

Research interest

I am interested in understanding the mechanisms taking place during crustal deformations. Especially, how fluid pressures can affect deformations such as faulting, fault reactivation or rock mode of deformations (brittle to ductile).

My research focuses on laboratory experiments combined with microstructure analysis and physical modelling of rock properties. I use bi- and tri-axial apparatus to deform rocks under different crustal conditions. The experimental setups are equipped with sensors such as piezoelectric ceramics or strain gages to understand the physics involved in the rock deformation processes. I then extrapolate these results to give constraints on natural crust deformations.

Education

2017 – 2021	Ph.D. Mechanics (Geomechanics) Title: On the effects of fluid pressure variations on rock-mass and fault mechanical behaviour. <i>Laboratory of Experimental Rock Mechanics, Swiss Federal Institute of Technology Lausanne (EPFL).</i> Supervisor: Marie Violay
2014 – 2016	Master degree in Earth Dynamics and Natural Hazards <i>University of Montpellier</i>
2011 – 2014	Bachelor degree in Earth and Environment <i>University of Science and Technology Lille 1</i>

Research experience

2017 – 2021	Ph.D. student <i>Laboratory of Experimental Rock Mechanics, Swiss Federal Institute of Technology Lausanne (EPFL).</i> Supervisor: Marie Violay
Jan 2016 – Jul 2016	Master thesis: Influence of erosion processes on rock gravitational slope deformation: analogue modelling and field study <i>Géoazur laboratory</i> Supervisor: Stéphane Bouissou and Yann Rolland

Publications

1. Noël, C., Passelègue, F. X., & Violay, M. (2021). Brittle faulting of ductile rock induced by pore fluid pressure build-up. *Journal of Geophysical Research: Solid Earth*. <https://doi.org/10.1029/2020JB021331>
2. Noël, C., Passelègue, F. X., Giorgetti, C., & Violay, M. (2019). Fault reactivation during fluid pressure oscillations: transition from stable to unstable slip. *Journal of Geophysical Research: Solid Earth*. <https://doi.org/10.1029/2019JB018517>
3. Noël, C., Pimienta, L., & Violay, M. (2019). Time-Dependent Deformations of Sandstone During Pore Fluid Pressure Oscillations: Implications for Natural and Induced Seismicity. *Journal of Geophysical Research: Solid Earth*, 124(1), 801-821. <https://doi.org/10.1029/2018JB016546>

Conferences talk (T) and poster (P)

1. Noël, C., Passelègue, F. X. & Violay, M. (2020, December). Brittle faulting induced by pore fluid pressure increase in ductile rock mass. (P). In *AGU Fall Meeting 2020*. AGU.
2. Noël, C., Passelègue, F. X., Giorgetti, C., & Violay, M. (2019, December). From aseismic to seismic slip during fluid pressure oscillations on laboratory fault. (P) In *AGU Fall Meeting 2019*. AGU.
3. Noël, C., Passelègue, F. X. T., Pimienta, L. X., & Violay, M. (2019, April). Fault reactivation during pore pressure oscillations. (P) In *EGU General Assembly Conference*. Abstracts (Vol. 21, p. 13143).
4. Noël, C., Passelègue, F. X. T., Pimienta, L. X., & Violay, M. (2019, April). Fault reactivation during pore pressure oscillations. (P) In *Third Schatzalp Workshop on Induced Seismicity*.
5. Noël, C., Pimienta, L., & Violay, M. (2018, September). Experimental study of reservoir seismicity using different injection strategies. (T) In *International Symposium on Energy Geotechnics*.
6. Noël, C., Pimienta, L., & Violay, M. (2018, November). Time-dependent deformations of sandstone during fluid pressure oscillations: implications for natural and induced seismicity. (P) In *16th Swiss Geoscience Meeting*.
7. Noël, C., Pimienta, L., Violay, M. (2018, July). Time-dependent deformations of porous sandstone: pore fluid pressure levels and cyclic oscillations. (P) *International School of Physics "Enrico Fermi", Course 202: Mechanics of Earthquake Faulting, Varenna, Italy, 2018*.
8. Noël, C., Pimienta, L., & Violay, M. (2018, April). Time-dependent deformation of a low porosity sandstone subjected to pore pressure oscillations. (T) In *EGU General Assembly Conference*. Abstracts (Vol. 20, p. 4631).

Supervision and Teaching

Student co-supervision

- Master thesis:
 - Ali Nejjar and Jonas Kasmi, Master Thesis (2019): How do earthquakes impact landslides? Analysis of the effect of cyclic oscillations on fault reactivation. *Swiss Federal Institute of Technology Lausanne*
- Master and Bachelor projects:
 - Filali-Ansary Antoine, Laboratory project (2020):

Microstructural analysis of samples undergone laboratory earthquakes. *Swiss Federal Institute of Technology Lausanne*

- Alexandre Mudry, Laboratory project (2019): Thermal effects on exposed rock slopes: Compilation of case histories and analysis of main problems related to the influence of changing temperature (daily and seasonal) on rock slope stability. *Swiss Federal Institute of Technology Lausanne*

- Katinka Meier and Jan Osterwalder, Laboratory project (2018): Influence of porosity on sandstone strength. *Swiss Federal Institute of Technology Lausanne*

- Arabelle de Saussure and Julie Gros, Laboratory project (2017): Influence of porosity on sandstone strength. *Swiss Federal Institute of Technology Lausanne*

Teaching Assistant

- Master courses:
 - Geophysics (2018 & 2019), Master Course, *Swiss Federal Institute of Technology Lausanne*, French/English
- Bachelor courses:
 - Geology for engineers (2019), Bachelor course, *Swiss Federal Institute of Technology Lausanne*, French
 - Rock Mechanics and Tunnelling (2017 & 2018), Bachelor course, *Swiss Federal Institute of Technology Lausanne*, French

Personal skills

Scientific skills

Laboratory geophysics: rock triaxial deformation, rock frictional interface deformation, passive and active ultrasonic wave measurement, porosity, permeability.

Microscopy: Optical microscope, Optical profilometer

Field geophysics: seismic refraction, electrical tomography, 3D scanner, static and cinematic GPS.

Optical imaging: displacement and deformation fields measurement using digital image correlation.

Cartography: tectonics and gravitational deformation characterisation, geomorphology.

Software skills

Matlab, QGIS, 7D, Illustrator

Languages

French: Mother tongue

English: Full professional proficiency

Italian: Basic

Outreach activities

2018 – 2020

Ph.D. student representative, Doctoral school of Mechanics (EDME),
Swiss Federal Institute of Technology Lausanne.