2019

EPFL

Laboratory of Soil Mechanics

Chair "Gaz Naturel" Petrosvibri

Prof. Lyesse Laloui

FOUNDATIONS FOR THE FUTURE

The Soil Mechanics Laboratory gives priority to the protection from geo-hazards and industrial damage to the environment, landforms and structures. Our experimental and modelling resources are mobilised to understand, investigate and predict the environmental impact of the new technologies such as nuclear waste disposal, and to provide tools for the up-to-date design of the geo-structures. In addition, in the context of the Chair "Gaz Naturel", we focus our activities on the geo-engineering and the CO2 storage.
Our scientific and technological developments are permanently transferred to education and industry.

Laboratory of Soil Mechanics – EPFL

LMS

MAIN IDEAS

- sustainability
- environmental friendliness
- coupled characterisation of geomaterials
- integrated approach

ENERGY GEOSTRUCTURES

The basis of our work consists of observing, measuring, understanding and predicting how energy geostructures behave from a multiphysical perspective.

LMS supports the goals of the Swiss Energy Strategy 2050

Special attention is put on cyclic thermo-mechanical behavior as well as heat extraction in crystalline rocks at high depts. The work is targeted to develop practical tools for design and conception.

This technology meets 70% of the energy needs of buildings

SOIL BIOIMPROVEMENT

We investigate a novel soil improvement strategy, inspired by the natural process of biologically driven crystal mineralization. The research aims to develop the conception of a geo-mechanical model to describe the enhanced behavior of the bio-treated soil, optimize the improv ement process and enhance the practical applicability of this technique. The works are carried out from laboratory to field scales.

BIOGEOS
biomediated geometerial strenghtening

"BIO-mediated GEO-material Strengthening for engineering applications"
ERC Advanced Grant 2018

- slope stabilization
- soil erosion risk mitigation
- foundation stabilization in urban zones
- earthquake and liquefaction protection in seismic areas

Geomechanics for Construction, Energy, Resources and Environment

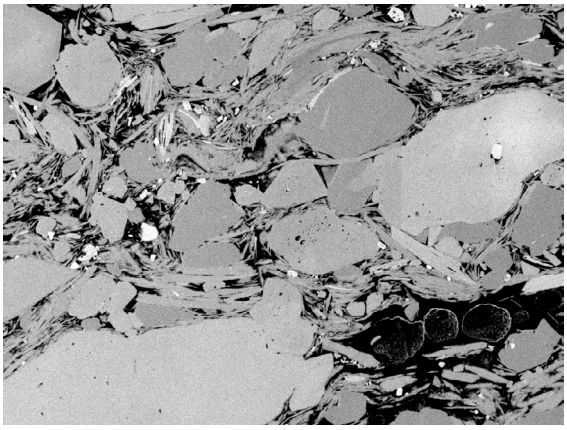
Theoretical and applied aspects in geomechanics, geo-energy, and geo-engineering aiming for the practical application of the obtained results

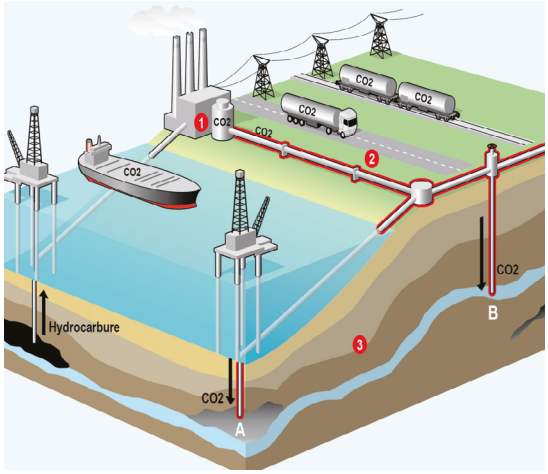
NUCLEAR WASTE STORAGE

Disposal in deep clay geological formations is the most promising way for disposing of high level wastes. The laboratory works as well as numerical modelling are being conducted taking into account complex thermo-hydro-mechanical (THM) behaviour of materials. Involved materials are deeply analyzed in order to provide reliable predictions for the behaviour of storage facilities.

GAS SHALE EXTRACTION

Shales are extremely complex geomaterials and many challenges are associated with the extraction of shale gas. Geomechanics is the key to achieving a better understanding and a deeper knowledge of shales' behaviour when subjected to engineering practices. Our laboratory and nunemerical work is targeted to develop practical tools aiding in better productivities, larger flowback precentages, and a general better understanding of the shale gas reservoirs.





CO_2 STORAGE

CO2 sequestration in deep geological formations is one of most suitable solutions for CCS (Carbon Capture and Storage). The interplay between transport, reaction and mechanics is tackled through innovative interdisciplinary research both experimentally and numerically. Our research focuses on experimental investigation of the behaviour of shale caprocks as well as on the quantitative risk prediction of large earthquakes occurring in the basement rocks below fluid injection intervals.

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Find further information in our **Annual Reports** by scanning the QR code:

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Meet the team!

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