



## PhD Research Position (Nancy, France)

### Hydromechanical behaviour of a compacted clay cover layer in the very long term

A fully funded PhD scholarship for 3 years at the University of Lorraine (F) is available to start in October 2015. In the context of nuclear waste storage at shallow depth, it is necessary to study the hydro-mechanical parameters of the host in situ clay and of the cover layer made of compacted clay. The key issue is to ensure the sustainability of the hydro-mechanical properties of these materials in the very long term. Indeed, it is likely that they will be subjected to various environmental stresses and climate variations under different mechanical conditions in the very long term. Their hydro-mechanical properties (hydraulic conductivity, swelling pressure, etc.) could be progressively modified, thus altering the performance of the repository. It is therefore essential to quantify the impact of these stresses on the hydro-mechanical properties of these materials, including compressibility, creep and transfer characteristics.

The main objective of this thesis is therefore to quantify the impact of external modifications (water content, chemical, mechanical) on the hydro-mechanical behavior of a clay in the very long-term. This project is divided in two main phases. Firstly, from an experimental point of view, we will focus on the analysis of the impact of cyclic water and thermal variations on compressibility, creep, hydraulic conductivity and cracking of the compacted clay. Chemical alteration of the host clay induced by a modification of the pore fluid chemistry will be also considered. Secondly, these results will be employed to model the long term behaviour of the repository to assess the impact of the alteration of soil properties.

PhD works will be of experimental and numerical nature, relying on state-of-the art laboratory equipment and strong numerical modelling resources.

Candidates should own a Master Degree in Civil, Geotechnical or Mechanical engineering, and have a strong interest in Mechanics of Geomaterials.

Knowledge of the French language is not mandatory. The thesis can be written in English.

#### Conditions

*Starting date* : September 2015 for a duration of three years

*Net Salary / Studentship*  $\approx$  1400 € per month

*Institution* : LEMTA ([http://lemta.univ-lorraine.fr/comp\\_thmc\\_sols.html](http://lemta.univ-lorraine.fr/comp_thmc_sols.html))

Université de Lorraine ([www.univ-lorraine.fr](http://www.univ-lorraine.fr))

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#### How to apply ?

Send by e-mail before **31<sup>st</sup> July 2015** a CV (2 pages max), if available a copy of the Master thesis (pdf file, internet link) or any relevant publication, and the name of one referee to both correspondents:

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