

JOB PROFILE

Post-Doctoral Researcher in Computational Geosciences/Geomechanics

PROJECT TITLE:

Hydro-Mechanical behavior of faults in the context of CO₂ geological storage

DESCRIPTION

The project will focus on investigating the hydraulic and mechanical interactions developing within stressed faults. Special emphasis will be put on the mechanisms leading a fault to (re)activate either hydraulically or mechanically as a result of fluid circulation. A better understanding of these mechanisms will help improve our knowledge on how fluid movements may control faults activity at depth and how hydro-mechanical processes correlate to fault zone stability and subsurface fluid migration in the context of underground storage of CO₂.

Our understanding of interrelationships between fault stability and fluid movements remains limited, and, while classic approaches like the Mohr-Coulomb type plasticity are commonly used for modeling coupled hydro-mechanical processes during fault reactivation, they cannot depict processes that occur prior to failure and cannot give a clear description of the mechanisms involved at the local scale where deformation and fluid circulation can be highly localized within and around the fault core. In order to study these mechanisms at the fault core scale, discrete numerical simulations based on the discrete element method (DEM) will be performed. The DEM, by providing an explicit representation of the fault core materials and of its pore space, enables to finely describe flow movements and associated deformation processes using a micromechanical viewpoint. The simulations will thus permit a characterization of the dynamics leading to hydro-mechanical instabilities in fault cores. Ultimately, we should be able to identify fundamental characteristics controlling fault zone stability and subsurface fluid migration by upscaling both the mechanical and hydraulic properties of the DEM models as functions of the loading conditions.

SELECTION CRITERIA

The applicant must hold a PhD degree in computational (geo)mechanics, or in a related discipline, with, ideally, a strong track record and interest in geology, tectonics or rock and soil mechanics. Advanced skills in numerical programming and expertise in discrete element modeling will be a very strong asset. Excellent written and oral communication skills are required.

TERMS AND TENURE

This 12-months position will be based at the **GeoRessources** laboratory of the **Université de Lorraine in Nancy, France**. GeoRessources is a multi-disciplinary laboratory devoted to the study of geological resources, their exploration and exploitation, as well as their impact on society and the environment.

The successful applicant will be part of the “**Multi-scale Hydro-Geomechanics**” team. The MHG team is formed by 8 full-time academic staff members, and 8 PhD and post-doctoral researchers. Areas of expertise include rock mechanics, flow and transport processes in porous media, engineering geology and geo-environmental engineering.

The target start date for the position is February 2020, with some flexibility on the exact start date.

The gross salary will be between 2,130 and 2,650 euros/month depending on experience.

The successful applicant will be directly supervised by Dr. Luc Scholtès and will have the opportunity to work with researchers from other research institutes:

- Dr. M. Souley from the French national institute INERIS, Nancy, France
- Pr. F.V. Donzé from the Université Grenoble-Alpes, ISTerre, Grenoble, France
- Pr. Y. Guglielmi from the Lawrence Berkeley National Laboratory, Berkeley, USA

HOW TO APPLY

Applicants are requested to submit the following materials:

- A cover letter applying for the position
- Full CV and list of publications
- Two selected publications
- The names and contact information of two referees

Deadline for application is **1st January 2020**. Applicants will be interviewed by an Ad Hoc Commission.

Applications are only accepted through email.

All document must be sent to luc.scholtes@univ-lorraine.fr