



**UNIVERSITÉ
DE LORRAINE**

**geo
Ressources**

Postdoc/Research Engineer position in Rock Mechanics

at University of Lorraine (France)

GeoRessources Laboratory

This postdoctoral position will open as soon as possible, for 12 months (renewable).

Net salary (including social security): 1800€ / month

Applicants should send a Curriculum Vitae, motivation letter and the names and email addresses of two references to:

albert.giraud@univ-lorraine.fr, dragan.grgic@univ-lorraine.fr

and fabrice.golfier@uni-lorraine.fr

Context

The applicant will be recruited within the Multiscale Hydro-Geomechanics (HGM) research team of GeoRessources laboratory. He/she will mainly work on the experimental platform. He/she will be involved in fundamental or applied research projects jointly with industrial partners (ORANO, TOTAL, ...) concerned with the hydro mechanical behavior of geomaterials and natural porous rocks. He/she will notably collaborate to the CIGEO research project of Andra and should design and supervise experimental tests for characterizing thermo-hydro-mechanical (THM) behavior of argillaceous rocks.

The experimental platform of the HGM team is one of the most important in France. It includes mechanical presses, pressure generators, high-capacity triaxial compression cells for conducting deformation and acoustic measurements for studying the mechanical and physical behaviour of rocks under mechanical strain, temperature and high-pressure fluid circulation, nano- and micro-indentors for investigating micro-mechanical behavior, a range of geotechnical (hardness-abrasion tests, Los Angeles, climatic chambers,...) and petrophysical apparatus (mercury porosimeter, sorption analyser...), a rock machining workshop. An experimental room dedicated to the study of biological processes in porous media (e.g., biodegradation, bacterial growth) is also available. These experimental devices are coupled to high-performance modeling resources (e.g., cluster computation, GPU stations) for 3D simulation of coupled processes.

Objectives and work summary

The work will be organized around two tasks:

- As part of a research project conducted in collaboration with Orano, the successful applicant will be in charge of studying the clogging mechanisms of wells observed during in situ recovery processes (ISR). This mining method consists in extracting the ore through acidic or alkaline attack solutions. Percolation tests will be performed on core samples under triaxial loadings so as to characterize ore leaching and to identify the source of clogging (mechanical and / or chemical). In addition to leachate monitoring, petrographic (permeability, porosity) and image analyzes (3D tomography of samples, SEM, TEM, etc.) will be performed to better characterize the evolution of the sample after leaching.
- In the context of the University of Lorraine / ANDRA partnership, he / she will on the one hand, write a summary of the physico-mechanical behavior of Callovo-Oxfordian argillites, investigated by the host team in the 2004 to 2019 period, and on the other hand, participate in ongoing research dedicated to the study of self-healing mechanisms taking place in clay rocks under different THM solicitations, as well as in the evaluation of their hydromechanical properties by acoustic measurements.

Requirements

- PhD degree in rock mechanics, applied geology or rock physics.
- Solid background in geomechanics and strong interest in experimental works
- Solid knowledge in petrographic and petrophysical characterization of rocks
- Fluency in English and in French (or willingness to learn French)
- Highly motivated and self-directed person

Contacts :

Head of the Research team

Fabrice Golfier, fabrice.golfier@uni-lorraine.fr

Albert Giraud, albert.giraud@univ-lorraine.fr

Scientific head of the HGM experimental platform

Dragan Grgic, dragan.grgic@univ-lorraine.fr

Additional information

Laboratory: GeoRessources

Laboratory Director: Jacques PIRONON

URL laboratory: <http://georessources.univ-lorraine.fr/>

Laboratory Overview: Created in 2013, GeoRessources is a multidisciplinary laboratory devoted to the field of geological resources - their exploration and exploitation, including recovery, treatment and recycling stages, and their impact on society and the environment. GeoRessources brings together Nancy's most important players in the field of Applied Geology. GeoRessources is hosted by the [University of Lorraine](#), and has three supervising institutions: University of Lorraine, CNRS and [CREGU](#). GeoRessources employs a total of 180 personnel (including part-time) of which more than 100 are permanent staff members (44 technicians, 60 researchers and assistant professors/professors). GeoRessources research activities are based around three main research themes - Geomodeling, Raw Materials, and Geosystems. The "Geomodels" theme is driven by two teams, "Integrative Numerical Geology" and "**Multi-Scale Hydro-Geomechanics (HGM)**". The Raw Materials theme is composed of three teams, "Carbon Resources", "Mineral Resources" and "Treatment of Resources and Residues", and the "GeoSystems" theme, related to the anthropogenic use of the geological environment, consists of two teams, "Geological Storage and Geothermal Energy" and "GeoMaterials, Structures and Risks".

GeoRessources is based on two transfer centres, [ASGA](#) and [CREGU](#), which facilitate its relationships with industrial partners. [ORANO](#) and [TOTAL](#) are the two CREGU shareholders. GeoRessources has also forged a number of other industrial partnerships through its involvement in [the RING consortium](#) and the STEVAL project. GeoRessources is developing strong and specialized partnerships with the so-called EPIC institutes (BRGM, INERIS, ANDRA, IFPEN, ...), some of which, such as the Lorraine INERIS sub-division, are already hosted by GeoRessources.

The HGM team conducts interdisciplinary research concerned with the use and management of the surface and sub-surface environment, with a strong focus on the safety of underground structures. Applications address local and national socio-economic issues, including geotechnics, environmental protection, and the surface and sub-surface storage of waste, CO₂ and H₂.

The originality of the team's work lies in addressing these issues from the points of view of hydrodynamics and transfer mechanisms, as well as from a poro-mechanics perspective. The team undertakes fundamental research in the hydrogeomechanics of porous and fractured media, through the use of laboratory and in-situ experimentation, academic developments, physical and numerical modelling and data analyses. These developments require collaboration in what have traditionally been isolated fields: geomechanics, hydrodynamics, mineralogy, biochemistry and chemical physics. A further difficulty in the development of such models is related to the incorporation of heterogeneities and multi-level complexities.