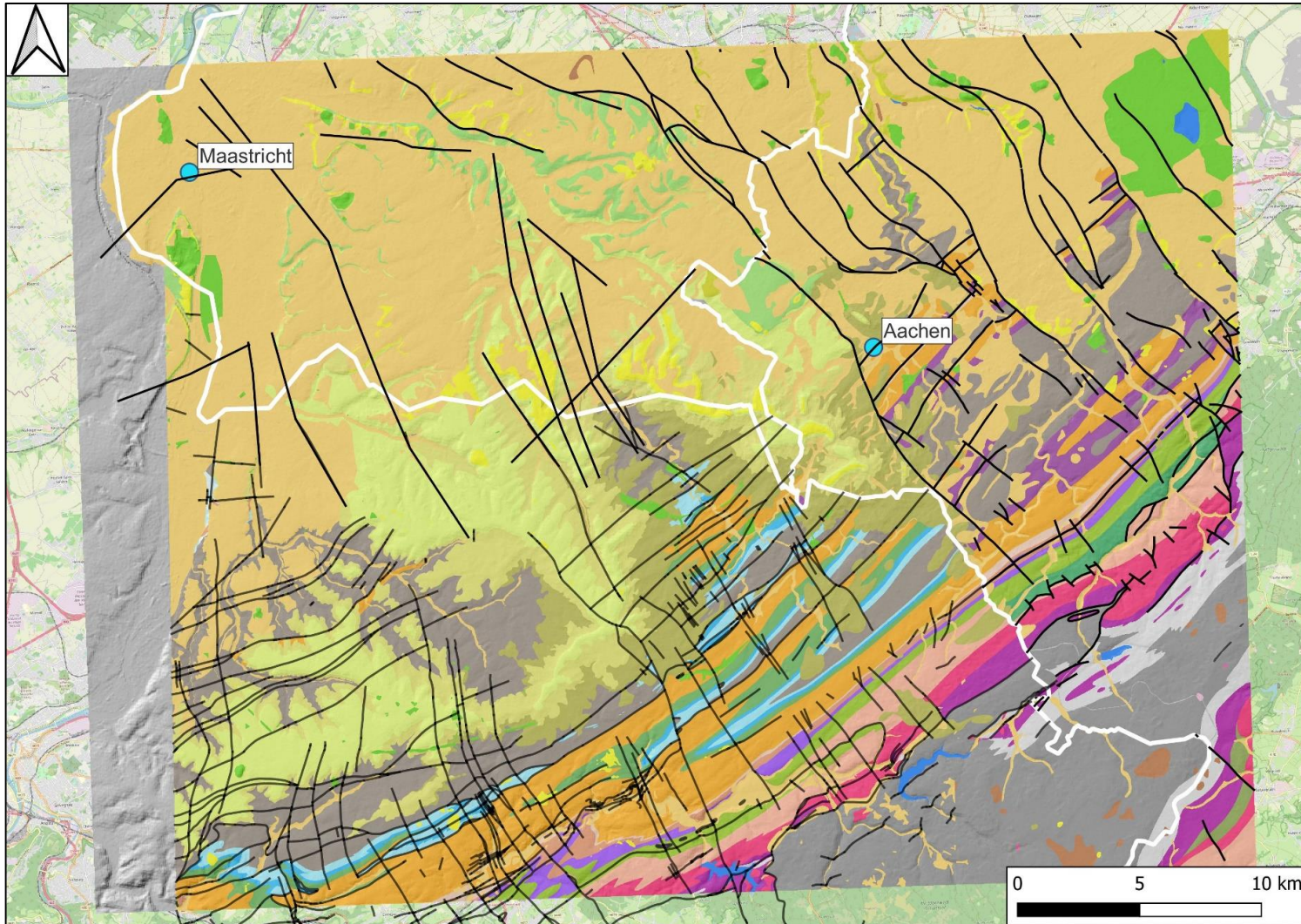


Einstein Telescope – 3rd SPB workshop Core and Borehole measurements - approach and standards

E-TEST TEAM @ RWTH Aachen University

7th December 2023

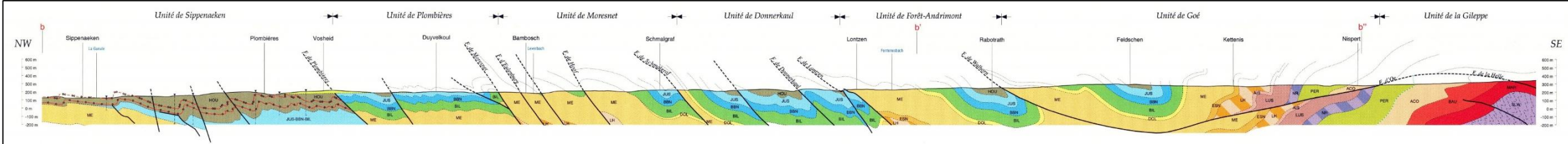
Recap: Geology of EMR region



- Rocks of Paleozoic age
 - Devono-Carboniferous
- Cretaceous cover
- Distribution varies
 - Lithology
 - Depth range
- Two structural sets

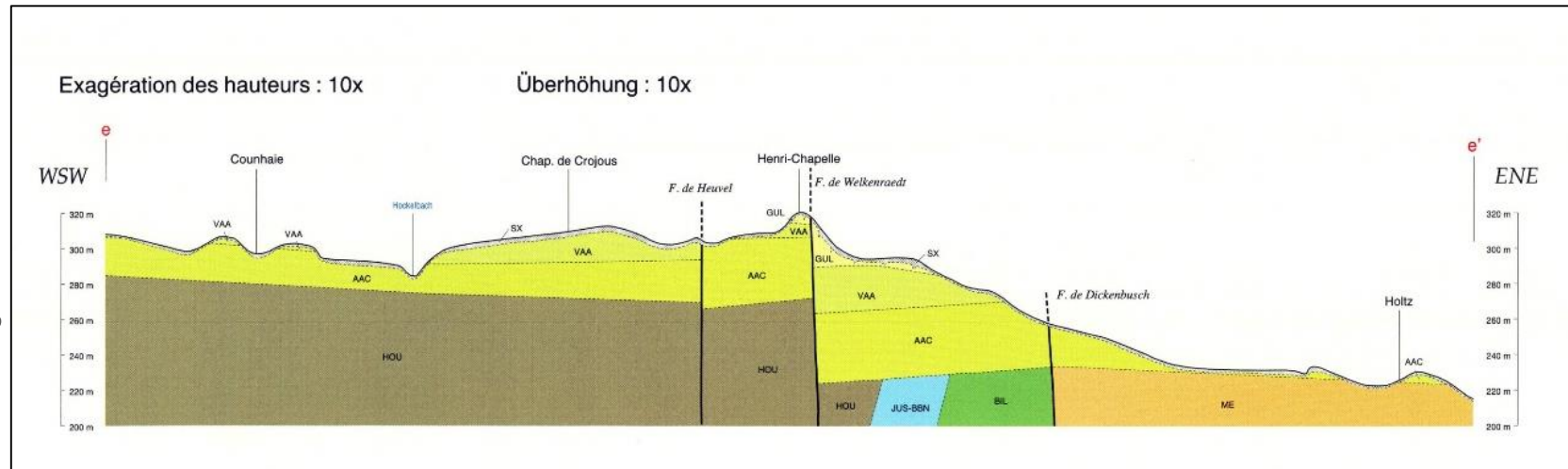
Recap: Structures in EMR region

- Structure set A
 - Strike: NE – SW
 - Originate from Late Paleozoic orogeny
 - Affects only Paleozoic rocks



Gysel et al; 2000

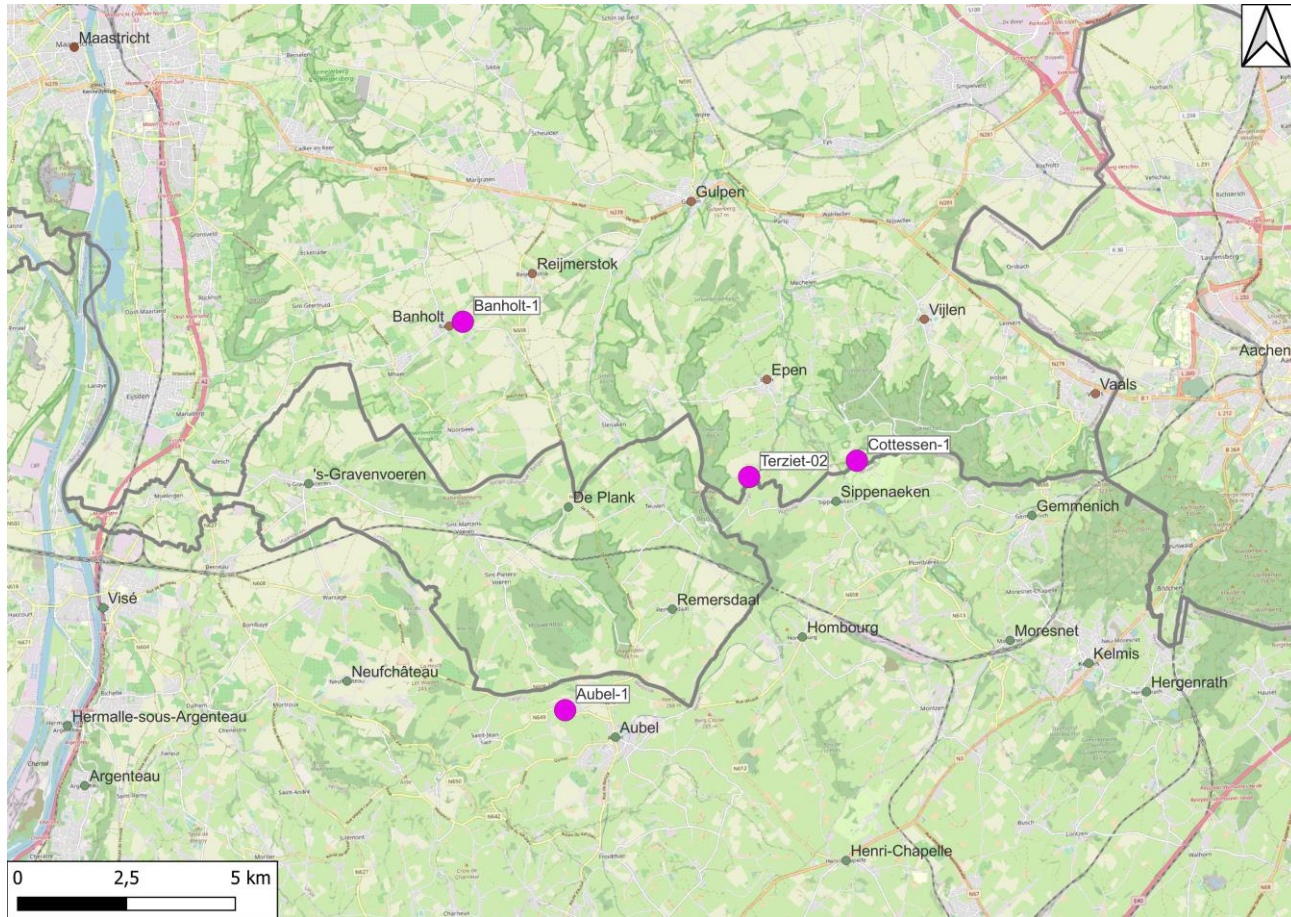
- Structure set B
 - Strike: NW-SE
 - Origin in Devonian,
 - reactivated several times
 - Affects all rocks



Gysel et al; 2000

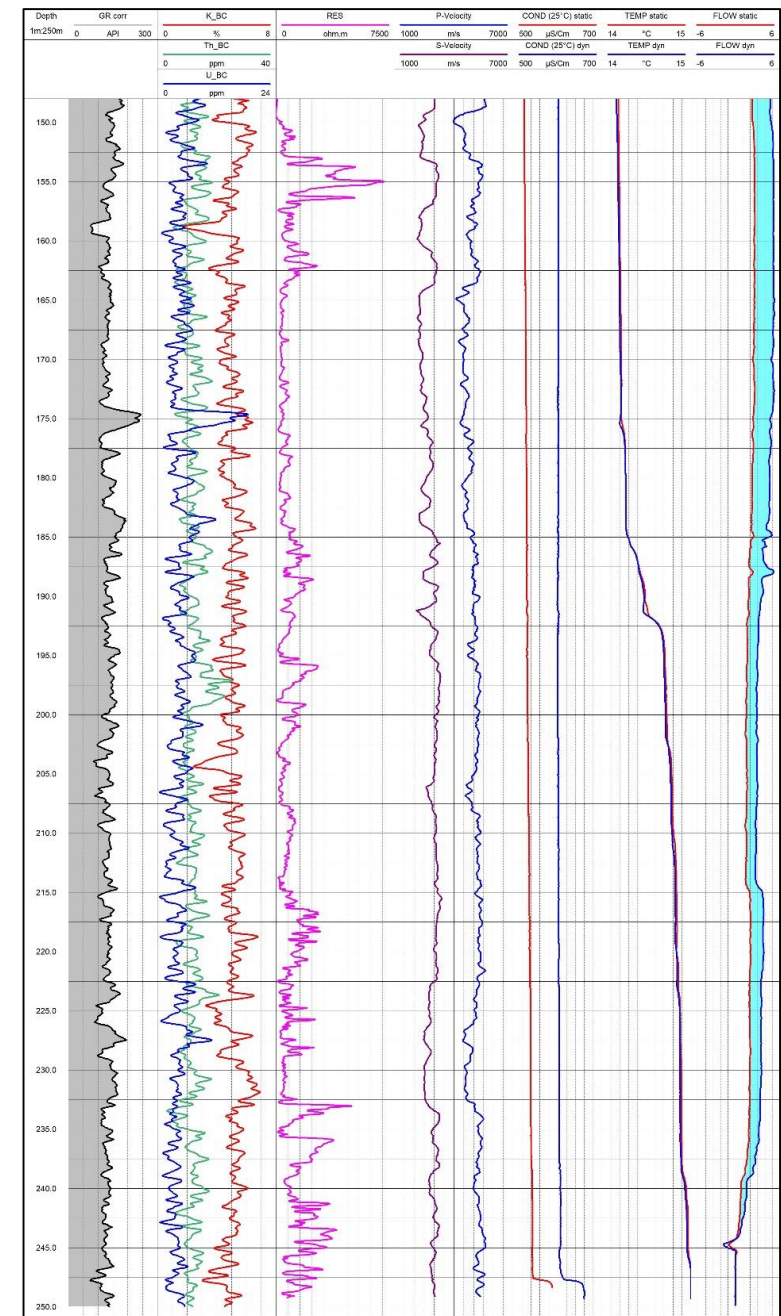
Boreholes, Geophysical logging & Borehole testing

Drilling campaigns



Geophysical logging of boreholes

- Data on various rock characteristics
- Pin data to location
 - Provide info to seismic
 - Interpolation between boreholes
 - Make drilling locations comparable
- New drilling campaign has standardised logging
 - GR
 - sGR
 - Resistivity
 - Sonic
 - Flowmeter
 - (Neutron-Density)



Optical logging

- Structural data: Type and orientation
 - Bedding
 - Fractures
 - Borehole breakouts

- Important for structural analysis

- Standardised measurement
 - Acoustic
 - Optical (if possible)

Result geophysical logging

- Lithological data
- Structural data

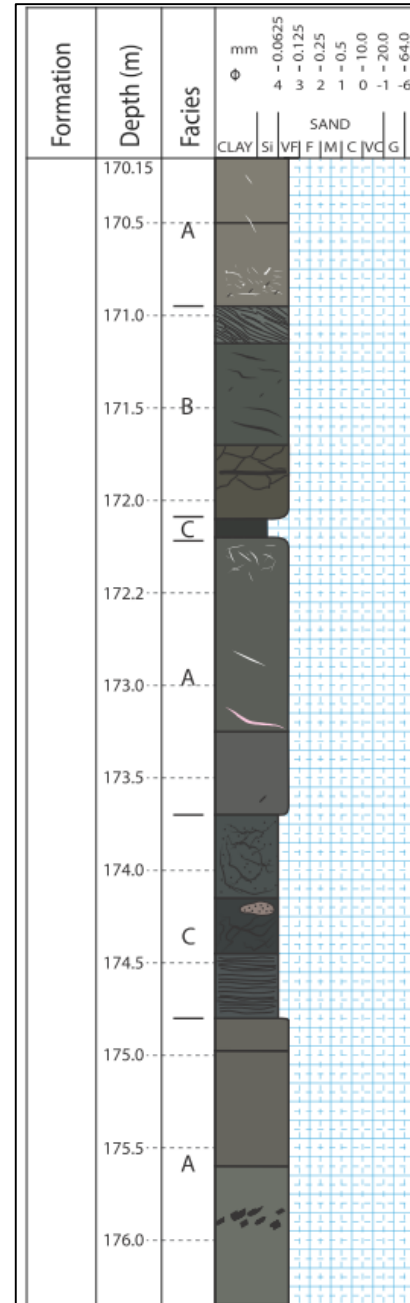
Testing of boreholes

- Hydrological testing
 - Along different intervals
 - Zones of water inflow
 - Permeability
 - Linking with structures possible
- HF / HTPF tests
 - Test of local stress field
 - Test of strength of existing fractures
- Standardising in new campaign
 - In location potential corner points

Geotechnical/Geomechanical work

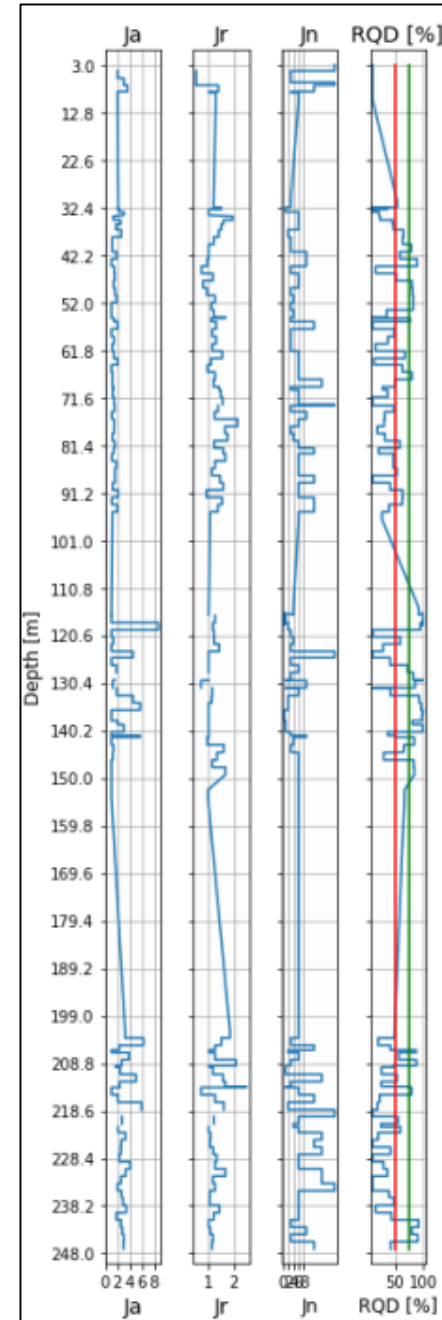
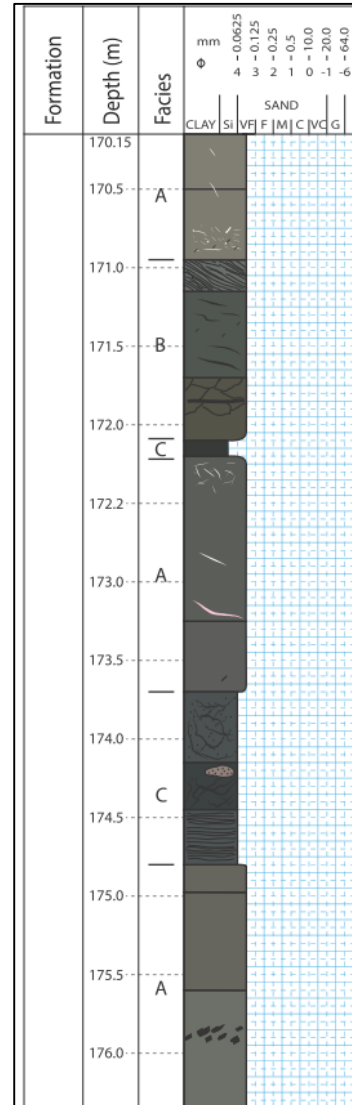
Logging of cores

- Lithology



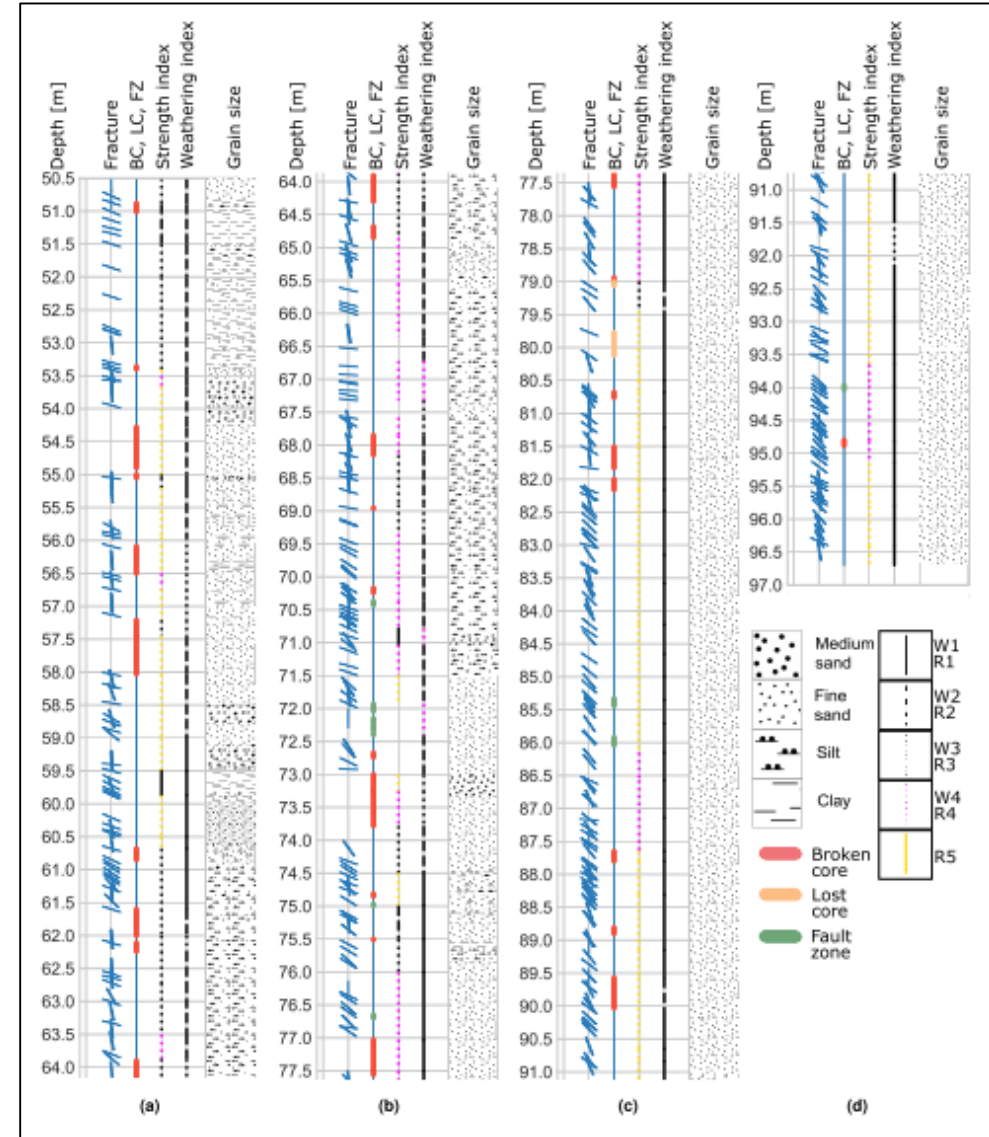
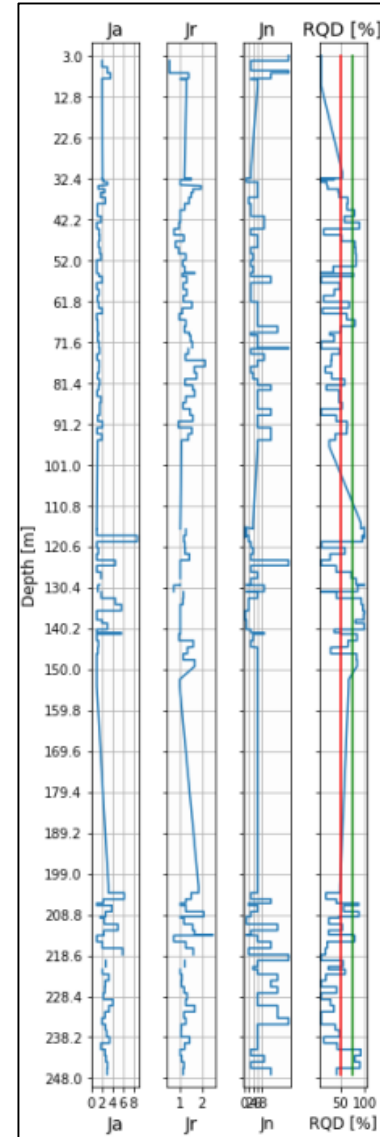
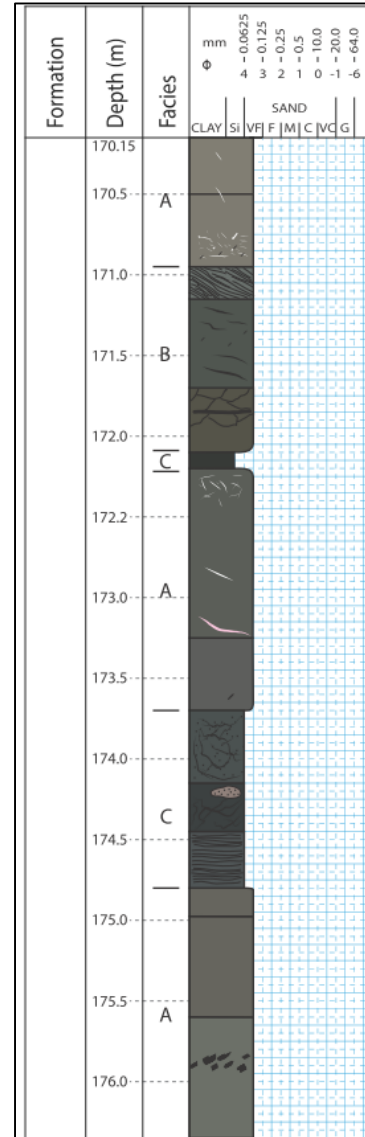
Logging of cores

- Lithology
- Fracture characteristics



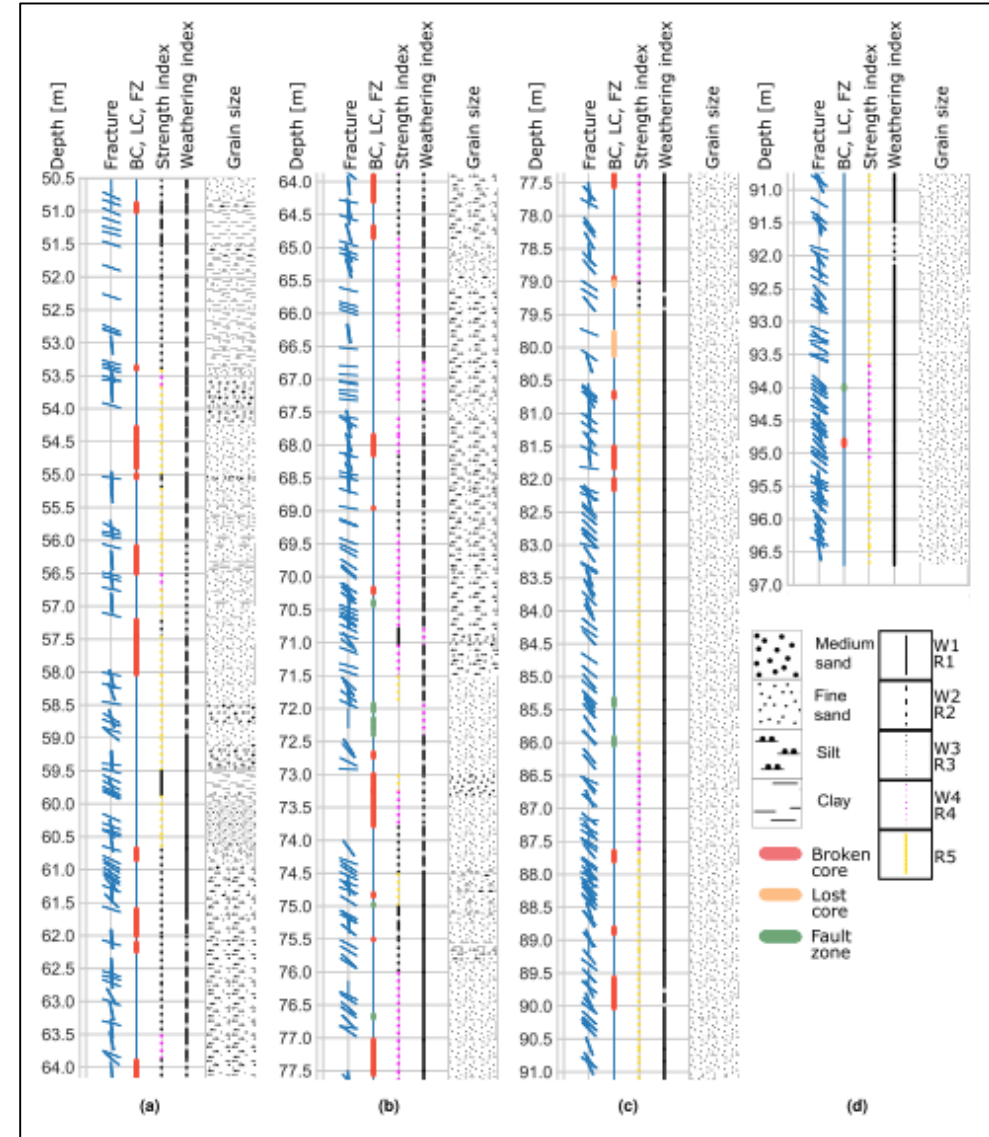
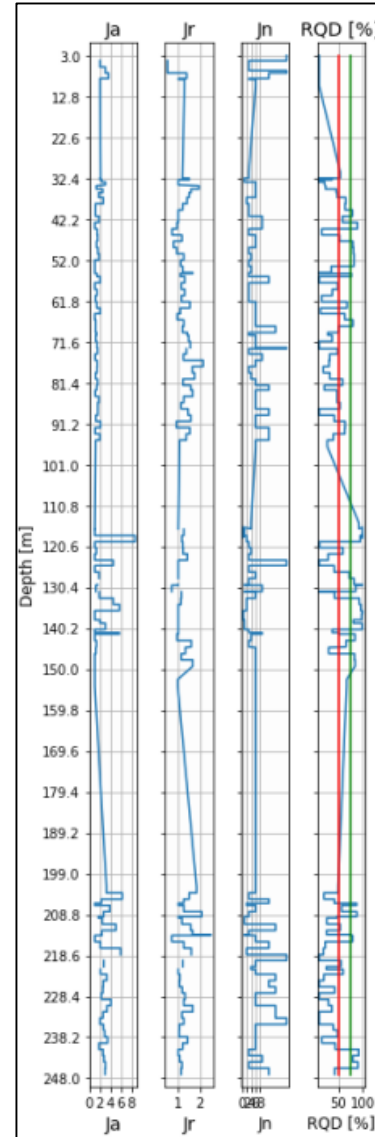
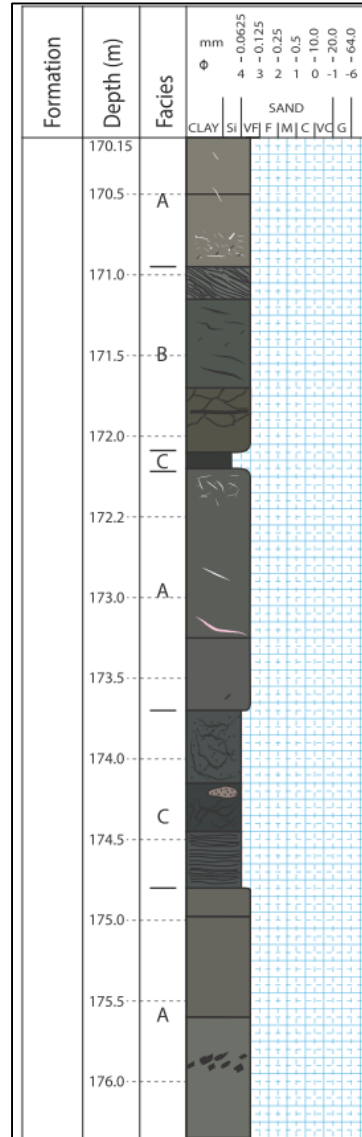
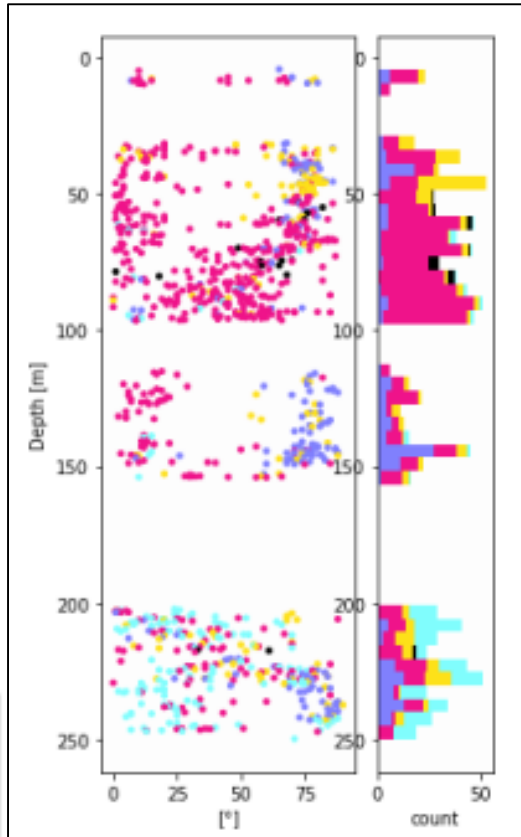
Logging of cores

- Lithology
- Fracture characteristics



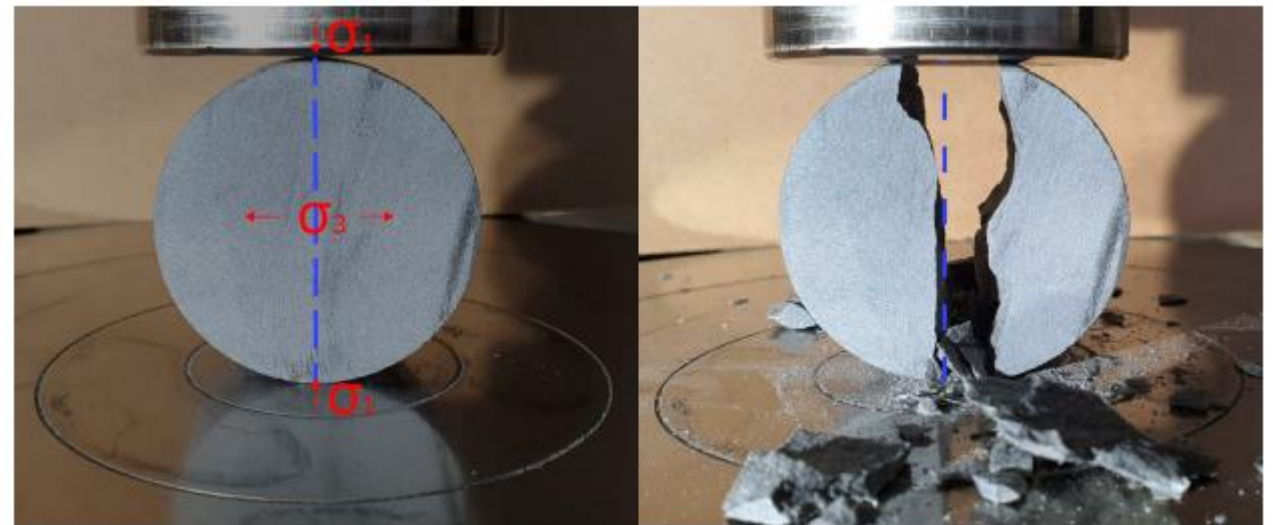
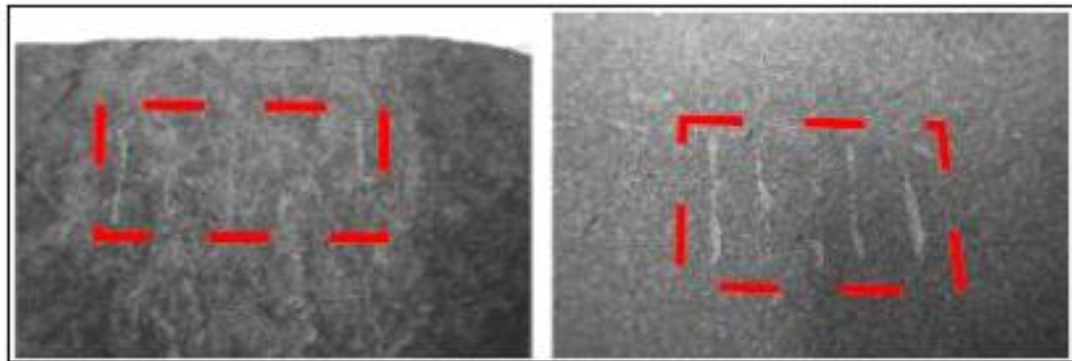
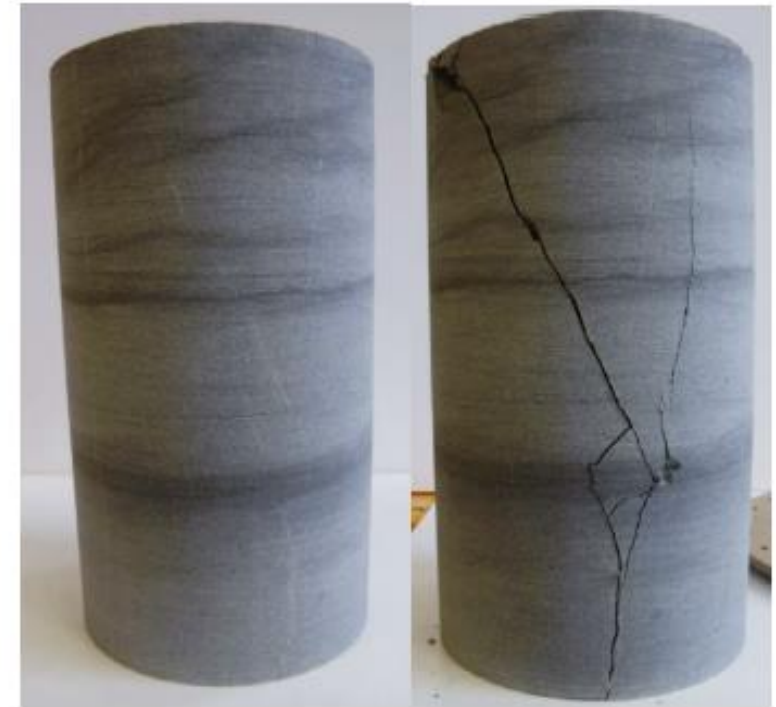
Logging of cores

- Lithology
- Fracture characteristics
- Standardised



Lab testing of core samples

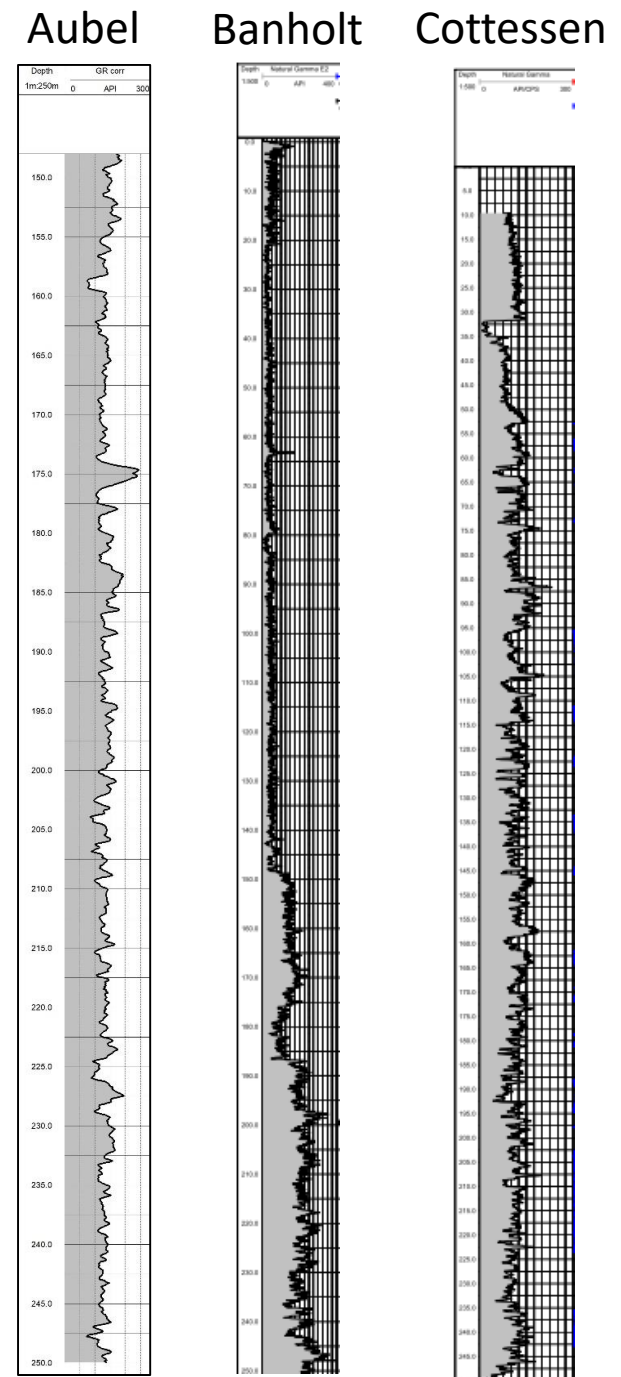
- Geomechanical characterization
- Input for cavern and tunnel planning
- Standardised measurements
 - UCS
 - BTS
 - Abrasivity
 - XRD



Final remarks

Why standardised investigations

- Effective and structured approach to data collection
- Allows comparison
 - Individual locations
 - Between locations
 - Within the area
 - In between areas
- Usability of data for infrastructure planning
 - Especially when norms are the basis -> core logging



Focus during logging and core analysis

- Structural analysis
 - Fractures & Fracture Zones in optical and acoustic logs
 - Fractures, Faults, Broken Core, Lost core

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- Fault and stress field analysis
 - Fractures & Fracture Zones in optical and acoustic logs
 - HF / HTPF tests
- Combination with seismic data for large-scale structures

Focus during logging and core analysis

Fault/Fracture Activity & Interaction fracture network with water inflow



E-TEST is co-funded by the Regions:



Wallonie



VLAAMS-
BRABANT



Ministerium für Wirtschaft, Innovation,
Digitalisierung und Energie
des Landes Nordrhein-Westfalen

provincie limburg



Ministerie van Economische Zaken
en Klimaat



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E-TEST partners

