

Master subject:
Experiments of progressive rock fracturing and crack propagation under cyclical forcing

Keywords: rock mechanics, statistical physics, fracture mechanics, environmental seismology, erosion process

Profile and skills required

Master's degree or engineering degree in mechanics, physics, or geophysics, with a strong interest in lab experiments, including acoustics. A broad interest in geosciences and/or natural hazards would be appreciated.

Project description

The environment (meteorological and climatic conditions) is known to play a key role in rock erosion within the critical zone (the first few tens of meters of the subsurface). Cracking and fracturing in this critical zone are crucial in landform buildings but also in gravitational natural hazards (rockfalls, landslides).

The sources and dynamics of fracturing on natural rock outcrops and cliffs remain insufficiently documented, and a quantitative estimation of environmental forcing on crack production is missing. Field and laboratory observations demonstrate the role of daily thermal cycles, rain, and freeze-thaw cycles on progressive rock damage and, furthermore, rock erosion, but the physics behind it is insufficiently quantified.

During this project we will perform cyclical loadings on rock samples to propagate cracks in the sub-critical regime. The goal of the project will be to evaluate how cyclical loadings will increase the size of the crack. Experimental results will be compared to field observations and existing theoretical models.

PhD funding will be open after the project.

Please send your CV to : Eric.Larose@univ-grenoble-alpes.fr and Noelie.Bontemps@univ-grenoble-alpes.fr

Project supervisors:

E. Larose, D. Amitrano, L. Moreau and L. Baillet

