ECOLE LEMANIQUE DES SCIENCES DE LA TERRE
DES UNIVERSITES DE GENEVE ET DE LAUSANNE

Master of Science in Geology

Investigation of the role of buried ice on stream morphodynamics at the Ottema glacier (VS) using electrical geophysical methods

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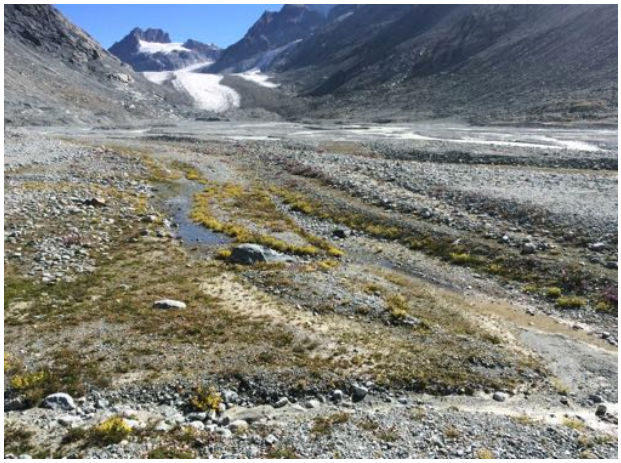
Context

Glacier meltwater streams play a critical role in the supply of freshwater in Switzerland. As glaciers retreat, large pieces of ice can be left behind and buried by sediments. These unseen, yet dynamic, components of braided river environments may have a strong influence on the morphodynamic behavior of the river. Here we seek to quantify the influence of buried ice within a river system with the aid of geophysical tools. Electrical resistivity tomography (ERT), for example, can be used to image buried ice due to the contrast in electrical properties between ice and saturated sediments, whereas self-potential (SP) methods may provide important information on predominant directions of groundwater flow.

Objectives and Methods

We will collect and process a series of electrical resistivity transects at increasing distances from the snout of the Ottema glacier, Val de Bagnes (VS) in order to first quantify the volume and distribution of buried ice. We will then evaluate how these parameters relate to the morphodynamics of the braided stream through joint analysis with time-lapse aerial drone imagery. The project will involve summer field work followed by analysis of the acquired data using MATLAB and other geophysical software. The responsible student should be prepared for physically demanding field days under challenging conditions. This includes hiking with the resistivity equipment, troubleshooting problems in the field, and potentially camping near the site to maximize efficiency in the data acquisition. Data processing will require familiarity with MATLAB and willingness to work with numerical models.



Everest, J., & Bradwell, T. (2003). Buried glacier ice in southern Iceland and its wider significance. *Geomorphology*, *52*(3-4), 347–358. http://doi.org/10.1016/S0169-555X(02)00277-5

Choice of orientation: