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.
CO₂ STORAGE

CO₂ sequestration in deep geological formations is one of the 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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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 numerical work is targeted to develop practical tools aiding in better productivities, larger flowback percentages, and a general better understanding of the shale gas reservoirs.

LABORATORY OF SOIL MECHANICS - EPFL

SUSTAINABILITY

DEEP GEO-ENGINEERING

The basis of our work consists of observing, measuring, understanding and predicting how energy geostructures behave from a multiphysical perspective. Special attention is put on cyclic thermo-mechanical behavior as well as heat extraction in crystalline rocks at high depths. The work is targeted to develop practical tools for design and conception.

ENERGY GEOSTRUCTURES

This technology meets 70% of the energy needs of buildings

LMS supports the goals of the Swiss Energy Strategy 2050

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 improvement process and enhance the practical applicability of this technique. The works are carried out from laboratory to field scales.

“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

The basis of our work consists of observing, measuring, understanding and predicting how energy geostructures behave from a multiphysical perspective.
Theoretical and applied aspects in geomechanics, geo-energy, and geo-engineering aiming for the practical application of the obtained results

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

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