

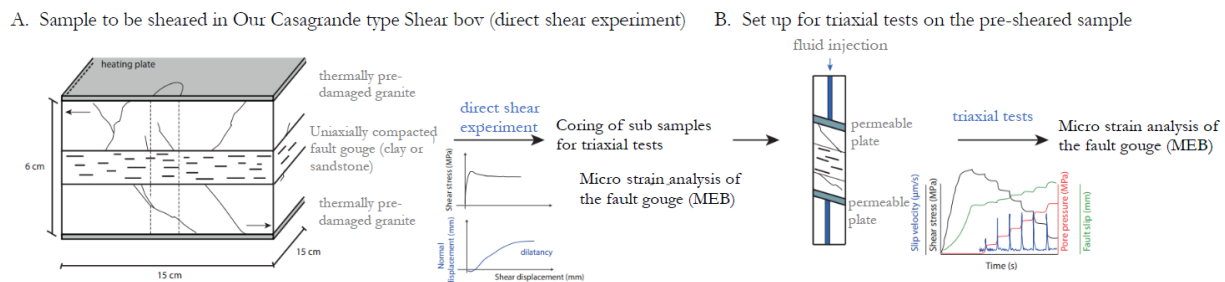
## Post doc position in experimental rock mechanics:

### THM behavior of faults

**Location:** Laboratoire GeoRessources, Nancy, France

**Duration :** 16 months

**Description of the position:** this experimental postdoctoral position is available within the framework of the ANR (French National Research Agency) project EARTH-BEAT. The project aims to identify the key mechanisms and parameters that control fluid-related fault reactivation and associated fertile zones in ore formation processes, by disentangling the relative roles of geological structures, their permeability evolution over time, fluid thermodynamics, and local stress regimes. It involves 6 partners including 4 academic laboratories (GeoRessources, LIAD, LMV and Mines Paris), the French geological survey (BRGM) and one private company (ORANO), and funds 5 post doc positions and 1 PhD. All partners are meeting twice a year.



*Figure 1 : proposed experimental protocol*

The objective of this position is to **develop an innovative experimental protocol to investigate the THM (Thermal-Hydraulic-Mechanical) behavior of faults** (Fig. 1). This protocol is based on the concept of creating synthetic shear zones and analyzing their behavior under progressively increasing pressure-temperature (PT) conditions. Initially, synthetic shear zones of clays and sandstone will be created in a direct shear apparatus (Casagrande type box). The material to be sheared will be dried, grinded and screened, following (Haines et al. 2013), and imbedded between two thermally pre-damaged granite forming a fault core and a damaged zone. The sample will be heated by two heating plates placed at the top and the bottom of the granites (Fig. 1). Then it will be uniaxially compacted within the direct shear apparatus, and sheared to evaluate the influence of composition and temperature on friction and dilatancy of the fault zone under dry condition and on a large sample (15\*15\*6cm). It is planned to re-core these samples to perform triaxial tests on the generated faults and evaluate the evolution of permeability, as well as elastic properties (static and dynamic) and slip behavior under the several pressure conditions (Fig. 1B). After each shearing step, micro strains analysis will be performed under SEM.

Deformation patterns observed on our synthetic samples will be confronted with natural fault-gouge samples for the sake of comparative analysis. This will allow to recover all the parameters that are crucial for the generation of realistic coupled (THMC) models for fault system understanding.

The position will be located in Nancy, France, at the geology research laboratory GeoRessources. GeoRessources is part of the University of Lorraine (<http://welcome.univ-lorraine.fr/>), which is one of the leading higher education institutions in Europe, with more than 55,000 students and 60 research laboratories. The University of Lorraine ranks 17th in the 2022 Shanghai Ranking in the "Mining and Mineral Engineering" category, making it the top European university in this field, thanks to the activities of GeoRessources. Nancy is one of the largest geoscience training centers in Europe, with 4 laboratories hosting over 300 researchers and 1,000 students. GeoRessources is the leading French academic laboratory for subsurface studies, with activities focused on energy and societal transitions (<http://georessources.univ-lorraine.fr/>). The postdoctoral researcher will have access to one of the largest analytical facilities in France dedicated to Earth sciences, which includes several specialized platforms. The researcher will primarily utilize instruments such as the scanning electron microscope (SEM), direct shear apparatus, and triaxial press.

**Salary :** between 2280 and 2360€ /per month depending on the work experience of the candidate.

**Starting :** from June 2025

**Your responsibilities:**

- Collaborate closely in an interdisciplinary context
- Perform mechanical experiments and elaborate innovative protocols
- Present, publish and communicate research results at scientific meetings and in scholarly journals

**Your qualifications:**

- A PhD in the domains of geomechanics
- Good communication skills

**Contacts for the position:**

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