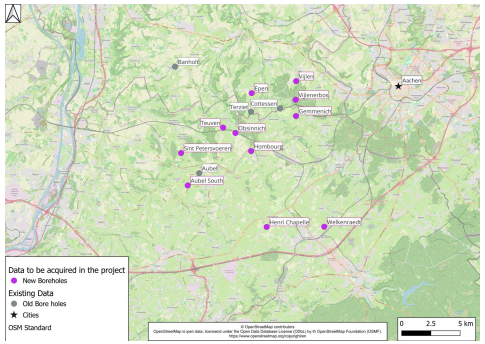


- Geophysical logging incl. magnetic susceptibility

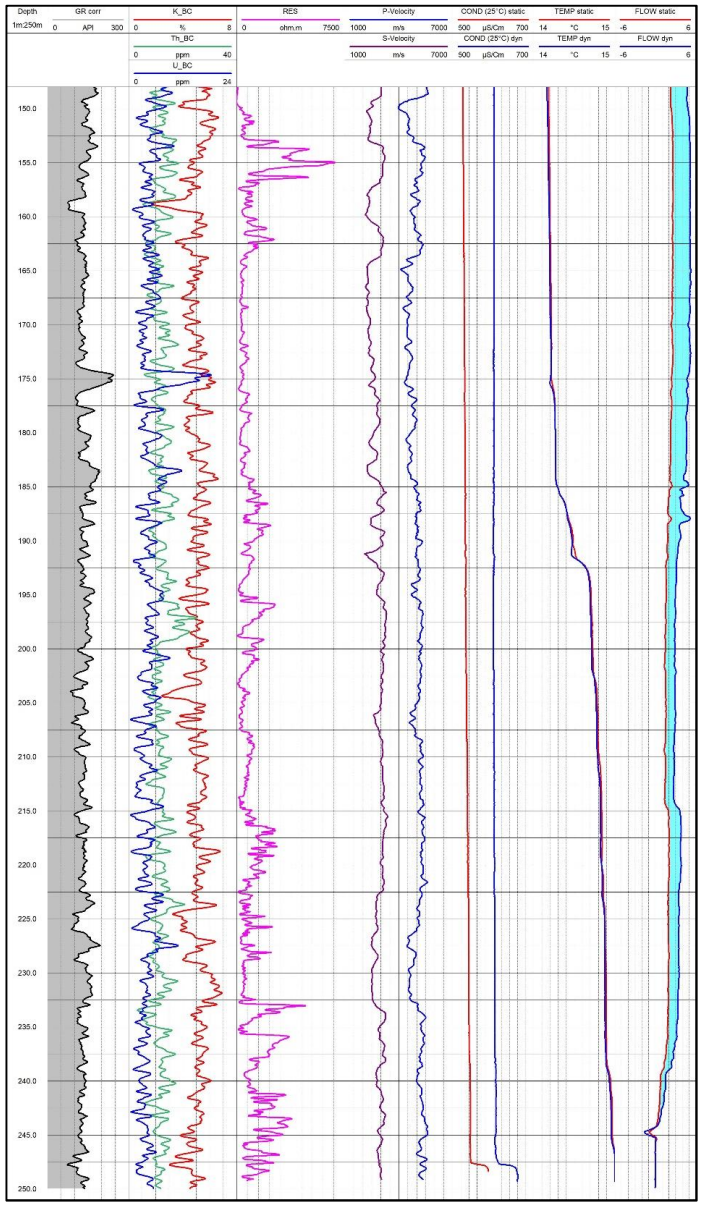


Burchartz et al., in prep.

Boreholes: Done & Planned



- Geophysical logging incl. magnetic susceptibility
- Analysis of small – scale structures



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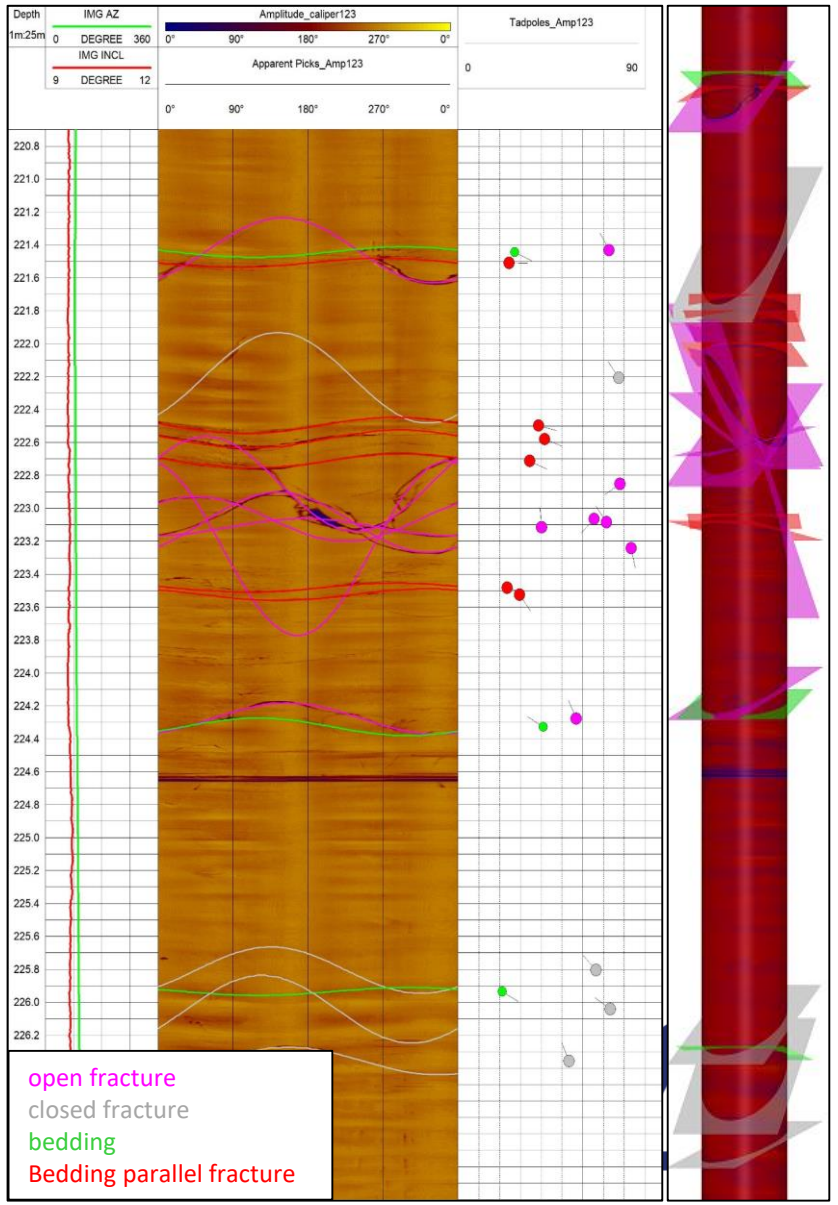

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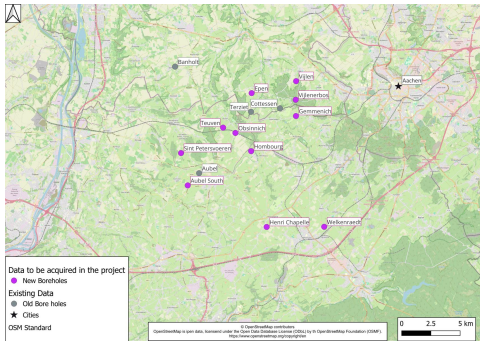
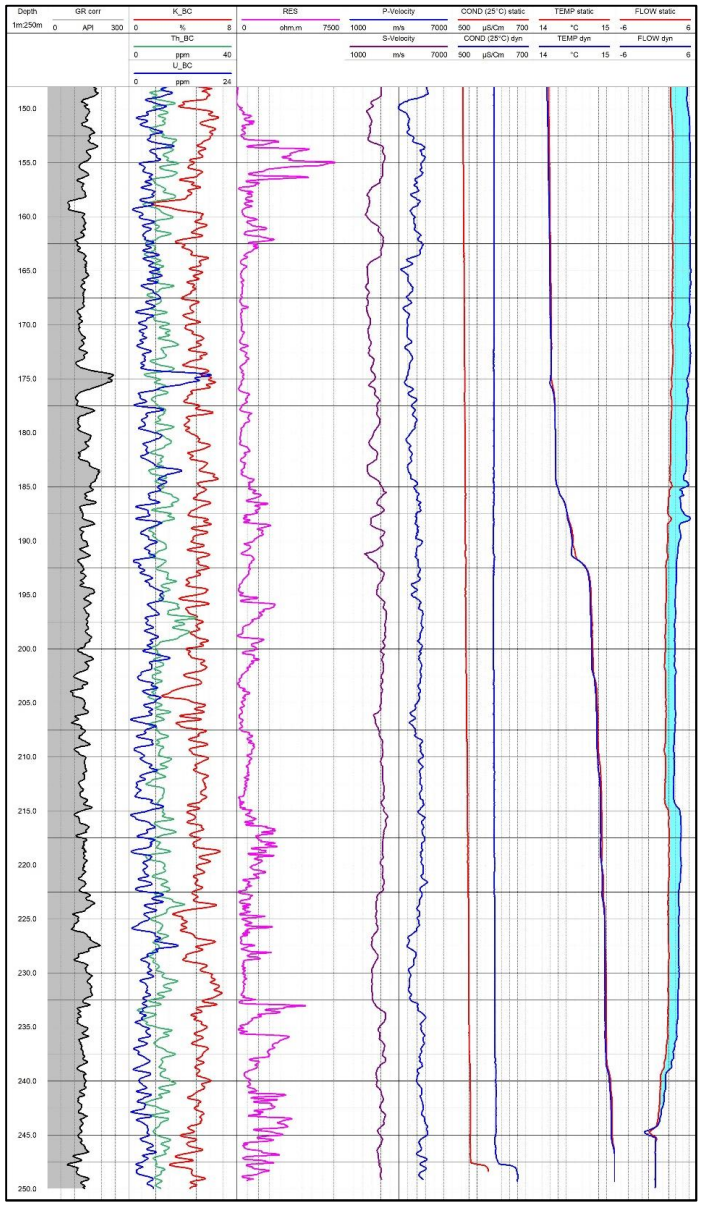
Boreholes: Done & Planned



- Geophysical logging incl. magnetic susceptibility
- Analysis of small – scale structures
- Orientation of structures



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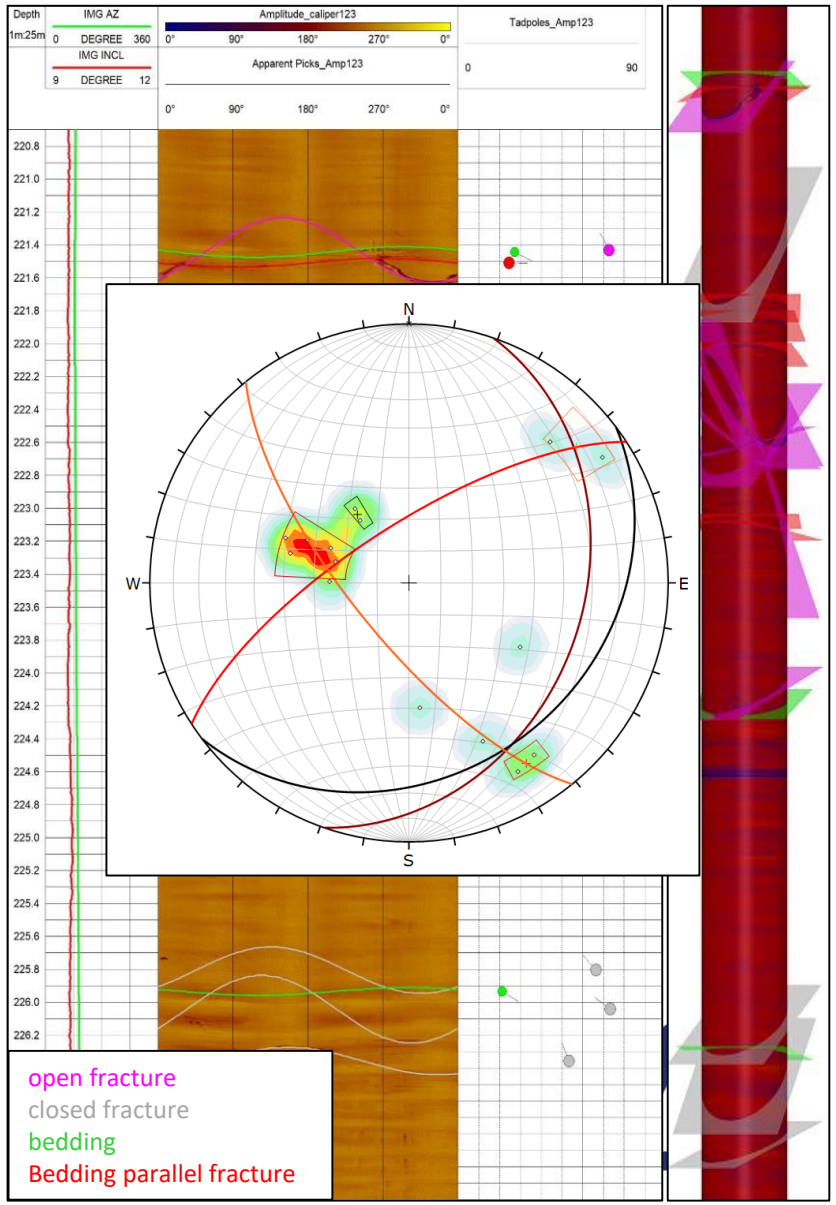

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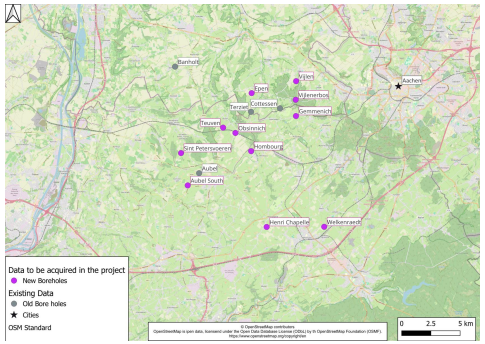
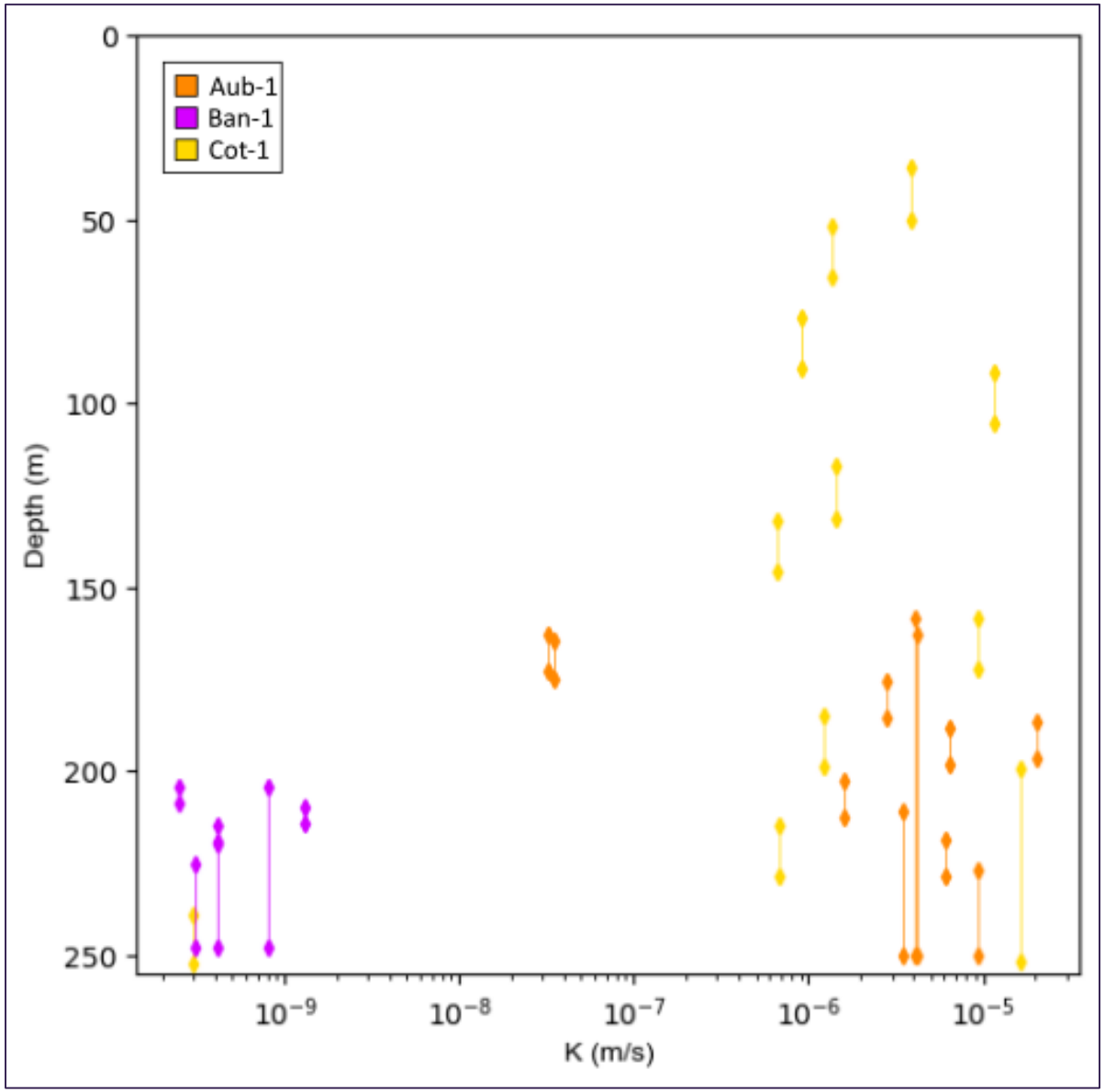
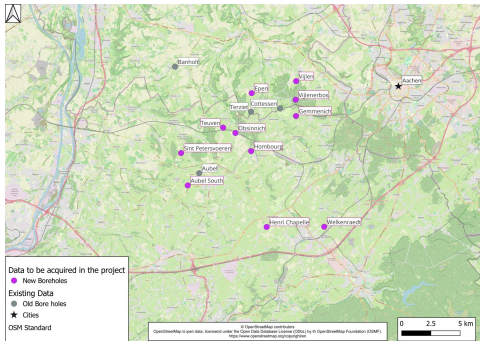


- Geophysical logging incl. magnetic susceptibility
- Analysis of small – scale structures
- Orientation of structures
- Hydraulic testing

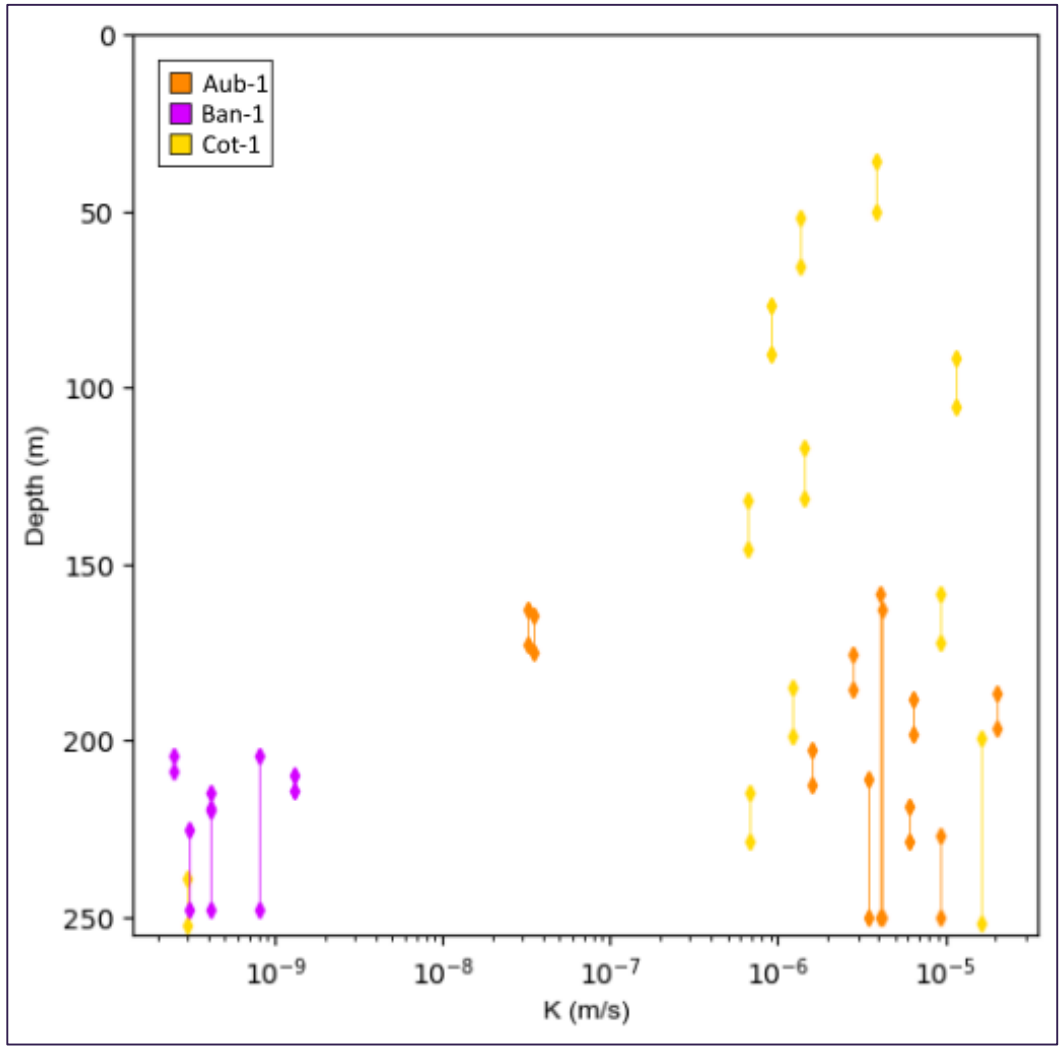


Burchartz et al., in prep.

Boreholes: Done & Planned



- Geophysical logging incl. magnetic susceptibility
- Analysis of small – scale structures
- Orientation of structures
- Hydraulic testing
- Stress testing
- Permanent monitoring station
  - Seismometer and magnetic
  - Piezometer



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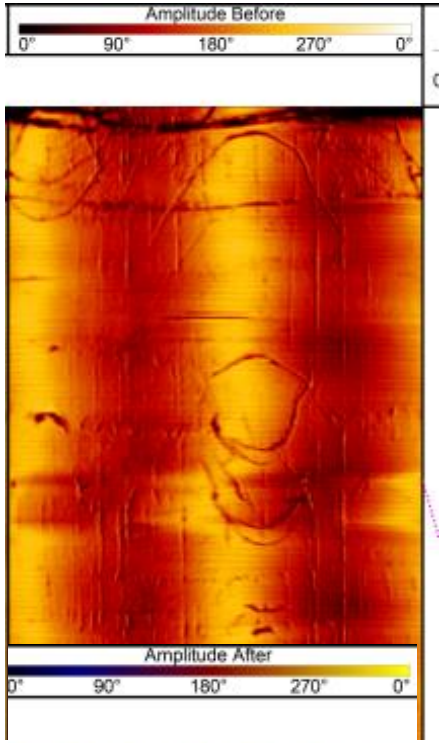
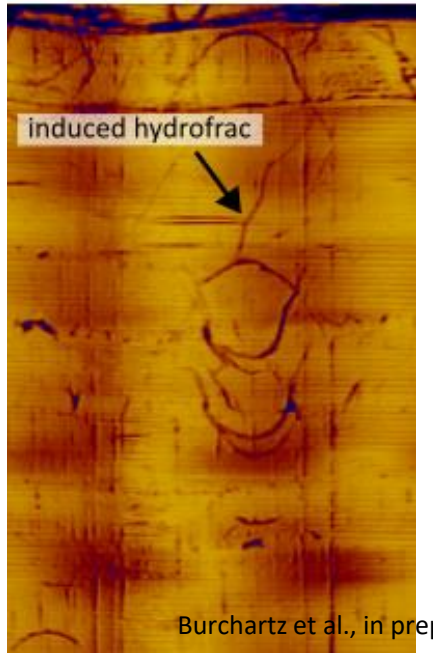
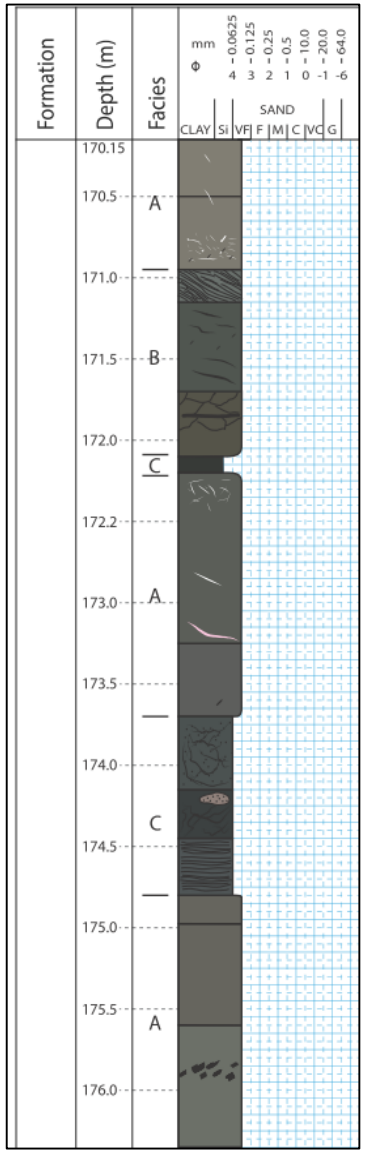


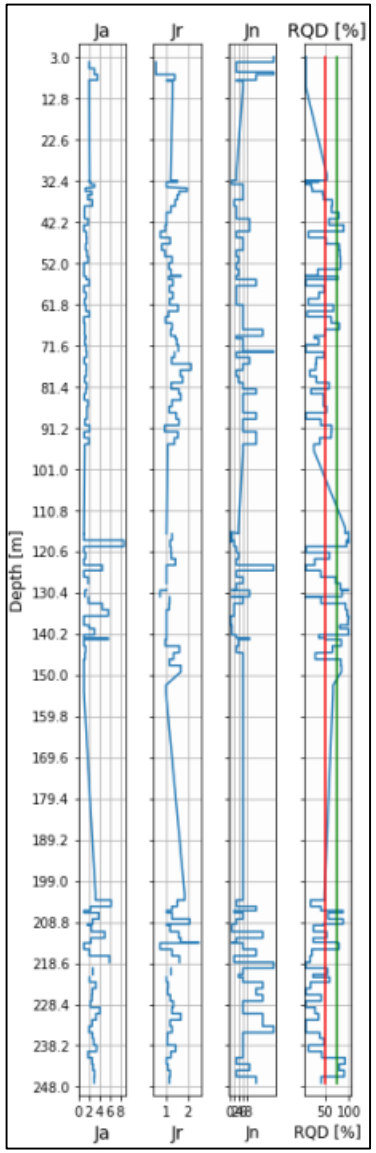


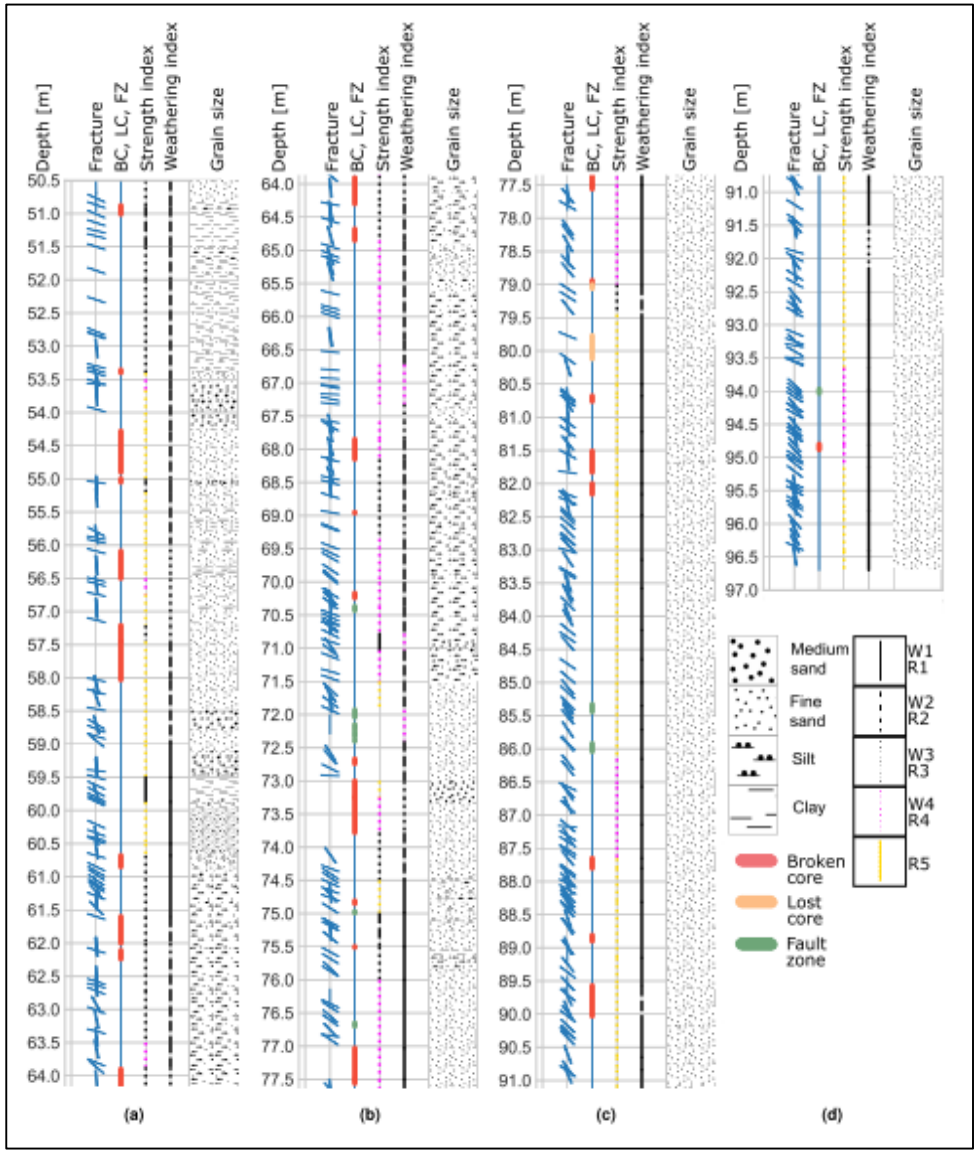
Burchartz et al., in prep.

Core logging and lab testing: Done & Planned

- Geotechnical Core logging
- Geomechanical testing
- Input for construction planning







Core logging and lab testing: Done & Planned

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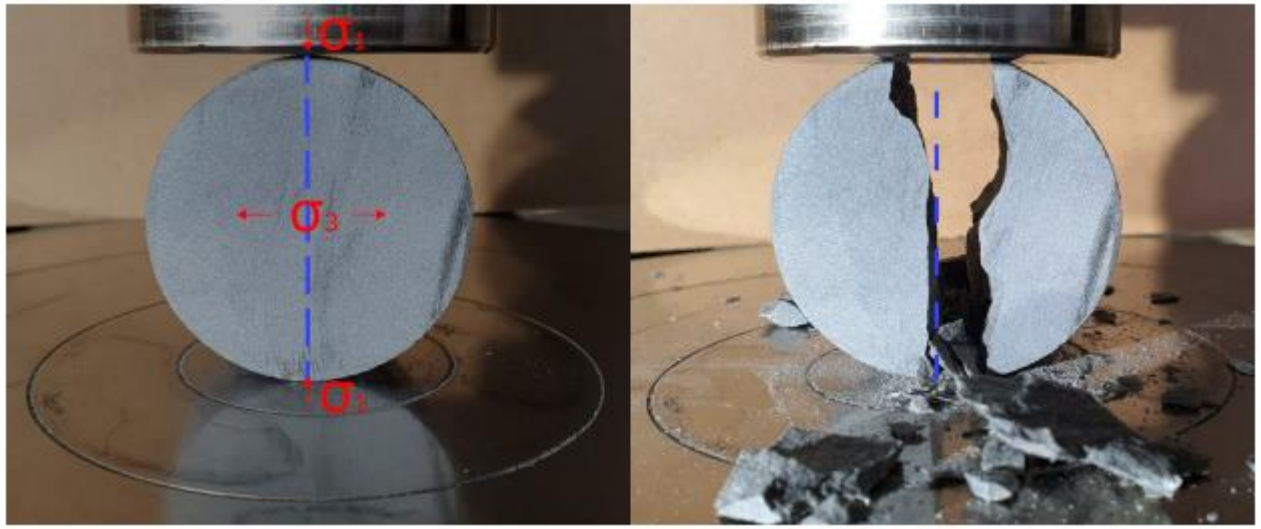
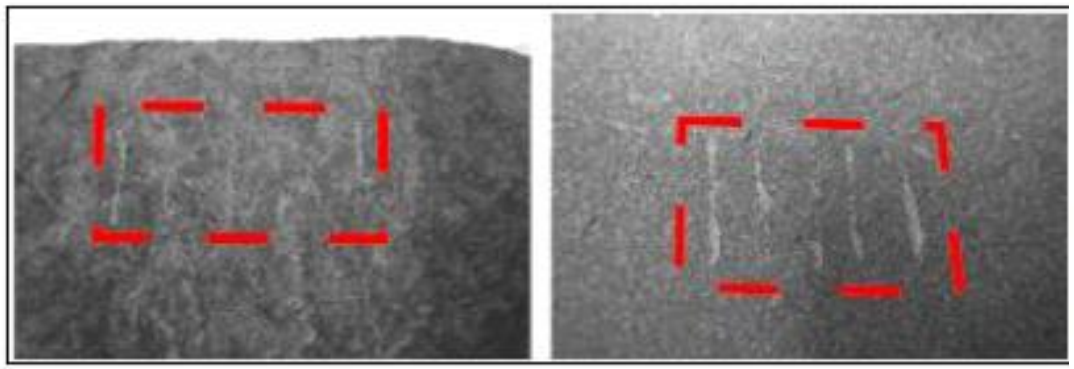
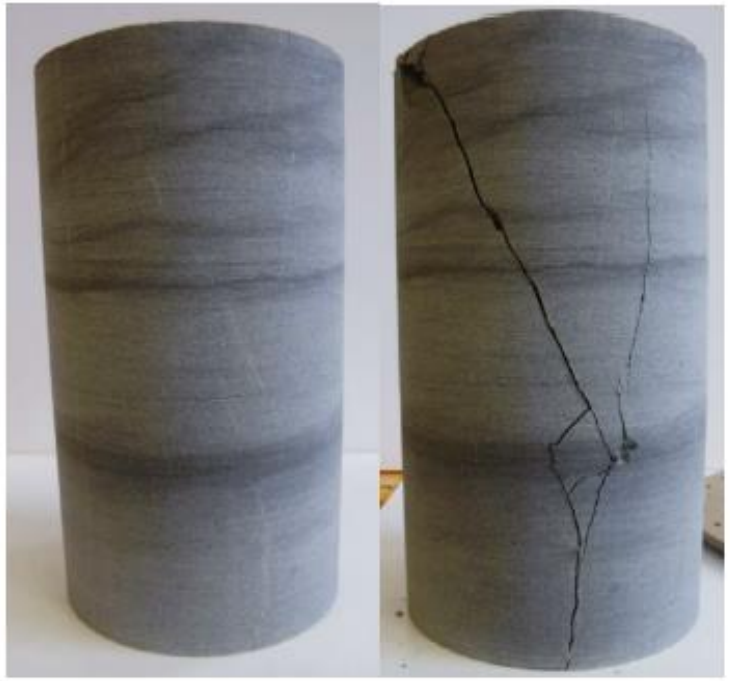






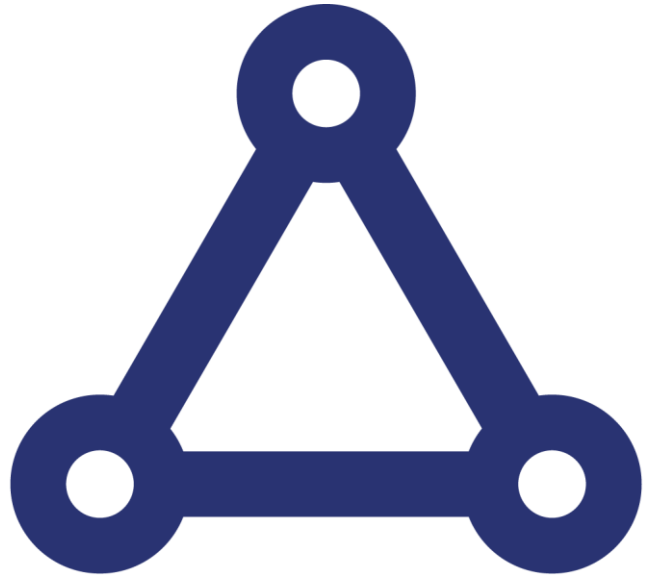
Outlook and future steps

- Newtonian noise
  - Seismic sensors in boreholes
  - Fibre glass cable along borehole casing
  - Passive seismic surveys

- Magnetic noise:
  - Sensors in borehole and on surface
  - Logging of magnetic susceptibility in borehole (and along core)

- 3D model including uncertainties
  - Geological-geophysical-hydrogeological input

- Construction planning
  - Cavern & Tunnel design: Cooperation with specialised companies
  - Geological , geotechnical and hydrogeological context analysis



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