

Master subject: **Environmental seismology and rockfall hazard: on the use of ambient seismic noise**

Keywords: environmental seismology, data processing, ambient seismic noise, rockfalls, fracture mechanics, erosion process

Profile and skills required

Master's degree or engineering degree in mechanics, physics, or geophysics, with strong interest in data processing. 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, freeze and thaw cycles on progressive rock damage and, furthermore, rock erosion, but the physics behind it is insufficiently quantified.

During this project we will perform ambient seismic noise processing of continuous data obtained on natural rock cliffs. Relative seismic velocity changes obtained from passive imaging and coda wave interferometry, together with passive coda wave decorrelation, will be compared to meteorological data and rockfall catalogs to identify the environmental forces that drive crack propagations. This fundamental project will contribute to understanding the physics of subcritical cracking but will also have an impact on natural hazard management.

Field experiments in the Alps will be part of the internship.

PhD funding will be open after the project.

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