

## Section Sciences et Ingénierie de l'environnement Design Project 2018 (semestre de printemps)

### Proposition n°23

#### Identification of rock glaciers with drones and thermal imaging

##### Encadrant externe

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##### Project description

The most visible form of lithological material movements in periglacial areas, rock glaciers are "the visible expression, in unconsolidated materials, of the slow and continuous deformation of a body of permafrost supersaturated in ice" (Delaloye, 2004). Research on permafrost creep, and in particular on rock glacier dynamics, has recently gained renewed interest. The possible deterioration of permafrost and rock glaciers, in the context of global warming, is likely to generate new natural hazards in mountain regions, and should therefore be detected and analyzed in order to characterize the risk. The use of recent detection techniques, such as thermal imaging by drones, will open up new perspectives to monitor periglacial dynamics.

The aim of this project is to develop a methodology to identify rock glaciers using multi-spectral imaging and identify the potential further developments and limitations of the method.

##### Objectives and tasks:

The project's objectives and tasks are the following:

1. Identify and evaluate the applications of multispectral imaging by drones, in the field of permafrost and rock glaciers, with precision of the potential and limitations of the methods;
2. Tests of thermal imaging in the detection of rock glaciers (in-situ telemetry);

3. Develop a method for thermal mapping of rock glaciers, to quickly and accurately determine their spatial extension.



Example of rocky glacier (Tsaté-Moiry), Lambiel et al., 2009

#### Other

Students will develop their knowledge and experience in the fields of:

- Dynamics of periglacial processes
- Drone thermal imaging
- Modeling and visualization of spatial data.

French and English are needed. Report will be delivered in French or English.