Vacancy for a PhD student in
Permafrost modelling supported by geophysical surveying

Starting date: January 2021

We have an open PhD position (3+1 year) at the University of Fribourg, Switzerland, Department of Geosciences, Cryosphere Research Group (https://www3.unifr.ch/geo/cryosphere/en/) within the topic of:

**Measuring and modelling of tipping points in mountain permafrost systems**

**Job description**

Permanently frozen ground (permafrost) is a globally widespread phenomenon and is thermally defined, with ground temperatures in the lithosphere required to be below 0°C for at least two consecutive years. Permafrost has faced increased attention, both, in relation to the permafrost-climate feedback associated with the release of greenhouse gases as well as in relation with increasing frequency of thawing induced slope instabilities (e.g. rock falls, debris flows) in mountain terrain.

Although permafrost monitoring activities through measurements of borehole temperature and kinematic/surface changes are currently increased, the permafrost subsurface characteristics, which govern the thermal regime, are mostly unknown. Here, geophysical measurements and subsurface thermo-hydraulic modelling can be used to characterise the dominant processes and to project the time scales, which lead to permafrost degradation (active layer deepening) and irreversible thawing of the permafrost body.

The open PhD position will be part of the ongoing modelling and geophysical activities within our research group, and will be focused within the following thematic and technical objectives:

1. Identification of tipping points in mountain permafrost systems by:
   a. Quantitative geophysical approaches to estimate ground ice contents and their temporal changes in permafrost regions
   b. Thermo-hydraulic modelling of permafrost degradation processes

2. Relation of observed and modelled ice content changes and permafrost degradation to hydrological and kinematic processes in permafrost terrain.

Beside the modelling activities, it is further expected that the successful candidate will participate in the operational geophysical field monitoring activities of the research group in the European Alps as well as in the organisation of the geophysical field courses at the Department of Geosciences (BSc and MSc level).

**More about the position**

The optimal starting date for the position is January 2021 to have sufficient time for familiarising with model specifics and geophysical techniques before the start of the field summer.

This position is associated with the Cryosphere research group within the Department of Geosciences of Fribourg University (https://www3.unifr.ch/geo/cryosphere/en/). The Cryosphere group has currently a staff of 24 scientists (including 10 PhD students) with strong expertise in surface processes of glaciers and ice sheets, snow, permafrost and geophysics.
Qualification requirements

We seek motivated, independent and creative individuals with technical understanding and strong interests in subsurface modelling and geophysics.

The following requirements for the position apply:

- The applicant must hold an MSc within geosciences, geophysics, atmospheric sciences, hydrology or in a closely related field
- Computer programming skills are mandatory, preferably using Matlab, Python, R, or similar languages – please provide specific examples in the application letter
- As geophysical fieldwork will be conducted in high-mountain/polar terrain, certain outdoor and mountaineering skills are required
- The applicant must have very good verbal and written communication skills in English and verbal skills in German or French (or the willingness to acquire one or the other)

The following points represent assets for the candidates:

- Demonstrated competences in the applications of geophysical measurements (such as geoelectrics or seismics)
- A solid background in the application of thermal, geophysical or hydrological models
- Experience in mountain/polar fieldwork or the willingness to participate in the field campaigns

We offer

- Salary according to the standards for PhD students of the Swiss National Science Foundation
- A professionally stimulating working environment and the ability to participate in teaching and research activities of the Department
- The opportunity to gain experience in supervision of BSc and MSc students
- Rich opportunities for culture and outdoor activities in the city and surroundings of Fribourg.

The Department of Geosciences (https://www3.unifr.ch/geo/en/) offers an interdisciplinary, international work environment within the bilingual (German/French) University of Fribourg, Switzerland, situated close to the Fribourg Prealps and the nearby lakes of the Dreiseenland. Our group has a strong, internationally recognised expertise in the monitoring and modelling of physical processes of the cryosphere with a focus on climate change related impacts.

How to apply

The application must include:

- Application letter (briefly summarizing your motivation to apply for the position and how you see your expertise fit with job description and required qualifications)
- CV
- Copies and transcripts of educational certificates
- Contact details of 2-3 references (name, affiliation, relation to applicant, e-mail & telephone number)

Please send your application merged into one pdf file by e-mail to christian.hauck(at)unifr.ch. Evaluation of applications will start November 01 and continue until the position is filled.