

# Methods for in-situ HM characterization of claystone at the Mont Terri Rock Laboratory

## *Highlights*

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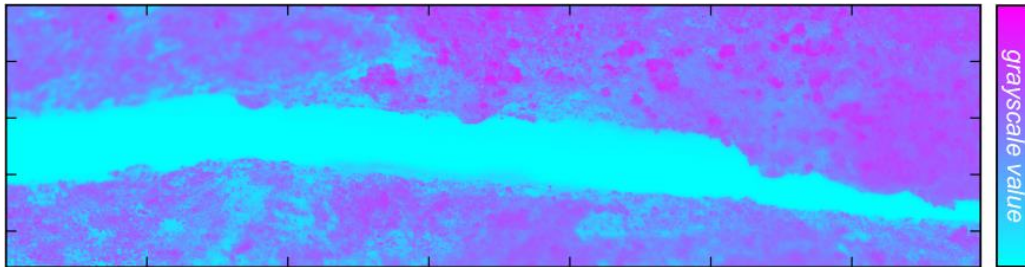
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# Objective & Methodology

Hydraulic (H) and mechanical (M) characterization of the *excavation disturbed zone* (EDZ) in the Opalinus Clay, on-site and non-destructively by

- (1) Transient-airflow permeameter measurements
- (2) Microscopic images of fracture profiles

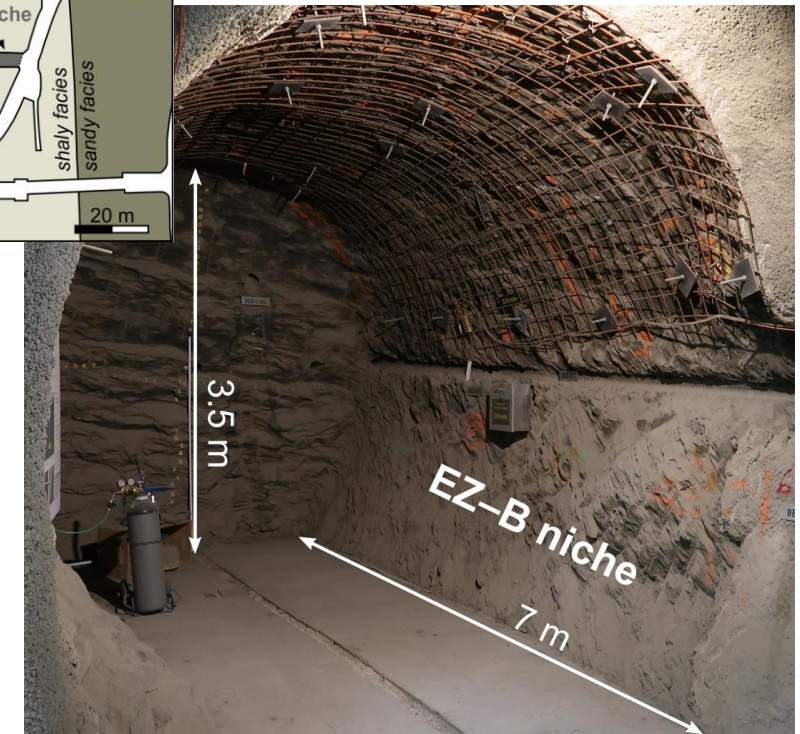
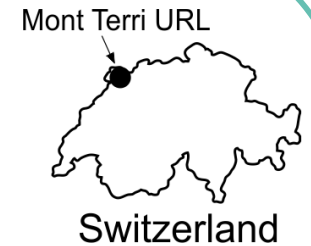
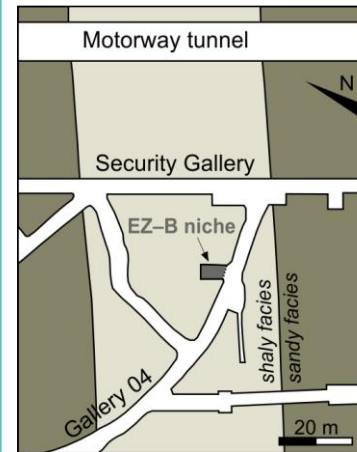


- (3) Needle penetrometer measurements



- Influence of EDZ on HM properties in the EZ-B niche
- Alterations due to 15 years of exposure

## Study site

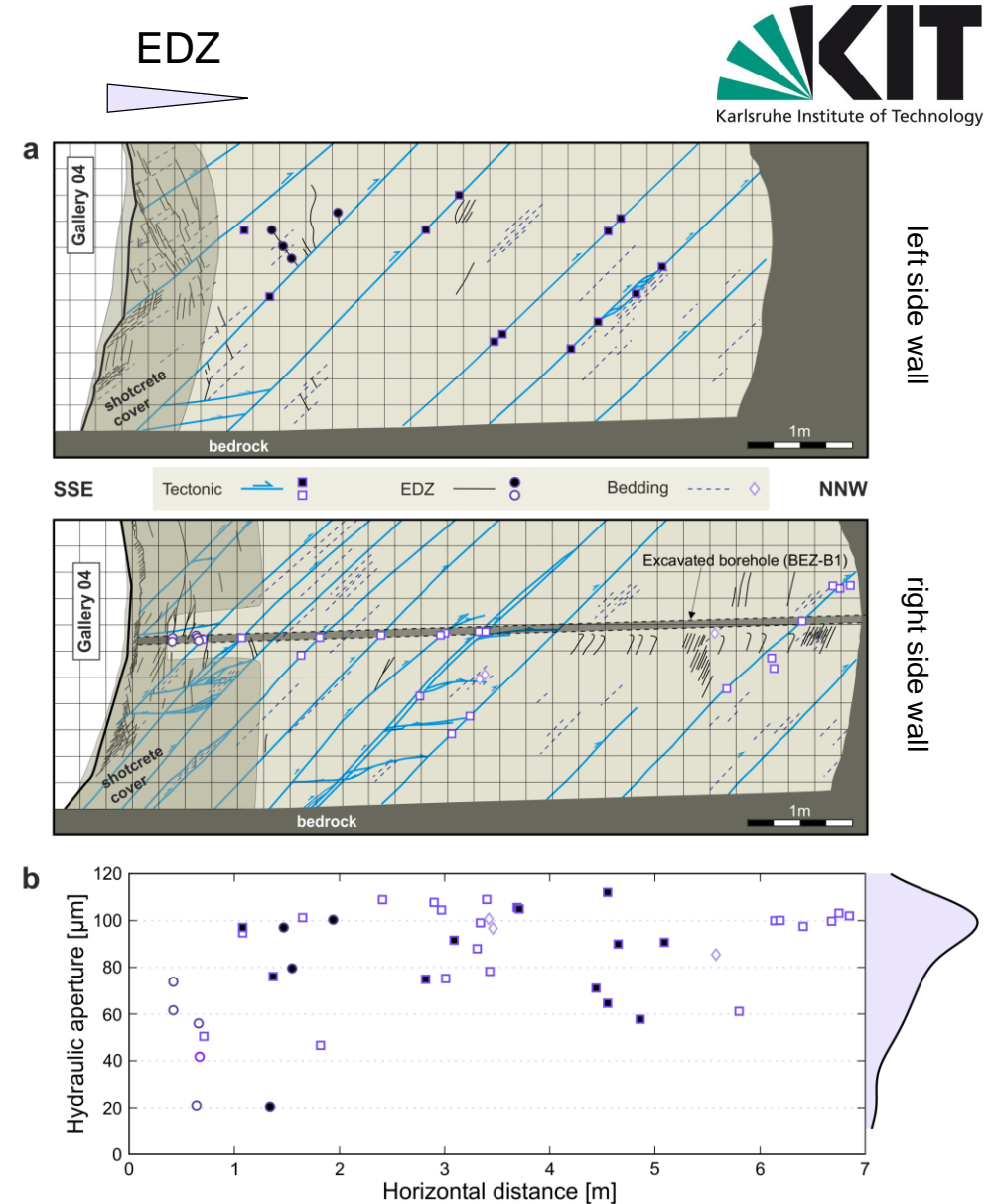


# Hydraulic characteristics

In total, 43 measurement points on both side walls of the EZ-B niche (a)

- ▶ *No increase* in hydraulic (and mechanical) fracture aperture with greater proximity to the EDZ of Gallery 04 (b)
- ▶ Mean *hydraulic fracture aperture*:  $84 \pm 23 \mu\text{m}$  (EDZ fractures:  $61 \pm 30 \mu\text{m}$ )

- Presence of open fractures within and outside the EDZ of Gallery 04
- Long-term: stagnation of self-sealing processes due to continuous desaturation of the Opalinus Clay



Measurement campaign April 2019

# Mechanical characteristics

Estimation of mechanical and geophysical properties using needle penetration tests (NPT) directly at the rock surface of the EZ-B niche

- *Negligible influence* of EDZ on needle penetration index
  - NPT-based estimation of physico-mechanical rock properties possible, especially *uniaxial compressive strength* (UCS)
- Significantly enhanced strength of the Opalinus Clay due to a strong decrease in water content (3.7 wt.-%)

