

## WELLBORE THERMO-MECHANICAL PROCESSES

### Context and objectives

Borehole breakouts in deep boreholes are compressive failure of the borehole wall due primarily to the stress concentration induced by the drilling. Borehole failure is a problem as it increases risk of stuck pipe and other adverse conditions while drilling. On the other hand, borehole breakouts when they occur provide very valuable information on the in-situ stress conditions. They are the best indicator of stress orientation and can give some information on the stress magnitudes. However, the formation of breakout in crystalline rock involves the progressive failure of rock under combined hydro-mechanical and thermo-mechanical effects that are complex and not sufficiently understood.

### Methodology

Within this project a new type of borehole probe will be developed, built and tested. This probe is constituted of a high-pressure double packer system combined with heating system and rock deformation device. This device will allow to control pressure and temperature conditions in the testing chamber and to measure the mechanical response to temperature and pressure changes. The probe will be tested at the Bedretto Underground Laboratory. This experimental work will give us a better understanding of the processes taking place during breakout formation under thermo-hydro-mechanical perturbations and thus help to avoid borehole failure and to interpret borehole breakouts in terms of in-situ stress conditions.

### Supervision and collaboration

The project will be supervised by Prof. Dr. B. Valley (CHYN, UniNE) in collaboration with a post-doctoral fellow at the CHYN. The development of the borehole probe is taking place in collaboration with solexpert and in-situ deployment will take place with colleagues from ETH Zürich at the Bedretto underground laboratory.

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