

# LMS | ACTIVITY REPORT 2018

## Courses taught

### BA, MA and Doctoral level at EPFL

The column "Credits / Coeff." indicates Coefficient for first-year students (BA1-2), Credits for the others

#### Spring semester 2018

| Teacher(s)  | Code      | Course title                                  | Section-Semester / Coeff. | Credits | Student number |
|---|-----------|---|---------------------------|---------|----------------|
| <b>Laloui, Lyesse</b> (LMS);<br><b>Bernier-Latmani, Rizlan</b> (EML);<br><b>Ferrer Rizzo, Ignacio</b> (SAR-ENS);<br><b>Ferrari, Alessio</b> (LMS);<br><b>Rotta Loria, Alessandro Francesco</b> (LMS);<br><b>Perrault, Dominique</b> (PH-ENAC);<br><b>Fernandez Andrino, Juan</b> (SAR-ENS);<br><b>Nguyen, Richard</b> (SAR-ENS) | PENS-211  | Terra Epidermis                               | ENAC-BA4                  | 4       | 35             |
| <b>Vulliet, Laurent</b> (LMS)   | CIVIL-203 | Mécanique des sols et écoulements souterrains | GC-BA4                    | 5       | 76             |
| <b>Laloui, Lyesse</b> (LMS)   | CIVIL-444 | Energy geostructures                          | GC-MA2,<br>GC-MA4         | 3       | 21             |
| <b>Laloui, Lyesse</b> (LMS);<br><b>Ferrari, Alessio</b> (LMS)   | CIVIL-530 | Slope stability                               | GC-MA2,<br>GC-MA4         | 3       | 38             |

#### Fall semester 2018

| Teacher(s)   | Code      | Course title                  | Section-Semester / Coeff. | Credits | Student number |
|--|-----------|-------------------------------|---------------------------|---------|----------------|
| <b>Vulliet, Laurent</b> (LMS);<br><b>Defert, Raphaël</b> (SGC-ENS) | CIVIL-438 | Analyse et gestion de risques | GC-MA1,<br>GC-MA3         | 3       | 35             |
| <b>Laloui, Lyesse</b> (LMS);<br><b>Koliji, Azad</b> (SGC-ENS)      | CIVIL-402 | Geomechanics                  | GC-MA1,<br>GC-MA3         | 3       | 51             |

### Additional teaching

| Teacher(s)                       | Course title   | Section-Semester   | Credits | Student number | Institution where taught (if not EPFL) | Additional information on external institution(s)         |
|----------------------------------|--|--------------------|---------|----------------|--|---|
| <b>Ferrari, Alessio</b><br>(LMS) | A Resilient Future: Science and Technology for Disaster Risk Reduction | EPFLx - edX Course |         |                |  | Silvia Hostettler, Cooperation & Development Center, EPFL |

## Advising

### Postdoc works (completed in 2018 or ongoing)

| Advisee  | Research topic   | Starting (month/year) | End, if known (month/year) | Supervisor(s)   | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|--|--|-----------------------|----------------------------|---|---------------------------------------|--|
| <b>Baryla, Patrycja Ewelina</b> (LMS)          | Laboratory investigations of the influence of granulation and compaction method on HM characteristic of granular bentonite | 12/2017               |                            | <b>Laloui, Lyesse</b> (LMS);<br><b>Ferrari, Alessio</b> (LMS) |                                       |  |
| <b>Hicher, Patrick</b> (LMS)                   | Electrically-Assisted Microbial-Induced Calcite Precipitation  | 03/2018               |                            | <b>Laloui, Lyesse</b> (LMS)                                   |                                       |  |
| <b>Madaschi, Aldo</b> (LMS)                    | Modelling activities on buffer and host rock materials for High Level Waste geologic repositories                          | 10/2016               |                            | <b>Laloui, Lyesse</b> (LMS)                                   |                                       |  |
| <b>Minardi, Alberto</b> (LMS)                  | Geomechanical characterization of caprock formations for the geological storage of carbon dioxide                          | 02/2018               |                            | <b>Laloui, Lyesse</b> (LMS);<br><b>Ferrari, Alessio</b> (LMS) |                                       |  |
| <b>Rotta Loria, Alessandro Francesco</b> (LMS) | Application of energy geo structures at the city scale   | 03/2018               | 03/2019                    | <b>Laloui, Lyesse</b> (LMS)                                   |                                       |  |
| <b>Sütman, Melis</b> (LMS)                     | Experimental and numerical investigation of thermo-active piles  | 10/2016               |                            | <b>Laloui, Lyesse</b> (LMS)                                   |                                       |  |
| <b>Terzis, Dimitrios</b> (LMS)                 | Bio-cemented soils   | 11/2017               |                            | <b>Laloui, Lyesse</b> (LMS)                                   |                                       |  |

### PhD thesis (completed in 2018 or ongoing)

| Advisee | Thesis title | Doctoral Program | Completion year | Advisor(s) | Co-advisor(s) | Other(s) | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|---------|--------------|------------------|-----------------|------------|---------------|----------|---------------------------------------|--|
|---------|--------------|------------------|-----------------|------------|---------------|----------|---------------------------------------|--|

| Advisee  | Thesis title  | Doctoral Program | Completion year | Advisor(s)                        | Co-advisor(s)                           | Other(s) | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|--|---|------------------|-----------------|-----------------------------------|---|----------|---------------------------------------|--|
| <b>Bosch Llufriu,</b><br>Jose Antonio<br>(LMS) | Constitutive modelling of active soils under environmental actions  | EDME             | 2020            | <b>Laloui,</b><br>Lyesse<br>(LMS) | <b>Ferrari,</b><br>Alessio<br>(LMS)     |          |                                       |  |
| <b>Cassini,</b><br>Etienne André<br>(LMS)      | Multi-scale thermo-chemo-mechanical modelling of MX-80 bentonite from atomistic description of clay-ions-water interactions | EDME             | 2019            | <b>Laloui,</b><br>Lyesse<br>(LMS) |   |          |                                       |  |
| <b>Crisci,</b><br>Eleonora (LMS)               | Advanced constitutive law for Opalinus Clay   | EDME             | 2019            | <b>Laloui,</b><br>Lyesse<br>(LMS) | <b>Ferrari,</b><br>Alessio<br>(LMS)     |          |                                       |  |
| <b>Elmaloglou,</b><br>Ariadni (LMS)            | Ground bio-stabilization: Bio-chemo-mechanical monitoring and optimized upscaling   | EDME             | 2022            | <b>Laloui,</b><br>Lyesse<br>(LMS) |   |          |                                       |  |
| <b>Fryer,</b> Barnaby<br>Padraig (LMS)         | Hazard and Risk Assessment of Large Seismic Events Owing to Fluid Injection   | EDME             | 2020            | <b>Laloui,</b><br>Lyesse<br>(LMS) | <b>Siddiqi,</b><br>Gunter<br>(EDME-ENS) |          |                                       |  |
| <b>Garbellini,</b><br>Cristiano (LMS)          | Soil-structure interaction in the context of piled-raft foundations with groups of energy piles                             | EDME             | 2020            | <b>Laloui,</b><br>Lyesse<br>(LMS) |   |          |                                       |  |
| <b>Harran,</b> Ray<br>(LMS)                    | Geotechnical aspects of Bio-improved soils in the context of BIOGEOS  | EDME             | 2022            | <b>Laloui,</b><br>Lyesse<br>(LMS) |   |          |                                       |  |

| Advisee  | Thesis title  | Doctoral Program | Completion year | Advisor(s)                     | Co-advisor(s)                    | Other(s) | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|--|---|------------------|-----------------|--------------------------------|----------------------------------|----------|---------------------------------------|--|
| <b>Kim, Jinwoo</b><br>(LMS)                          | Effective Stress Framework for Partially Saturated Gas Shales   | EDME             | 2022            | <b>Laloui, Lyesse</b><br>(LMS) | <b>Ferrari, Alessio</b><br>(LMS) |          |                                       |  |
| <b>Kim, Taeheon</b><br>(LMS)                         | The chemical effect of CO2 on geomechanical properties of geological carbon sequestration                 | EDME             | 2022            | <b>Laloui, Lyesse</b><br>(LMS) |                                  |          |                                       |  |
| <b>Minardi, Alberto</b><br>(LMS)                     | Hydro-mechanical characterization of gas shales and Opalinus Clay shale in partially saturated conditions | EDME             | 2018            | <b>Laloui, Lyesse</b><br>(LMS) | <b>Ferrari, Alessio</b><br>(LMS) |          |                                       |  |
| <b>Ravera, Elena</b><br>(LMS)                        | Cyclic thermo-mechanical behaviour of energy piles  | EDME             | 2021            | <b>Laloui, Lyesse</b><br>(LMS) |                                  |          |                                       |  |
| <b>Rotta Loria, Alessandro</b><br>Francesco<br>(LMS) | Thermo-mechanical performance of energy pile groups   | EDME             | 2018            | <b>Laloui, Lyesse</b><br>(LMS) |                                  |          |                                       |  |
| <b>Speranza, Gianluca</b><br>(LMS)                   | Methods for carbon footprint assessment of geostructures  | EDME             | 2020            | <b>Laloui, Lyesse</b><br>(LMS) | <b>Ferrari, Alessio</b><br>(LMS) |          |                                       |  |
| <b>Tuttolomondo, Angelica</b><br>(LMS)               | Constitutive and numerical modeling of the coupled thermo-hydro-chemo-mechanical behaviour of shales      | EDME             | 2019            | <b>Laloui, Lyesse</b><br>(LMS) | <b>Ferrari, Alessio</b><br>(LMS) |          |                                       |  |

| Advisee                        | Thesis title   | Doctoral Program | Completion year | Advisor(s)                     | Co-advisor(s)                    | Other(s) | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|--------------------------------|--|------------------|-----------------|--------------------------------|----------------------------------|----------|---------------------------------------|--|
| <b>Zannin, Jacopo</b><br>(LMS) | Shallow geothermal energy for renovated civil engineering structures: a geomechanical and environmental approach | EDME             | 2019            | <b>Laloui, Lyesse</b><br>(LMS) | <b>Ferrari, Alessio</b><br>(LMS) |          |                                       |  |

### Master diploma projects in Civil Engineering, Environmental Engineering and other programs (started in spring or fall 2018)

| Advisee(s)                                       | Project title  | Section-Semester | Advisor(s)                    | Co-advisor(s) | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|--|--|------------------|-------------------------------|---------------|---------------------------------------|--|
| <b>Aguettant, Grégoire Marie Maxime</b> (GC-PME) | effet washboard  | GC-PME           | <b>Laloui, Lyesse</b> (LMS)   |               |                                       |  |
| <b>Caldi, Simon</b> (GC-PMH)                     | Nouveau port à Yverdon-les-Bains dans le cadre du plan directeur localisé Gare-Lac                         | GC-PMH           | <b>Vulliet, Laurent</b> (LMS) |               |                                       |  |
| <b>Cingari, Stefano Giovanni Pierre</b> (GC-PME) | Étude de faisabilité de l'utilisation de la géothermie dans les gares - Application au Grand Paris Express | GC-PME           | <b>Laloui, Lyesse</b> (LMS)   |               |                                       |  |
| <b>Cousin, Benoît Claude Henri</b> (CL-COURS)    | Feasibility and energy performance of an energy segmental lining for a subway tunnel                       | GC-PME           | <b>Laloui, Lyesse</b> (LMS)   |               |                                       |  |
| <b>De Saussure, Arabelle Calliope</b> (GC-PME)   | Experimentation on Hydraulic Fracturing of Barre Granite: From Hydrofracturing to Hydroshearing            | GC-PME           | <b>Laloui, Lyesse</b> (LMS)   |               |                                       |  |

| Advisee(s)                                  | Project title   | Section-Semester | Advisor(s)                  | Co-advisor(s) | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|---|---|------------------|-----------------------------|---------------|---------------------------------------|--|
| <b>Delessert, Nicolas</b> (GC-PME)          | Etude géotechnique et géothermique d'une tranchée couverte en site urbain   | GC-PME           | <b>Laloui, Lyesse</b> (LMS) |               |                                       |  |
| <b>Harran, Ray</b> (LMS)                    | Decision Aids for Tunneling - A CATALOGUE FOR APPLICATION TO SMALL TUNNELS  | GC-PME           | <b>Laloui, Lyesse</b> (LMS) |               |                                       |  |
| <b>Peltier, Margaux Marie Valérie</b> (LMS) | Evaluation du potentiel thermique de la ligne de métro m3 de Lausanne       | GC-PME           | <b>Laloui, Lyesse</b> (LMS) |               |                                       |  |
| <b>Schmid, Nicola Matias</b> (GC-PME)       | Etude géotechnique de l'extension de l'aménagement hydroélectrique de Lavey | GC-PME           | <b>Laloui, Lyesse</b> (LMS) |               |                                       |  |

### Master diploma projects in Architecture (completed in spring 2018, direct link to Infoscience)

*Empty category*

### Prestudies of master projects in Civil Engineering (completed in fall 2018)

| Advisee(s)                        | Project title   | Section-Semester | Tutors(s)                   | Supervisors(s) | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|-----------------------------------|---|------------------|-----------------------------|----------------|---------------------------------------|--|
| <b>Casanova, Michela</b> (GC-MA3) | Laboratory Testing on Hydraulic Fracturing of Barre Granite: Monitoring of acoustic emissions and influence of microstructure | GC-MA3           | <b>Laloui, Lyesse</b> (LMS) |                |                                       |  |
| <b>Fessler, Yannick</b> (GC-MA3)  | Tunnel en terrain meuble - métro m3 de Lausanne entre le Flon et la Blécherette   | GC-MA3           | <b>Laloui, Lyesse</b> (LMS) |                |                                       |  |

| Advisee(s)  | Project title   | Section-Semester | Tutors(s)                     | Supervisors(s) | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|---|---|------------------|-------------------------------|----------------|---------------------------------------|--|
| <b>Llabjani, Qazim</b> (GC-MA3)                     | Prévention du risque de liquéfaction des sols par un pré-traitement thermique | GC-MA3           | <b>Laloui, Lyesse</b> (LMS)   |                |                                       |  |
| <b>Walid Mahmoud Helmy Nadeem, Mohamed</b> (GC-MA3) | BIM (Building Information Modeling) 5D  | GC-MA3           | <b>Vulliet, Laurent</b> (LMS) |                |                                       |  |

### Theoretical statements of master projects in Architecture (completed in january 2018, direct link to Infoscience)

*Empty category*

### Semester projects (completed in 2018)

| Advisee(s)  | Project title   | Section-Semester | Tutor(s)                      | Supervisor(s) | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|---|---|------------------|-------------------------------|---------------|---------------------------------------|--|
| <b>Bianchi, Gianluca</b> (GC-MA3)   | Projet de construction: Parking souterrain                                  | GC-MA2           | <b>Vulliet, Laurent</b> (LMS) |               |                                       |  |
| <b>Fuselier, Héloïse Manon</b> (GC-MA3)   | Projet de construction: Thermal Response Test on Energy Walls               | GC-MA3           | <b>Laloui, Lyesse</b> (LMS)   |               |                                       |  |
| <b>Gillet, Maxime Loris</b> (GC-MA3)  | Projet ENAC: Dimensionnement des soutènements par intelligence artificielle | GC-MA2           | <b>Vulliet, Laurent</b> (LMS) |               |                                       |  |
| <b>Haftgoli Bakhtiari, Babak</b> (GC-MA3);<br><b>Freiburghaus, Sylvain</b> (GC-MA3) | Projet de systèmes civils: Les risques en gestion de projet                 | GC-MA3           | <b>Vulliet, Laurent</b> (LMS) |               |                                       |  |
| <b>Jaffal, Mohamed-Nabil</b> (GC-H)   | Projet de systèmes civils: Risques en Gestion de projets                    | GC-H             | <b>Vulliet, Laurent</b> (LMS) |               |                                       |  |
| <b>Lebbar, Youssouf</b> (GC-MA1)  | Projet de construction: Projet géotechnique - De Cérenville Géotechnique SA | GC-MA1           | <b>Vulliet, Laurent</b> (LMS) |               |                                       |  |



| Advisee(s)  | Project title   | Section-Semester | Tutor(s)                      | Supervisor(s) | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|---|---|------------------|-------------------------------|---------------|---------------------------------------|--|
| <b>Lemghari, Salma</b><br>(GC-MA3)  | Projet de construction:<br>Les risques en gestion de projet   | GC-MA3           | <b>Vulliet, Laurent</b> (LMS) |               |                                       |  |
| <b>Llabjani, Qazim</b><br>(GC-MA3)  | Projet de construction:<br>Etude du potentiel de développement des géostructures  | GC-MA3           | <b>Laloui, Lyesse</b> (LMS)   |               |                                       |  |
| <b>Llabjani, Qazim</b><br>(GC-MA3)  | Laboratoire GC: Essais triaxiaux cycliques thermo-mécaniques  | GC-MA3           | <b>Laloui, Lyesse</b> (LMS)   |               |                                       |  |
| <b>Maye, Robin Daniel Etienne</b><br>(GC-MA3)   | Projet de construction:<br>Interaction sol-structure : cas du radier brosse   | GC-MA2           | <b>Vulliet, Laurent</b> (LMS) |               |                                       |  |
| <b>Maye, Robin Daniel Etienne</b><br>(GC-MA3);<br><b>Fuselier, Héloïse Manon</b> (GC-MA3) | Laboratoire GC:<br>Experimental study on density of shales for engineering applications                                 | GC-MA3           | <b>Laloui, Lyesse</b> (LMS)   |               |                                       |  |
| <b>Monneron, Armand Quy Kim</b><br>(GC-MA3);<br><b>Guggisberg, Antoine</b> (GC-MA1)       | Projet de systèmes civils: Projet immobilier en terrain instable, Lucerne   | GC-MA3           | <b>Vulliet, Laurent</b> (LMS) |               |                                       |  |
| <b>Norcaro, Alexandre Pascal</b><br>(GC-MA3)  | Projet de systèmes civils: Suisse 2050 - Megatrends et impacts sur les infrastructures                                  | GC-MA2           | <b>Vulliet, Laurent</b> (LMS) |               |                                       |  |
| <b>Wyss, Richard Alois</b> (GC-MA3)   | Projet de construction:<br>Limit State design of thermo-active diaphragm walls: understanding the role of thermal loads | GC-MA2           | <b>Laloui, Lyesse</b> (LMS)   |               |                                       |  |

## Other supervisions

| Advisee | Type of supervision | Work topic | Starting (month/year) | End, if known (month/year) | Supervisor(s) | Institution(s) involved (if not EPFL) | Additional information on external institution(s) involved |
|---------|---------------------|------------|-----------------------|----------------------------|---------------|---------------------------------------|--|
|---------|---------------------|------------|-----------------------|----------------------------|---------------|---------------------------------------|--|

| Advisee                                       | Type of supervision | Work topic  | Starting (month/year) | End, if known (month/year) | Supervisor(s)               | Institution(s) involved (if not EPFL)  | Additional information on external institution(s) involved |
|---|---------------------|---|-----------------------|----------------------------|-----------------------------|--|--|
| <b>Cousin, Benoit</b> Claude Henri (CL-COURS) | Others              | Scientific assistant / Machine learning techniques for the optimisation of geothermal system (GeoBrain project)   | 11/2018               |                            | <b>Laloui, Lyesse</b> (LMS) |  |  |
| <b>Cousin, Benoit</b> Claude Henri (CL-COURS) | Internship          | Energy geostructures  | 08/2018               | 10/2018                    | <b>Laloui, Lyesse</b> (LMS) |  |  |
| <b>Di Bari, Francesco</b> (GC-H)              | Internship          | The project deals with the development of a complete performance-based design methodology for energy pile foundations in the framework of Eurocodes, based on the use of theoretical analyses and experimental results. | 03/2018               | 02/2019                    | <b>Laloui, Lyesse</b> (LMS) | Polytechnic University of Turin, IT (European Universities and Research Centers) | Master student   |
| <b>Dornberger, Sarah</b> Catherine (LMS)      | Others              | Scientific assistant / In-situ applications of bio-cementation for ground reinforcement   | 10/2018               |                            | <b>Laloui, Lyesse</b> (LMS) |  |  |

| Advisee  | Type of supervision | Work topic  | Starting (month/year) | End, if known (month/year) | Supervisor(s)   | Institution(s) involved (if not EPFL)  | Additional information on external institution(s) involved |
|--|---------------------|---|-----------------------|----------------------------|---|--|--|
| <b>Girard,</b><br>Caroline<br>Marie Amélie           | Internship          | Evaluation de la propagation d'erreur dans les mesures de laboratoire pour la caractérisation géotechnique. | 06/2018               | 07/2018                    | <b>Laloui,</b><br>Lyesse<br>(LMS)   | Polytech Sorbonne ()   |  |
| <b>Khoshbakht,</b><br>Saina                          | Internship          | Cyclic triaxial tests on a specific local sand to determine damping ration and shear modulus variation.     | 04/2018               | 09/2018                    | <b>Laloui,</b><br>Lyesse<br>(LMS)   | Amirkabir University of Technology (AUT), IR (World Universities and Research Centers) | PhD student  |
| <b>Lejmi,</b><br>Heithem                             | Internship          | Evaluation et faisabilité d'injection de CO2 dans un milieu peu perméable à des fins EOR et de stockage.    | 05/2018               | 05/2018                    | <b>Laloui,</b><br>Lyesse<br>(LMS)   | Université de Pau, France ()   | Master student   |
| <b>Ly, Tony</b><br>(LMS)                             | Apprenticeship      | Apprenti employé de commerce  | 08/2017               | 08/2018                    | <b>Laloui,</b><br>Lyesse<br>(LMS);<br><b>Turielle,</b><br>Rosa Ana<br>(LMS) |  |  |
| <b>Peltier,</b><br>Margaux<br>Marie Valérie<br>(LMS) | Internship          | Energy geostructures  | 09/2018               | 12/2018                    | <b>Laloui,</b><br>Lyesse<br>(LMS)   |  |  |
| <b>Romann,</b><br>Erwan (LMS)                        | Apprenticeship      | 1st year apprentice, laborant en physique   | 08/2016               | 07/2020                    | <b>Laloui,</b><br>Lyesse<br>(LMS);<br><b>Dubey,</b><br>Patrick<br>(LMS)     |  |  |

| Advisee                 | Type of supervision | Work topic  | Starting (month/year) | End, if known (month/year) | Supervisor(s)               | Institution(s) involved (if not EPFL)  | Additional information on external institution(s) involved |
|-------------------------|---------------------|---|-----------------------|----------------------------|-----------------------------|--|--|
| <b>Tourchi, Saeed</b>   | Internship          | Thermos-hydro-mechanical coupling, numerical analysis of geotechnical problems, constitutive modelling of soils, and study of the behaviour of unsaturated soils. | 06/2018               | 08/2018                    | <b>Laloui, Lyesse</b> (LMS) | Polytechnic University of Catalonia (BarcelonaTech), ES (European Universities and Research Centers) | PhD Student  |
| <b>Wang, Zhen</b> (LMS) | Internship          | Advanced thermo-hydro-chemo mechanical behaviour of geomaterials.   | 10/2018               | 09/2019                    | <b>Laloui, Lyesse</b> (LMS) | Hohai University, CN (World Universities and Research Centers)                                       | PhD student  |

## Research

### Funded and submitted research projects

| Title   | Principal Investigator (PI)              | Co-PI(s)   | Funding organisation; Program          | Granted amount (CHF)       | Starting date | Duration (Months) | Status  |
|---|--|--|--|----------------------------|---------------|-------------------|---------|
| Electrically-Assisted Microbial-Induced Calcite Precipitation   | Hicher Patrick<br>Gabriel<br>Yihsiu-Ming |  | FNS-CTI<br>BRIDGE                      | 113,004 out of 113,004     | 05.06.2018    |                   | Pending |
| DOn (prix BCV)  | LALOUI Lyesse                            | LALOUI Lyesse  | Non lucr.-<br>Recherche;<br>BCV        | 132,000 out of 132,000     | 01.11.2018    | 24                | Ongoing |
| BIOGEOS - Bio-mediated Geo-material Strengthening for engineering applications  | LALOUI Lyesse                            |  | H2020;<br>Excellent<br>Science         | 2,991,544 out of 2,991,544 | 01.11.2018    | 60                | Ongoing |
| Experimental assessment of shale properties for safe geological CO2 storage   | LALOUI Lyesse                            |  | Non lucr.-<br>Recherche;<br>Mont Terri | 10,000 out of 10,000       | 01.09.2018    | 12                | Ongoing |
| Cyclic Thermo-Mechanical Behaviour of Energy Piles  | LALOUI Lyesse                            |  | FNS; FNS-<br>Project<br>Funding        | 450,000 out of 450,000     | 01.11.2017    | 42                | Ongoing |
| ELEGANCY - Efficient generation of renewables H2 from Biomass, while harvesting geothermal heat and enabling negative CO2 emissions | Giardini Domenico                        | LALOUI Lyesse  | Off. Conf.;<br>Divers<br>Confédération | 45,000 out of 2,500,000    | 01.09.2017    | 36                | Ongoing |
| BEACON - Bentonite Mechanical Evolution   | Ferrari Alessio                          | LALOUI Lyesse  | Autres EU;<br>Euratom                  | 268,193 out of 4,131,368   | 01.06.2017    | 48                | Ongoing |
| SoE - Supply of Electricity   | AVELLAN François                         | SCHLEISS ANTON;<br>LALOUI Lyesse;<br>Lehning Michael;<br>Lecampion Brice; Violay Marie | Off. Conf.; CTI / KTI                  | 310,000 out of 18,200,120  | 01.01.2017    | 48                | Ongoing |

| Title   | Principal Investigator (PI) | Co-PI(s) | Funding organisation; Program    | Granted amount (CHF)     | Starting date | Duration (Months) | Status              |
|---|-----------------------------|----------|----------------------------------|--------------------------|---------------|-------------------|---------------------|
| TERRE - Training Engineers and Researchers to Rethink geotechnical Engineering for a low carbon future        | Tarantino Alessandro        |          | H2020; Excellent Science         | 371,318 out of 4,745,934 | 01.11.2015    | 48                | Ongoing             |
| Hosting the Greenhouse Gas Technology Conference GHGT-13 at the Swiss Tech Centre of EPFL                     | LALOU Lyesse                |          | Off. Conf.; Divers Confédération | 350,000 out of 350,000   | 01.11.2013    | 98                | Ongoing             |
| Seismic resistance of embankment dams with asphalt facing   | LALOU Lyesse                |          | Off. Conf.; Divers Confédération | 50,000 out of 50,000     | 01.10.2017    | 6                 | Completed           |
| Thermo-mechanical performance of energy pile groups   | LALOU Lyesse                |          | FNS; FNS-COST                    | 180,000 out of 180,000   | 01.01.2016    | 36                | Completed           |
| Triaxial tests for buffer bentonite on rock shear   | Lyesse LALOU                |          | AINS (A-Insinnöörít Civil Oy)    | 51,000 out of 51,000     | 01.07.2019    | 10                | Industrial contract |
| THM-model validation in the context of the FE modelling Task Force  | LALOU Lyesse                |          | TTO - recherche ind.             | 180,000 out of 180,000   | 13.11.2018    |                   | Industrial contract |
| Gas Transport in Bentonite  | LALOU Lyesse                |          | TTO - recherche ind.             | 50,000 out of 50,000     | 26.10.2018    |                   | Industrial contract |
| Support in geomechanical test analysis : conclusion of benchmark study and derivation of reference parameters | LALOU Lyesse                |          | Ctr Service                      | 53,000 out of 53,000     | 26.07.2018    |                   | Industrial contract |
| Study on effective stress definition for gas shales in partially water saturated conditions                   | Lyesse LALOU                |          | Chevron USA Inc.                 | 150,000 out of 150,000   | 06.12.2017    | 37                | Industrial contract |
| Advanced studies of the Structure and Safety of High Level Waste storage in deep geological formations        | Lyesse LALOU                |          | Swissnuclear                     | 319,000 out of 319,000   | 01.10.2014    | 39                | Industrial contract |

## Funded equipment

*Empty category*

## Awards

| Awardee  | Name of prize / Competition   | Place / Organization                             | Award description / URL   | Prize sum (CHF) |
|--|---|--|---|-----------------|
| <b>Baryla, Patrycja Ewelina</b> (LMS)          | Polish award for the best PhD thesis in geotechnical engineering, 2017        | Poland   | <a href="https://actu.epfl.ch/news/dr-patrycja-baryla-wins-best-phd-thesis-4/">https://actu.epfl.ch/news/dr-patrycja-baryla-wins-best-phd-thesis-4/</a>           |                 |
| <b>Cousin, Benoît Claude Henri</b> (CL-COURS)  | Best Master Project in the areas of hydropower, tunnels or work below grounds | IM Maggia Engineering                            |   |                 |
| <b>Laloui, Lyesse</b> (LMS)                    | 30th Roberval Prize   | Paris / French Academy of Sciences               | <a href="https://actu.epfl.ch/news/the-tgc-18-wins-the-roberval-prize/">https://actu.epfl.ch/news/the-tgc-18-wins-the-roberval-prize/</a>                         |                 |
| <b>Rotta Loria, Alessandro Francesco</b> (LMS) | Young Professor Trust prize   | Anahelm (USA) / Deep Foundations Institute (DFI) |   |                 |
| <b>Sütman, Melis</b> (LMS)                     | 2018 Pitch Your Impact competition  | Lausanne / Innoseed ENAC EPFL                    | <a href="https://actu.epfl.ch/news/geothermal-energy-and-drones-take-top-honors-2/">https://actu.epfl.ch/news/geothermal-energy-and-drones-take-top-honors-2/</a> |                 |
| <b>Terzis, Dimitrios</b> (LMS)                 | ENAC best paper award 2018  | ENAC EPFL  | <a href="https://actu.epfl.ch/news/enac-best-paper-award-2018-2/">https://actu.epfl.ch/news/enac-best-paper-award-2018-2/</a>                                     |                 |
| <b>Vulliet, Laurent</b> (LMS)                  | 30th Roberval Prize   | Paris / French Academy of Sciences               | <a href="https://actu.epfl.ch/news/the-tgc-18-wins-the-roberval-prize/">https://actu.epfl.ch/news/the-tgc-18-wins-the-roberval-prize/</a>                         |                 |

## Research facilities

*Empty category*

## Publications & Presentations

### Books (direct link to InfoScience)

| Data   | Key |
|--|-----|
| Ferrari A., Laloui L., <b>Energy Geotechnics</b> , Springer, Cham, 2018-08-24, 978-3-319-99669-1, Springer Series in Geomechanics and Geoengineering, Abstract: yes, Status: published |     |

### Journal articles (direct link to InfoScience)

| Data  | Not produced at EPFL | Peer reviewed | Key |
|---|----------------------|---------------|-----|
| Sütman M., Brettmann T., Olgun C. G., <b>Full-scale in-situ tests on energy piles: Head and base-restraining effects on the structural behaviour of three energy piles</b> , in <a href="#">Geomechanics for Energy and the Environment</a> , vol. 18, p.56-68 , 2018-09-05, Abstract: yes, Status: published | ✓                    | ✓             |     |
| Ferrari A., <b>Themed Issue on advances in "Laboratory Testing and Modelling of Soil and Shales" - selected Papers of International Workshop ATMSS-2017</b> , in <a href="#">GEOMECHANICS FOR ENERGY AND THE ENVIRONMENT</a> , vol. 14, p.1-2 , 2018, Abstract: no, Status: published                         |                      | ✓             |     |
| Giger S., Ewy R., Favero V., Stankovic R., Keller L., <b>Consolidated-undrained triaxial testing of Opalinus Clay: Results and method validation</b> , in <a href="#">GEOMECHANICS FOR ENERGY AND THE ENVIRONMENT</a> , vol. 14, p.16-28 , 2018, Abstract: no, Status: published                              |                      | ✓             |     |
| Kong G., Wu D., Liu H., Laloui L., Cheng X., Zhu X., <b>Performance of a geothermal energy deicing system for bridge deck using a pile heat exchanger</b> , in <a href="#">International Journal of Energy Research</a> , vol. 43, num. 1, p.596-603 , 2018-10-24, Abstract: yes, Status: published           | ✓                    | ✓             |     |
| Rotta Loria A. F., Laloui L., <b>Analysis of the vertical displacement of energy pile groups</b> , in <a href="#">Geomechanics for Energy and the Environment</a> , vol. 16, p.1-14 , 2018, Abstract: yes, Status: published  |                      | ✓             |     |
| Fryer B. P., Siddiqi G., Laloui L., <b>Reservoir stimulation's effect on depletion-induced seismicity</b> , in <a href="#">Journal of Geophysical Research: Solid Earth</a> , vol. 123 , 2018, Abstract: yes, Status: published   |                      | ✓             |     |
| Sütman M., Brettmann T., Olgun G., <b>Full-Scale In-Situ Tests on Energy Piles: Head and Base-Restraining Effects on the Structural Behaviour of Three Energy Piles</b> , in <a href="#">Journal of Geomechanics for Energy and the Environment</a> , 2018, Abstract: yes, Status: accepted                   |                      | ✓             |     |
| Sütman M., Olgun G., Laloui L., <b>Cyclic Load – Transfer Approach for the Analysis of Energy Piles</b> , in <a href="#">ASCE Journal of Geotechnical and Geoenvironmental Engineering</a> , vol. 145, num. 1 , 2018, Abstract: yes, Status: accepted   |                      | ✓             |     |
| Parisio F., Vilarrasa Riano V., Laloui L., <b>Hydro-mechanical modeling of tunnel excavation in anisotropic shale with coupled damage-plasticity and micro-dilatant regularization</b> , in <a href="#">Rock Mechanics and Rock Engineering</a> , p.1-15 , 2018-08-23, Abstract: yes, Status: published       |                      | ✓             |     |
| Ferrari A., Minardi A., Ewy R., Laloui L., <b>Gas Shales Testing in Controlled Partially Saturated Conditions</b> , in <a href="#">International Journal of Rock Mechanics and Mining Sciences</a> , vol. 107, p.110-119 , 2018, Abstract: yes, Status: published   |                      | ✓             |     |



| Data  | Not produced at EPFL | Peer reviewed | Key |
|---|----------------------|---------------|-----|
| Minardi A., Ferrari A., Ewy R., Laloui L., <b>Nonlinear elastic response of partially saturated gas shales in uniaxial compression</b> , in <a href="#">Rock Mechanics and Rock Engineering</a> , 2018, Abstract: yes, Status: accepted   |                      | ✓             |     |
| Favero V., Laloui L., <b>Impact of CO2 injection on the hydro-mechanical behaviour of a clay-rich caprock</b> , in <a href="#">International Journal of Greenhouse Gas Control</a> , vol. 71, p.133–141, 2018, Abstract: yes, Status: published   |                      | ✓             |     |
| Terzis D., Laloui L., <b>3-D micro-architecture and mechanical response of soil cemented via microbial-induced calcite precipitation</b> , in <a href="#">Scientific reports</a> , vol. 8, num. 1416, 2018, Abstract: yes, Status: published  |                      | ✓             |     |
| Favero V., Ferrari A., Laloui L., <b>Anisotropic behaviour of Opalinus Clay through consolidated and drained triaxial testing in saturated conditions</b> , in <a href="#">Rock Mechanics and Rock Engineering</a> , vol. 51, num. 5, p.1305–1319, 2018, Abstract: yes, Status: published |                      | ✓             |     |
| Rotta Loria A. F., Laloui L., <b>Group action effects caused by various operating energy piles</b> , in <a href="#">Geotechnique</a> , vol. 68, num. 9, p.834-841, 2018, Abstract: yes, Status: published   |                      | ✓             |     |
| Minardi A., Ferrari A., Ewy R., Laloui L., <b>The impact of the volumetric swelling behavior on the water uptake of gas shale</b> , in <a href="#">Journal of Natural Gas Science and Engineering</a> , vol. 49, p.132-144, 2018, Abstract: yes, Status: published                        |                      | ✓             |     |

### Conference papers (direct link to InfoScience)

| Data   | Peer reviewed | Key |
|--|---------------|-----|
| Zannin J., Ferrari A., Pousse M., Laloui L., <b>A flowchart for early-stage thermal design of Energy Walls</b> , <a href="#">International Symposium on Energy Geotechnics SEG2018</a> , Lausanne, Switzerland, 25-28 September 2018, Abstract: no   | ✓             |     |
| Tuttolomondo A., Ferrari A., Laloui L., <b>An effective stress framework for clayey geomaterials</b> , <a href="#">International Symposium on Energy Geotechnics (SEG) 2018</a> , Lausanne, Switzerland, September 25-28, 2018, Abstract: no   | ✓             |     |
| Garbellini C., Laloui L., <b>On the Soil-Structure Interaction of Surface Strip Footings at Ultimate Limit State</b> , <a href="#">26th European Young Geotechnical Engineers Conference</a> , Graz, Austria, September 11-14, 2018, Abstract: no  | ✓             |     |
| Sütman M., Olgun G., Laloui L., <b>Load-Transfer Approach for Modeling the Cyclic Thermo-Mechanical Behaviour of Energy Piles</b> , <a href="#">International Symposium on Energy Geotechnics (SEG-2018)</a> , Lausanne, Switzerland, 25-28 September 2018, Abstract: yes  | ✓             |     |
| Madaschi A., Crisci E., Ferrari A., Alcolea Rodriguez A., Keller L., Marschall P., Laloui L., <b>Mechanical anisotropy of Opalinus Clay shale: a multiscale approach</b> , <a href="#">International Symposium on Energy Geotechnics (SEG) 2018</a> , Lausanne, Switzerland, September 25-28, 2018, Abstract: yes, Status: published | ✓             |     |
| Madaschi A., Laloui L., <b>Hydro-mechanical analysis of gas transport in compacted bentonite: uncertainty modelling</b> , <a href="#">Second International Workshop on the Finite Element Code LAGAMINE (LAGASHOP 2018)</a> , Delft, Netherlands, January 31 - February 2, 2018, Abstract: yes, Status: published                    | ✓             |     |
| Minardi A., Ferrari A., Ewy R., Laloui L., <b>Gas shale water imbibition tests with controlled suction technique</b> , <a href="#">International Symposium on Energy Geotechnics, SEG 2018</a> , Lausanne, Switzerland, 25-28 September, 2018, Abstract: yes   | ✓             |     |

| Data  | Peer reviewed | Key |
|---|---------------|-----|
| Crisci E., Ferrari A., Giger S., Laloui L., <b>On the swelling behavior of shallow Opalinus Clay shale</b> , 7th International Conference on Unsaturated Soils, HKUST, Hong Kong, August, 3-5, 2018, Abstract: yes  | ✓             |     |
| Laloui L., Ferrari A., Minardi A., Ewy R., <b>Laboratory testing of gas shales in unsaturated conditions</b> , The 7th International Conference on Unsaturated Soils, Hong Kong, 03-05/08/2018, Abstract: yes   | ✓             |     |
| Minardi A., Ferrari A., Ewy R., Laloui L., <b>Elastic behavior of partially saturated gas shales during unloading - reloading cycles in uniaxial compression</b> , The 7th international conference on unsaturated soils, Hong Kong, 3-5/08/2018, Abstract: yes | ✓             |     |
| Madaschi A., Laloui L., <b>A stochastic approach to the modelling of gas transport in bentonite</b> , 7th International Conference on Unsaturated Soils, Hong Kong, August 3-5, 2018, Abstract: yes   | ✓             |     |
| Ferrari A., Manca D., Laloui L., <b>Hydro-chemo-mechanical behavior of a sand/bentonite mixture upon wetting paths</b> , The 7th International Conference on Unsaturated Soils, Hong Kong, August 3-5, 2018, Abstract: yes                                      | ✓             |     |

### Posters (direct link to InfoScience)

| Data  | Key |
|---|-----|
| Minardi A., Laloui L., <b>Mechanical response of Opalinus Clay during CO2 injection</b> , SCCER-SoE annual conference 2018, Horw (LU), Switzerland, 14-15/09/2018, Abstract: no, Status: published                            |     |
| Favero V., Minardi A., Laloui L., <b>Experimental assessment of shale properties for safe geological CO2 storage</b> , Mont Terri Technical Meeting 36, Porrentruy, Switzerland, 7-8/02/2018, Abstract: no, Status: published |     |

### Patents (direct link to InfoScience)

| Data  | Key |
|---|-----|
| Terzis D., Laloui L., EPFL, <b>GEOTEXTILE</b> , 2018-12-06, Abstract: yes |     |

### Technical reports (direct link to InfoScience)

| Data   | Peer reviewed | Key |
|--|---------------|-----|
| Tuttolomondo A., Ferrari A., Laloui L., <b>Evaluation of the in situ stress state of Opalinus Clay based on suction and swelling pressure measurements</b> , 2018, Abstract: no, Status: submitted     | ✓             |     |
| Minardi A., Laloui L., <b>Experimental assessment of shale properties for safe geological CO2 storage</b> , 2018, Abstract: no, Status: published  | ✓             |     |
| Madaschi A., Laloui L., <b>NAGRA Project Order 16'189 EBS – Task Force: Gas Transport in Bentonite</b> , 2018-12-20, Abstract: yes, Status: published  | ✓             |     |
| Ferrari A., Crisci E., Laloui L., <b>Arbeitsbericht NAB 17-27 - Geotechnical Experimental Characterisation of Opalinus Clay Cores from the Borehole Lausen</b> , 2018, Abstract: no, Status: published | ✓             |     |

### Theses (direct link to InfoScience)

| Data  | Key |
|---|-----|
| Rotta Loria A. F., <b>Advisor(s): Laloui L., Thermo-mechanical performance of energy pile groups</b> , Thèse EPFL, n° 8138, 2018, Abstract: yes, Status: published  |     |
| Minardi A., <b>Advisor(s): Laloui L., Ferrari A., Hydro-mechanical characterization of gas shales and Opalinus Clay shale in partially saturated conditions</b> , Thèse EPFL, n° 8315, 2018, Abstract: yes, Status: published |     |

## Media (direct link to InfoScience)

| Data   | Key |
|--|-----|
| Dolzan S., <i>Rencontre avec Lyesse Laloui</i> , in <a href="#">RTS</a> , 2018-03-24, Abstract: yes  |     |
| RTS , <i>La prudence reste de mise en montagne, en forêt et sur les berges</i> , in <a href="#">RTS</a> , 2018-01-06, Abstract: yes  |     |
| Chaboudez P., <i>La géothermie, ce potentiel inexploité: interview de Lyesse Laloui, professeur à l'EPFL</i> , in <a href="#">RTS</a> , 2018-09-20, Abstract: yes                                  |     |
| Buschini L., <i>Chauffer les bâtiments grâce à leurs fondations en béton</i> , in <a href="#">24 Heures</a> , 2018-01-10, Abstract: no   |     |
| Nicolet L., <i>Déchets radioactifs: qui veut d'un site d'enfouissement près de chez lui?</i> , in <a href="#">MIGROS MAGAZINE</a> , 2018-03-09, Abstract: yes                                      |     |
| Marenne S., <i>Gaznat se tourne vers l'EPFL</i> , in <a href="#">L'AGEFI</a> , 2018-05-22, Abstract: yes   |     |
| Détraz A., <i>À l'EPFL, l'avenir de l'homme mûrit sous terre</i> , in <a href="#">24 Heures</a> , 2018-06-18, Abstract: yes  |     |
| Maillard C., <i>Des bactéries pour soutenir le sol de Rances</i> , in <a href="#">La Région</a> , p.18.07.2018 , 2018-07-18, Abstract: yes   |     |
| Maillar C., <i>Des bactéries contre l'érosion</i> , in <a href="#">La Liberté</a> , 2018-07-31, Abstract: yes  |     |
| Baryla P. E., <i>Mechanics – the key to unlocking subsurface resources for energy supply and storage</i> , 2018-10-05, Abstract: yes   |     |
| Barenne S., <i>Gaz naturel et tournant énergétique</i> , in <a href="#">L'extension</a> , 2018-10, Abstract: yes   |     |
| Peltier M. M. V., Rotta Loria A., Laloui L., <i>Les géostructures énergétiques: une énergie renouvelable sous nos pieds</i> , in <a href="#">Tracés</a> , p.07.11.2018 , 2018-11-07, Abstract: yes |     |

## Outreach

### Current ongoing collaborations

| People involved at ENAC & EPFL wide          | Collaborating institution(s) (if not EPFL)  | Additional information on cooperation partner(s)                                | Project topic/Description, Financial support (CHF) if any         | Collaboration includes... |
|--|---|---|---|---------------------------|
| Laloui, Lyesse (LMS)                         | Swiss Competence Center for Energy Research (SCCER-SoE), CH (Swiss Universities and Research Centers) | Swiss Competence Center for Energy Research – Supply of Electricity (SCCER-SoE) | Geothermal energy and CO2 storage                                 |                           |
| Laloui, Lyesse (LMS)                         | Office fédéral de topographie (Swisstopo), CH (Swiss Government)                                      | SWISSTOPO   | Hydro-mechanical modelling of the Opalinus Clay in Mont Terri     |                           |
| Laloui, Lyesse (LMS)                         | Office fédéral de l'énergie (OFEN), CH (Swiss Government)   | Swiss Federal Office of Energy SFOE   | Seismic resistance of embankment dams with asphalt facing         |                           |
| Laloui, Lyesse (LMS); Ferrari, Alessio (LMS) | Chevron Corporation, US (Private sector)  | CHEVRON   | Geomechanical characterization of gas shales                      |                           |
| Laloui, Lyesse (LMS); Ferrari, Alessio (LMS) | National Cooperative for the Disposal of Radioactive Waste (NAGRA), CH (Private sector)               | NAGRA   | Experimental and constitutive analysis of the Opalinus Clay shale |                           |

### Innovation

| Inventor(s)   | Description of innovation | Additional information  |
|---|---------------------------|---|
| Rotta Loria, Alessandro Francesco (LMS); Laloui, Lyesse (LMS) | GEOEG spin-off            | GEOEG provides integrated solutions for energy geostructures. The company provides building contractors, municipalities, engineering and architecture firms with the best solutions for the renewable energy supply and structural support of any type of built environment through energy geostructures. It also accompanies projects through consulting, analysis and design services but also testing, monitoring and training services. |
| Terzis, Dimitrios (LMS); Laloui, Lyesse (LMS)                 | MeduSoil Startup          | MeduSoil received 350k CHF in funding including VentureKICK stage II, Climate-KIC stage II, an EPFL Innogrant fellowship, the support of SPEI (Vaud) and FIT-seed. MeduSoil was recognized as one of Europe's TOP30 cleantech startups by EIT-ClimateKIC and was invited to attend Slush2018, the world's largest startup event where more than 20.000 participants gathered together in Helsinki in December 2018.                         |

### Distinguished work

| Author(s)  | Article title  | Journal & Pages              | Publication date |
|--|--|------------------------------|------------------|
| <b>Laloui, Lyesse</b><br>(LMS)   | Remettre le CO2 d'où il vient!   | Le Temps,<br>9               | 21/12/2018       |
| <b>Laloui, Lyesse</b><br>(LMS)   | Les projets pour changer le climat et filtrer le CO2 ne font pas l'unanimité | RTS Info                     | 16/12/2018       |
| <b>Laloui, Lyesse</b><br>(LMS)   | Le futur des déchets nucléaires  | RTS                          | 01/12/2018       |
| <b>Laloui, Lyesse</b><br>(LMS)   | Gaz naturel et tournant énergétique  | L'extension,<br>56-57        | 26/10/2018       |
| <b>Laloui, Lyesse</b><br>(LMS)   | À l'EPFL, l'avenir de l'homme mûrit sous terre                               | 24 heures                    | 18/06/2018       |
| <b>Laloui, Lyesse</b><br>(LMS)   | Déchets radioactifs: qui veut d'un site d'enfouissement près de chez lui?    | Migros Magazine              | 09/03/2018       |
| <b>Laloui, Lyesse</b><br>(LMS)   | Techniques de demain cherchent à faire leur(s) trou(s)                       | SWI<br>swissinfo.ch          | 20/03/2018       |
| <b>Laloui, Lyesse</b><br>(LMS)   | Chauffer les bâtiments grâce à leurs fondations en béton                     | 24 heures,<br>6-7            | 10/01/2018       |
| <b>Laloui, Lyesse</b><br>(LMS)   | La prudence reste de mise en montagne, en forêt et sur les berges            | RTS Info                     | 06/01/2018       |
| <b>Laloui, Lyesse</b><br>(LMS);<br><b>Rotta Loria,</b><br>Alessandro<br>Francesco (LMS);<br><b>Peltier, Margaux</b><br>Marie Valérie (LMS) | Les géostructures énergétiques : une énergie renouvelable sous nos pieds     | Tracés, 7-9                  | 07/11/2018       |
| <b>Terzis, Dimitrios</b><br>(LMS)  | Des bactéries pour soutenir le sol de Rances                                 | La Région<br>Nord<br>vaudois | 18/07/2018       |
| <b>Terzis, Dimitrios</b><br>(LMS)  | Des bactéries contre l'érosion   | La liberté,<br>15            | 31/07/2018       |

## Appointments at other institutions

| Name                             | Title               | Institution  | Additional information on institution |
|----------------------------------|---------------------|--|---------------------------------------|
| <b>Ferrari, Alessio</b><br>(LMS) | Associate professor | University of Palermo, IT (European Universities and Research Centers) |                                       |
| <b>Laloui, Lyesse</b><br>(LMS)   | Adjunct professor   | Duke University, US (World Universities and Research Centers)          |                                       |
| <b>Laloui, Lyesse</b><br>(LMS)   | Advisory Professor  | Hohai University, CN (World Universities and Research Centers)         |                                       |

## Visiting scholars

| Visitor                            | Home Institution   | Additional information on home institution | Aim of visit, Duration                        |
|------------------------------------|--|--|---|
| <b>Choo, Jinhyun</b>               | The University of Hong Kong ()   |  | Visit and seminar, 17/08/2018                 |
| <b>Cinicioglu, Safiye Feyza</b>    | Özyegin University, Istanbul ()  |  | Lab visit and scientific exchange, 07/02/2018 |
| <b>Hanusova, Irena</b>             | Surao, Czech Republic ()   |  | Visit and Seminar, 24/04/2018                 |
| <b>Khanmohammadi, Mohammadreza</b> | Amirkabir University of Technology (AUT), IR (World Universities and Research Centers) |  | Visit and Seminar, 08/05/2018                 |
| <b>Manassero, Mario</b>            | Polytechnic University of Turin, IT (European Universities and Research Centers)       |  | Visit and Seminar, 12/10/2018                 |
| <b>Sadek, Salah</b>                | American University in Beirut (AUB), LB (World Universities and Research Centers)      |  | Lab visit and scientific exchange, 22/10/2018 |
| <b>Simonini, Paolo</b>             | University of Padova, IT (European Universities and Research Centers)                  |  | Visit and Seminar, 07/12/2018                 |

## Alumni

*Empty category*

## Distinguished alumni

| Alumnus   | Achievement / Distinction  |
|---|--|
| <b>Rotta Loria, Alessandro</b><br>Francesco (LMS) | Tenure Track Assistant Professor appointment, Department of Civil and Environmental Engineering of Northwestern University (USA) |

## Organization of events

| Date (month) | Location                              | Event title  | Key people in lab involved  | Description / URL   |
|--------------|---------------------------------------|--|---|---|
| 09/2018      | SwissTech Convention Center, Lausanne | International Symposium on Energy Geotechnics (SEG) 2018 | <b>Laloui, Lyesse</b> (LMS);<br><b>Ferrari, Alessio</b> (LMS);<br><b>Sütman, Melis</b> (LMS);<br><b>Baryla, Patrycja</b> Ewelina (LMS);<br><b>Terzis, Dimitrios</b> (LMS);<br><b>Madaschi, Aldo</b> (LMS);<br><b>Hicher, Patrick</b> (LMS);<br><b>Speranza, Gianluca</b> (LMS);<br><b>Fryer, Barnaby</b> Pdraig (LMS) | <a href="https://memento.epfl.ch/event/international-symposium-on-energy-geotechnics-se-6/">https://memento.epfl.ch/event/international-symposium-on-energy-geotechnics-se-6/</a> |

| Date (month) | Location                       | Event title  | Key people in lab involved   | Description / URL   |
|--------------|--------------------------------|--|--|---|
| 01/2018      | Villars sur Ollon, Switzerland | Winter School on Geomechanics for Energy and the Environment | <b>Laloui</b> , Lyesse (LMS);<br><b>Ferrari</b> , Alessio (LMS);<br><b>Tuttolomondo</b> , Angelica (LMS) | <a href="https://actu.epfl.ch/news/winter-school-on-geomechanics-for-energy-and-env-2/">https://actu.epfl.ch/news/winter-school-on-geomechanics-for-energy-and-env-2/</a> |
| 05/2018      | Lausanne, Switzerland          | SCCER-SoE Workshop Geo-energies                              | <b>Laloui</b> , Lyesse (LMS);<br><b>Minardi</b> , Alberto (LMS)  | <a href="https://actu.epfl.ch/news/sccer-soe-workshop-geo-energies-4/">https://actu.epfl.ch/news/sccer-soe-workshop-geo-energies-4/</a>                                   |
| 03/2018      | Lausanne, Switzerland          | Short Course - Energy Geostuctures Analysis and Design       | <b>Laloui</b> , Lyesse (LMS);<br><b>Rotta Loria</b> , Alessandro Francesco (LMS)                         | <a href="https://actu.epfl.ch/news/energy-geostuctures-analysis-and-design-2/">https://actu.epfl.ch/news/energy-geostuctures-analysis-and-design-2/</a>                   |
| 09/2018      | Lausanne, Switzerland          | COST Action TU 1405 – GABI Short Course                      | <b>Rotta Loria</b> , Alessandro Francesco (LMS)  | <a href="https://seg2018.epfl.ch/index.php/short-course/">https://seg2018.epfl.ch/index.php/short-course/</a>   |

### Invited talks and contributions to events

| Date (month) | Location           | Event title   | Key people in lab involved     | Role / Talk title  | Description / URL   | Organizing institution (if not EPFL)   | Additional information on organizing institution |
|--------------|--------------------|---|--------------------------------|--|---|--|--|
| 10/2018      | Querétaro, Mexico  | International Symposium of Unsaturated Soils                      | <b>Ferrari</b> , Alessio (LMS) | Keynote speaker / Hydro-Mechanical analyses of volcanic slopes                   |   |  |  |
| 11/2018      | Cairo, Egypt       | GeoMEast 2018 International Congress and Exhibition               | <b>Laloui</b> , Lyesse (LMS)   | Keynote speaker  | <a href="https://actu.epfl.ch/news/keynote-lecture-2/">https://actu.epfl.ch/news/keynote-lecture-2/</a>   | Soil-Structure Interaction Group in Egypt (SSIGE) ()                                       | Shehata, Hany Farouk                             |
| 01/2018      | Delft, Netherlands | Second International Workshop on the Finite Element Code LAGAMINE | <b>Laloui</b> , Lyesse (LMS)   | Keynote speaker / Analysis of canister movements in an engineered barrier system | <a href="https://memento.epfl.ch/event/professor-laloui-will-give-a-keynote-lecture-at-2/">https://memento.epfl.ch/event/professor-laloui-will-give-a-keynote-lecture-at-2/</a> | Delft University of Technology (TU Delft), NL (European Universities and Research Centers) | Anne-Catherine Dieudonné, Robert Charlier        |

| Date (month) | Location              | Event title  | Key people in lab involved  | Role / Talk title  | Description / URL   | Organizing institution (if not EPFL)                          | Additional information on organizing institution    |
|--------------|-----------------------|--|-----------------------------|--|---|---|---|
| 08/2018      | Hong Kong             | The 7th International Conference on Unsaturated Soils                    | <b>Laloui, Lyesse</b> (LMS) | Keynote speaker  |   | The Hong Kong University of Science and Technology (HKUST) () | Charles W.W. Ng                                     |
| 05/2018      | Assisi, Italy         | Fourth International Symposium on Computational Geomechanics (ComGeo IV) | <b>Laloui, Lyesse</b> (LMS) | Keynote speaker  | <a href="https://actu.epfl.ch/news/keynote-lecture-of-professor-lyesse-laloui-at-co-4/">https://actu.epfl.ch/news/keynote-lecture-of-professor-lyesse-laloui-at-co-4/</a>       | University of Perugia, Italy ()                               | Gyan N. Pande, Stan Pietruszczak, Claudio Tamagnini |
| 09/2018      | Lausanne, Switzerland | International Symposium on Energy Geotechnics (SEG) 2018                 | <b>Laloui, Lyesse</b> (LMS) | Keynote speaker / Analysis, Design And Application Of Energy Geotechnics From The Building To The City Scale | <a href="https://memento.epfl.ch/event/international-symposium-on-energy-geotechnics-seg/">https://memento.epfl.ch/event/international-symposium-on-energy-geotechnics-seg/</a> |   |   |
| 09/2018      | Chicago, USA          | DFI Energy Foundations Seminar   | <b>Laloui, Lyesse</b> (LMS) | Invited Speaker / Current Research Conclusions on Energy Foundations   | <a href="https://actu.epfl.ch/news/two-lectures-of-professor-laloui-at-energy-foundat/">https://actu.epfl.ch/news/two-lectures-of-professor-laloui-at-energy-foundat/</a>       | University of Illinois at Chicago, USA ()                     | Angie Gible   |
| 09/2018      | Chicago, USA          | DFI Energy Foundations Seminar   | <b>Laloui, Lyesse</b> (LMS) | Invited Speaker / Energy Tunnels and Slurry Wall   | <a href="https://actu.epfl.ch/news/two-lectures-of-professor-laloui-at-energy-foundat/">https://actu.epfl.ch/news/two-lectures-of-professor-laloui-at-energy-foundat/</a>       | University of Illinois at Chicago, USA ()                     | Angie Gible   |
| 12/2018      | Bern, Switzerland     | 16th Swiss Geoscience Meeting  | <b>Laloui, Lyesse</b> (LMS) | Session chair / Shale-Gas, CO2 Storage and Deep Geothermal Energy  | <a href="https://actu.epfl.ch/news/call-for-abstracts-swiss-geoscience-meeting-4/">https://actu.epfl.ch/news/call-for-abstracts-swiss-geoscience-meeting-4/</a>                 | Swiss Academy of Sciences ()                                  | Pierre Dèzes  |

## News / Actus

| News channel | Title, Date | Heading | Authors | Links |
|--------------|-------------|---------|---------|-------|
|--------------|-------------|---------|---------|-------|



| News channel | Title, Date  | Heading   | Authors            | Links                                    |
|--------------|--|---|--------------------|--|
| LMS          | <b>Prudence sur les berges et en forêt</b><br>07.01.2018                                   | Interview du Professeur Lyesse Laloui à la RTS sur les risques pendant la période de décrue   |                    |  |
| LMS          | <b>Le 24 heures explique la géostructure énergétique</b><br>10.01.2018                     | Le 24 heures a publié un article pour expliquer le fonctionnement des fondations énergétiques.  |                    |  |
| LMS          | <b>Le TGC 18 est l'oeuvre lauréate de la 30e édition du Prix Roberval !</b><br>18.01.2018  | Le TGC 18 - Mécanique des sols et des roches - avec écoulements souterrains et transferts de chaleur - est l'oeuvre lauréate de la 30e édition du Prix Roberval!  |                    | Youtube                                  |
| LMS          | <b>Un ciment bactérien pour stabiliser les sols</b><br>23.01.2018                          | Afin de renforcer des sols de sable ou de gravier, le Laboratoire de mécanique des sols de l'EPFL a mis au point une technique aisément reproductible à base de bactéries et d'urée. Des réactions chimiques engendrent la formation rapide de cristaux minéraux qui agissent comme des liants entre les particules du sol. | Carron Cécilia     | Laboratoire de mécanique des sols        |
| LMS          | <b>Alessio Ferrari invited to join the LARAM School Scientific Committee</b><br>30.01.2018 | LARAM is an International School on "LAndslide Risk Assessment and Mitigation" organized by the University of Salerno.  |                    |  |
| LMS          | <b>LMS Publishes Annual Report 2017</b><br>13.02.2018                                      | The 2017 Annual Report from the LMS   |                    | Annual Report 2017                       |
| LMS          | <b>Dr. Melis Sutman participating Pitch your Impact Contest 2018</b><br>19.02.2018         | LMS postdoc, Melis Sutman, will participate the public contest organized by InnoSeed ENAC with her pitch centered on the energy geostructures field.  |                    |  |
| LMS          | <b>Keynote Lecture</b><br>20.02.2018   | Professor Laloui will give a keynote lecture at GeoMEast 2018 International Congress and Exhibition in Cairo.   |                    |  |
| LMS          | <b>La géothermie et les drones à l'honneur</b><br>01.03.2018                               | Melis Sütman et Davide Cucci, post-doctorants en génie civil et sciences et ingénierie de l'environnement, ont remporté respectivement le prix du public et le prix du jury du concours Pitch Your Impact 2018.   | ENAC Communication | InnoSeed ENAC ; Social Impact Initiative |
| LMS          | <b>Enfouissement des déchets radioactifs</b><br>12.03.2018                                 | Interview du Professeur Laloui pour Migros Magazine   |                    |  |

| News channel       | Title, Date   | Heading   | Authors | Links |
|--------------------|---|---|---------|-------|
| LMS                | <b>Keynote Lecture</b><br>13.03.2018  | Professor Laloui will give a keynote lecture at the 7th International Symposium on Deformation Characteristics of Geomaterials, which will be held in Glasgow   |         |       |
| LMS                | <b>10 étudiants ont choisi le LMS pour leur projet de master</b><br>19.03.2018      | 10 étudiants travaillent actuellement à leur projet de master chez le LMS   |         |       |
| LMS                | <b>Mécanique des sols - Techniques innovantes</b><br>20.03.2018                     | A l'EPFL de Lausanne, les spécialistes de la mécanique des sols se taillent une réputation mondiale   |         |       |
| LMS                | <b>PhD position in geomechanics at the EPFL</b><br>22.03.2018                       | Laboratory of Soil Mechanics (LMS) at Swiss Federal Institute of Technology, Lausanne (EPFL) has an opening for a PhD Position in the field of geomechanics.  |         |       |
| Chaire Gaz Naturel | <b>Soil mechanics - Innovative techniques</b><br>26.03.2018                         | At the EPFL of Lausanne, the specialists of soil mechanics acquire a world reputation   |         |       |
| LMS                | <b>Energy Geostructures Analysis and Design</b><br>26.03.2018                       | Prof. Lyesse Laloui and Dr. Alessandro F. Rotta Loria successfully organized a short course for practitioners and academics entitled "Energy Geostructures Analysis and Design"                             |         |       |
| LMS                | <b>Keynote lecture of Professor Lyesse Laloui at ComGeo IV</b><br>04.04.2018        | Professor Lyesse Laoui will deliver a keynote lecture on the THMC behaviour of shales at the Fourth International Symposium on Computational Geomechanics (ComGeo IV) held in Assisi, Italy, 2-4 May, 2018. |         |       |
| LMS                | <b>La RTS rediffusera l'entretien "Rencontre avec Lyesse Laloui"</b><br>04.04.2018  | Ce dimanche, 08.04.2018, la RTS rediffusera dès 10h00 dans l'émission « CQFD » l'entretien intitulé « Rencontre avec Lyesse Laloui »  |         |       |
| LMS                | <b>Prof. L. Laloui récompensé du prestigieux "ERC Advanced Grant"</b><br>11.04.2018 | Les bourses du Conseil Européen de la Recherche (ERC Advanced grants) sont accordées aux meilleurs chercheurs qui ont fait leurs preuves dans le domaine de la recherche au cours des 10 dernières années   |         |       |
| LMS                | <b>The LMS is looking for new PhD candidates!</b><br>16.04.2018                     | Join us at LMS, EPFL  |         |       |
| LMS                | <b>Deux livres du LMS dans le top 25%</b><br>20.04.2018                             | Les livres "Multiphysical Testing of Soils and Shales" et "Advances in Laboratory Testing and Modelling of Soils and Shales (ATMSS)" édités par deux membres du LMS rencontrent un franc succès             |         |       |

| News channel       | Title, Date  | Heading   | Authors | Links                                 |
|--------------------|--|---|---------|---------------------------------------|
| LMS                | <b>La Revue Swiss Engineering publie un article sur la biocimentation</b><br>20.04.2018  | La Revue Technique Suisse "Swiss Engineering" a publié un article sur les recherches en biocimentation du Dr. Dimitrios Terzis et du Prof. Lyesse Laloui pour son édition d'avril.  |         |                                       |
| Chaire Gaz Naturel | <b>SCCER-SoE Workshop Geo-energies</b><br>15.05.2018                                     | SCCER-SoE Workshop Geo-energies   |         |                                       |
| LMS                | <b>SCCER-SoE Workshop sur les Géo-énergies</b><br>15.05.2018                             | SCCER-SoE Workshop sur les Géo-énergies   |         |                                       |
| LMS                | <b>Call for abstracts - Swiss Geoscience Meeting</b><br>17.05.2018                       | Swiss Geoscience Meeting 2018   |         |                                       |
| LMS                | <b>Le Prof. Lyesse Laloui donnera une conférence plénière au COGGUS2</b><br>22.05.2018   | Le Professeur Lyesse Laloui donnera une conférence au 1er Symposium sur la Géomécanique Computationnelle et Géoenvironnementale des Structures souterraines à Nancy en France, du 12 au 14 février 2019.  |         |                                       |
| Chaire Gaz Naturel | <b>La géoséquestration de CO2 discutée entre le Prof. Laloui et Gaznat</b><br>23.05.2018 | La transition de Gaznat abordée durant la conférence sur les énergies modernes et les besoins en Suisse impliquerait une collaboration avec les chercheurs de l'EPFL. D'ailleurs, le Prof. Lyesse Laloui a été invité à discuter de la manière dont les recherches effectuées dans sa chaire, Gaz Naturel Petrosvibri, pourraient contribuer aux activités futures de Gaznat. |         |                                       |
| LMS                | <b>La géoséquestration de CO2 discutée entre le Prof. Laloui et Gaznat</b><br>23.05.2018 | La transition de Gaznat abordée durant la conférence sur les énergies modernes et les besoins en Suisse impliquerait une collaboration avec les chercheurs de l'EPFL. D'ailleurs, le Prof. Lyesse Laloui a été invité à discuter de la manière dont les recherches effectuées dans sa chaire, Gaz Naturel Petrosvibri, pourraient contribuer aux activités futures de Gaznat. |         |                                       |
| LMS                | <b>La fondation BCV récompense le Professeur Lyesse Laloui</b><br>24.05.2018             | Le Prof. Lyesse Laloui, pionnier en matière de recherches sur les géostructures énergétiques, est récompensé pour ses travaux de référence qui révolutionnent un des secteurs les plus prometteurs de la construction.  |         | allnews ;<br>ROMANDIE ;<br>zonebourse |
| Chaire Gaz Naturel | <b>GETE Winter School 2019</b><br>13.06.2018   | Following the success of last year, the Laboratory of Soil Mechanics (LMS) of EPFL is pleased to announce the 2nd edition of the Winter School on Geomechanics for Energy and the Environment.  |         |                                       |

| News channel       | Title, Date   | Heading   | Authors | Links                  |
|--------------------|---|---|---------|------------------------|
| LMS                | <b>ENAC best paper award 2018</b><br>14.06.2018   | Félicitations à notre post-doc, Dimitrios Terzis, qui a gagné le « ENAC BEST PAPER AWARD 2018 ».  |         |                        |
| LMS                | <b>Le 24 Heures publie un long portrait du Prof. Lyesse Laloui</b><br>19.06.2018        | Le 24 Heures a publié un long article consacré aux activités du Prof. Lyesse Laloui, Directeur du Laboratoire de Mécanique des Sols de l'EPFL.  |         |                        |
| Chaire Gaz Naturel | <b>Le 24 Heures publie un long portrait du Prof. Lyesse Laloui</b><br>19.06.2018        | Le 24 Heures a publié un long article consacré aux activités du Prof. Lyesse Laloui, chef du Laboratoire de Mécanique des Sols de l'EPFL.   |         |                        |
| LMS                | <b>Le Prof. Lyesse Laloui est co-fondateur de l'IJRC</b><br>21.06.2018                  | Le Prof. Lyesse Laloui est co-fondateur du Centre International de Recherche pour la Géotechnique Énergétique en Chine, une nouvelle plateforme internationale de coopération technologique.  |         |                        |
| LMS                | <b>GETE publie un numéro spécial sur un Workshop en ATMISS</b><br>21.06.2018            | Le Journal Geomechanics for Energy and the Environment (GETE) a publié un numéro spécial "Selected Papers from the International Workshop on Advances in Laboratory Testing and Modelling of Soils and Shales.                          |         |                        |
| LMS                | <b>Dr. Alessandro F. Rotta Loria nommé prof. assistant à Northwestern</b><br>29.06.2018 | Dr. Alessandro F. Rotta Loria nommé professeur assistant "tenure track" à l'Université Northwestern   |         |                        |
| LMS                | <b>Essais pilotes d'injection de bio-ciment sur le terrain</b><br>02.08.2018            | Le Dr. D. Terzis se prépare à apporter du bio-ciment au sol de Rances.  |         | La Liberté ; La Région |
| LMS                | <b>Deux cours du Prof. Laloui au séminaire de fondations énergétiques</b><br>23.08.2018 | Le professeur Lyesse Laoui donnera deux cours au Séminaire de Fondations Énergétiques organisé par l'Institut de fondations profondes, le 18 septembre 2018 à l'Université de l'Illinois à Chicago                                      |         |                        |
| Chaire Gaz Naturel | <b>Energy Geotechnics Book Published</b><br>24.08.2018                                  | Energy Geotechnics, the book of proceedings which contains all the full papers accepted to SEG 2018, has been published. The book was edited by Dr. Alessio Ferrari and Prof. Lyesse Laloui of the Laboratory of Soil Mechanics (LMS).  |         |                        |
| LMS                | <b>Energy Geotechnics Book Published</b><br>28.08.2018                                  | Energy Geotechnics, le livre des travaux qui contient tous les articles complets acceptés au SEG 2018, a été publié. Cet ouvrage a été édité par le Dr. Alessio Ferrari et le Prof. Lyesse Laloui du Laboratoire de Mécanique des Sols. |         |                        |

| News channel       | Title, Date   | Heading   | Authors | Links |
|--------------------|---|---|---------|-------|
| LMS                | <b>Dr. Patrycja Baryla reçoit le prix de la meilleure thèse de doctorat</b><br>10.09.2018 | Le Dr. Patrycja Baryla a remporté le prix de la meilleure thèse de doctorat de l'année 2017 en génie géotechnique en Pologne.   |         |       |
| Chaire Gaz Naturel | <b>RTS Interviews Prof. Laloui about Geothermal Energy</b><br>20.09.2018                  | Prof. Laloui gave an interview with RTS this morning about the current status of geothermal energy in Switzerland in relation to its progression in other countries.  |         |       |
| LMS                | <b>La RTS rencontre le Prof. Laloui à propos de l'énergie géothermique</b><br>21.09.2018  | Le Prof. Laloui a donné ce matin une interview à la RTS sur la situation actuelle de l'énergie géothermique en Suisse par rapport à son évolution dans d'autres pays.   |         |       |
| LMS                | <b>Prof. Laloui preside le panel international d'évaluation au Portugal</b><br>17.10.2018 | Professeur Laloui a été appelé à présider le panel international d'évaluation des six plus importants départements de Génie Civil et de la Géologie de l'Ingénieur du Portugal.   |         |       |
| LMS                | <b>Conférence publique du Prof. Laloui: géo-structures énergétiques</b><br>23.10.2018     | A l'occasion d'une conférence au Cercle littéraire de Lausanne, le Prof. Laloui présentera la révolution « géo-structures énergétiques », ou comment rendre nos constructions autonomes pour les besoins quotidiens en chauffage, en eau chaude ou encore en climatisation. |         |       |
| LMS                | <b>Contributions scientifiques du LMS mentionnées dans L'Extension</b><br>26.10.2018      | L'Extension évoque les contributions de la Chaire Gaz Naturel – Petrosvibri à l'EPFL dans sa parution d'Octobre 2018.   |         |       |
| LMS                | <b>Lancement officiel du projet BIOGEOS à l'EPFL</b><br>02.11.2018                        | Ce 1er Novembre sonne le coup d'envoi du projet BIOGEOS (de l'anglais Bio-mediated Geo-material Strengthening), sous la direction du Prof. Lyesse Laloui, suite à son financement par le Conseil Européen de la Recherche (ERC).  |         |       |
| LMS                | <b>LMS, le pionnier des géo-structures énergétiques selon TRACÉS</b><br>09.11.2018        | TRACÉS a publié un article dédié aux travaux pionniers dans le domaine des géostructures énergétiques qui se font au Laboratoire de Mécanique des Sols (LMS) à l'EPFL.  |         |       |
| LMS                | <b>Alessio Ferrari rejoint le comité EDME</b><br>13.11.2018                               | Dr. Ferrari a été élu membre de la commission de l'Ecole Doctorale de Mécanique (EDME).   |         |       |

| News channel | Title, Date   | Heading  | Authors | Links |
|--------------|---|--|---------|-------|
| LMS          | <b><i>Nouvelles positions ouvertes au LMS: deux PhD et un Postdoctorant</i></b><br>21.11.2018   | Le LMS cherche deux candidats pour un PhD ainsi qu'un Postdoctorant afin d'entreprendre des recherches dans le domaine de tests et modèles THM sur les géomatériaux dans le cadre des activités de recherche sur le stockage des déchets nucléaires. |         |       |
| LMS          | <b><i>Prof. Laloui interviewé par la RTS au sujet des déchets nucléaires</i></b><br>03.12.2018  | Prof. Laloui est intervenu dans le cadre de l'émission « 15 minutes » de la RTS au sujet du stockage des déchets nucléaires.   |         |       |
| LMS          | <b><i>Des publications du Prof. Laloui retentissent avec grand impact</i></b><br>04.12.2018     | Prof. Laloui a participé à la rédaction d'articles à grand impact parmi la communauté scientifique qui ont été qualifiés de « Highly Cited Papers » par le portail Web of Science.   |         |       |
| LMS          | <b><i>Prof. Laloui interviewé par RTS au sujet de la séquestration du CO2</i></b><br>17.12.2018 | Prof. Laloui est intervenu au « 19h30 » de la RTS au sujet de la séquestration du CO2 en Suisse.   |         |       |
| LMS          | <b><i>Prof. Laloui explique la séquestration du CO2 dans « Le Temps »</i></b><br>21.12.2018     | Prof. Lyesse Laloui, directeur du Laboratoire de mécanique des sols (LMS), explique dans « Le Temps » ce qu'est la technique de capture et séquestration du CO2 (CCS).   |         |       |

## Services

### EPFL committees and services

| Name                             | Service   | Role              | Role in funding allocation |
|----------------------------------|---|-------------------|----------------------------|
| <b>Ferrari, Alessio</b><br>(LMS) | Doctoral School in Mechanics (EDME)   | Commission member | no                         |
| <b>Laloui, Lyesse</b><br>(LMS)   | Faculty Search Committee for a position of Professor in Hydraulics at EPFL          | Member            | no                         |
| <b>Laloui, Lyesse</b><br>(LMS)   | Civil Engineering Section   | Director          | yes                        |
| <b>Laloui, Lyesse</b><br>(LMS)   | Direction of the School of Architecture, Civil and Environmental Engineering (ENAC) | Member            | yes                        |
| <b>Laloui, Lyesse</b><br>(LMS)   | Committee of the Doctoral Program in Mechanics                                      | Member            | no                         |

### Other committees and services (national including the EPF domain, international...)

| Name                             | Service   | Role   | Role in funding allocation |
|----------------------------------|---|--|----------------------------|
| <b>Ferrari, Alessio</b><br>(LMS) | Journal Geomechanics for Energy and the Environment   | Member of the Editorial Board  | no                         |
| <b>Ferrari, Alessio</b><br>(LMS) | International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) TC 308 "Energy Geotechnics"                 | Member of the technical committee                                    | no                         |
| <b>Ferrari, Alessio</b><br>(LMS) | International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) TC 101 "Unsaturated Soils"                  | Member of the technical committee                                    | no                         |
| <b>Ferrari, Alessio</b><br>(LMS) | Sixth EAGE shale workshop 2019, Bordeaux, France  | Member of the Scientific Committee                                   | no                         |
| <b>Ferrari, Alessio</b><br>(LMS) | International School on "LAndslide Risk Assessment and Mitigation" (LARAM)  | Member of the Scientific Committee                                   | no                         |
| <b>Laloui, Lyesse</b><br>(LMS)   | International Energy Agency Greenhouse R&D Technology Collaboration Program   | Executive Committee representative for the Government of Switzerland | no                         |
| <b>Laloui, Lyesse</b><br>(LMS)   | International Technical Committee of AP-UNSAT2019 - 7th Asia-Pacific Conference on Unsaturated Soils, 2019, Nagoya, Japan | Member   | no                         |

| Name                              | Service   | Role                              | Role in funding allocation |
|-----------------------------------|---|-----------------------------------|----------------------------|
| <b>Laloui,</b><br>Lyesse<br>(LMS) | International Centre for Mechanical Sciences (CISM)   | Member of the scientific council  | no                         |
| <b>Laloui,</b><br>Lyesse<br>(LMS) | Swiss Competence Center for Energy Research - Supply of Electricity   | Member of the executive committee | no                         |
| <b>Laloui,</b><br>Lyesse<br>(LMS) | Acta Geotechnica  | Member of Editorial Board         | no                         |
| <b>Laloui,</b><br>Lyesse<br>(LMS) | Chinese Journal of Geotechnical Engineering   | Member of Editorial Board         | no                         |
| <b>Laloui,</b><br>Lyesse<br>(LMS) | European Journal of Environmental and Civil Engineering   | Member of Editorial Board         | no                         |
| <b>Laloui,</b><br>Lyesse<br>(LMS) | Journal of Coupled Systems and Multiscale Dynamics  | Member of Editorial Board         | no                         |
| <b>Laloui,</b><br>Lyesse<br>(LMS) | Environmental Geotechnics   | Advisory Board Member             | no                         |
| <b>Laloui,</b><br>Lyesse<br>(LMS) | International Journal for Numerical and Analytical Methods in Geomechanics  | Member of Editorial Board         | no                         |
| <b>Laloui,</b><br>Lyesse<br>(LMS) | TC101 "Laboratory Stress Strain Strength - Testing of Geomaterials" of the International Society for Soil Mechanics and Geotechnical Engineering. | Vice-Chair                        | no                         |
| <b>Laloui,</b><br>Lyesse<br>(LMS) | International journal Geomechanics for Energy and the Environment   | Editor-in-Chief                   | no                         |
| <b>Laloui,</b><br>Lyesse<br>(LMS) | International evaluation panel - Portuguese Civil and Geological Engineering Departments, Fundação para a Ciência e a Tecnologia (FCT), Portugal  | Chair                             | no                         |



## Vision

## Highlights

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1. Development of the ERC advanced project BIOGEOS: <https://biogeos.epfl.ch/>
2. Investigation of the behaviour of energy geostructures in the context of a large SNSF project : <https://lms.epfl.ch/fr/research-research-fields-energy-geostructures-thermal-piles-fr/>
3. Investigation of the multiphysical behaviour of soils and shales in the context of several PhD projects

## Goals

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The LMS activities are designed to promote engineering solutions in the field of the alternative sources of energy, including nuclear waste disposal, geothermal energy and CO<sub>2</sub> sequestration.

The LMS activities will continue to cover education, research and technology transfer in the large field of Geomechanics. The vision aims at contributing to a sustainable development of our built and natural environment by addressing selected key questions with the highest possible academic standard, within transdisciplinary internal and international collaborations and through contacts with industry with long-term research focuses.

The research activities will focus on problems involving a variable environment and new and advances in existing technologies of energy production. These two areas: environment and energy are expected to dominate technological agenda for forthcoming years. The reason for that is two-fold: first there is world-wide crisis of environment endangerment related to the geosphere: soil and groundwater pollution by accidental spills, CO<sub>2</sub> emission driven reduction of fossil fuel usage and/or inadequate isolation of pollutants, and second there is a host of new sources of energy related to geosphere. In both cases, there is an emerging new fundamental research concerning the effects of chemical, thermal and biological variables on mechanical properties and mechanical variables of soils and shales, and vice versa the effects of mechanical variables as stress, strain, damage affecting chemical and biological, physical or thermal processes and properties that require a multi-disciplinary approach. The levels of these couplings are multiple and often poorly recognized.

Especially with nascent technologies related to the energy production it is rational to include the environmental considerations early in the phase of development rather than seek remedies post factum, or after the damage has been induced. This clearly may refer to production of natural gas from shales, the techniques of hydraulic and chemical fracturing, CO<sub>2</sub> sequestration technologies, nuclear waste isolation (long and short term), heat and fuel storage in the underground and under structures, geothermal fluid energy, energy from methane hydrates, oil production from high temperature, high pressure deposits, and many others. Effects of chemical and biological pollution on isolation geo-structures constitute a separate class of problems. Finally, technologies of chemical and biological improvement of mechanical and hydraulic quality of soils and shales involve knowledge and methods based on the same principles.

The intrinsic nature of coupling of chemical, biological, thermal and mechanical properties, variables and fields distinguishes the related problems from those in classical geomechanics. It is believed that continuing and establishing new research activities dedicated to these issues of Energy and Environmental Geomechanics is a great opportunity for LMS and ENAC.

Some examples of activities for the coming years would be in the following areas:

### Geo-energy structure

Efforts are being devoted to better understand the physical mechanisms and phenomena characterising the operation of energy geostructures for ensuring an optimal geotechnical, structural and energy performance of such ground structures. The LMS has nowadays more than 10 years of experience on this scope and is internationally recognised by Universities and Companies as the leader research group in this field. The analyses that are being performed are focused on various aspects that characterise energy geostructures, including the non-isothermal behaviour of soils when subjected to cyclic temperature variations, the interaction (soil-structure) with the concrete composing these ground structures, the structural behaviour of the concrete itself subjected to temperature changes, the hydraulic aspects related to the fluid flow inside of the pipes embedded in the concrete that allow for the heat exchange between the soil and the ground structure, and the optimal practices for equipping the considered elements. It is considered that the exploitation of shallow geothermal energy for satisfying the energy needs of building environments in an environmentally-friendly way will increase and spread worldwide more and more in the foreseeable future. The LMS, through its expertise in this subject matter, aims at being the representative of this revolutionary approach.

### Deep Geo-Energy

## Goals

Advanced theoretical, experimental and computational knowledge was developed in the recent years at the LMS for assessing and predicting the behaviour of geomaterials subjected to changes in temperature and at different states of saturation. This state of the art expertise has been mainly applied in the fields of underground nuclear waste storage as well as the geothermal use of the building foundations. The research activities are now devoted to (i) the enhancement of the understanding of the thermo-hydro-chemical-mechanical behaviour of shales (including gas shales and host rock formations for waste disposal) and bentonites and the prediction of their long term behaviour, and (ii) the development of computational design tools for geo-energy structures.

Several highly sophisticated and unique experimental tools were developed at the lab in the recent three years with an investment of about 1000.- Kfrs (from FNS, EPFL and industry). It is planned to develop the knowledge and the understanding on the behaviour of soils and shales in the light of the extreme loading conditions that the equipment allows. There is a huge room for fundamental research on the running of coupled thermo (until 150°C) –hydro (until 400 MPa of suction)-mechanical (until 30 MPa) testing as well as on the behaviour of the materials in such conditions. I would like also to extend the laboratory facilities serving the research to micro scale observations (i.e. neutron tomography) for a better insight on the fundamental physical mechanism governing the thermo-hydro-mechanical behaviour of the involved materials.

### Environmental Geomechanics

Efforts will be devoted to maintain the current research activities in the area of multi-physical coupling processes in soils at leading edge of technology with expertise in the fundamentals of soil mechanics.

LMS has a large tradition in the domain of landslides analysis. In the past years, early warning system methods have been developed. Climate change and its effects on earth equilibria, water budget are studied all around the world by thousands of researchers. Following this trend, the current researches at LMS focus on the effects of climate variations on the stability of slopes. To do so, interactions between the soil and the atmosphere have to be studied to understand the exchanges between the two systems. Making use of the foreseen climate changes, the aims of these researches would be to take a step forward in the management of the natural hazards by predicting the situation in the next century. As dry Summers as the 2015 are more often anticipated in the 21st century, the focus will be set on the mechanism of desiccation cracking in soils. The room for research on this phenomenon is extremely important and its implications on landfill liners integrity, stability of foundations, agriculture and stability of slopes have to be assessed.

The project of bio-improved soils currently carried out at LMS has proven great potential in building a sustainable, environmental-friendly method for stabilizing soils and preventing failures in a vast range of engineering problems. The project has already offered the chance for interdisciplinary collaboration between LMS and EML and offers common ground for collaboration with other ENAC laboratories. As a foreseen step, a pilot, large-scale application of the technique is planned in order to better design and suggest an efficient method, adaptable to the needs of the geotechnical problem.

### CO2 storage

The financial support of Petrosvibri to the Chair allows the development of a deep knowledge in the area of CO2 storage. Experimental facilities devoted to this topic are developed. Also computational tools at the basin scale will be introduced for the analysis of the various scenarios.

These objectives would help the ENAC to strengthen its research and teaching profile and to play an important national and an international role in the most advanced and strategically important areas of research in Energy and Environmental Geomechanics.

## Others

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