



Postdoctoral position at CNRM-CEN, Grenoble, France

Snow settlement and metamorphism observation and modeling in alpine and arctic conditions

General information:

- Workplace: Centre d'Etudes de la Neige, Grenoble, France
- Contract from ERC Starting Grant project IVORI
- Duration: 23 months
- Expected date of employment: 1 March 2024
- Deadline for application : 21 December 2023
- Work proportion: 100%
- Salary will be provided according to Météo-France salary rates and depends on the background of the retained candidate. For example, the growth monthly salary is about 3280€ for 1-2 years research experience after PhD.
- Desired level of education: PhD
- Contact: marie.dumont@meteo.fr, matthieu.lafaysse@meteo.fr, neige.calonne@meteo.fr

Interested in this position? please send CV and motivation letter to the contact persons.

Context

The position is part of the ERC starting grant project, IVORI, starting in February 2021 (5 years project). IVORI's goal is to build a microstructure-based snow-firn model encompassing all the relevant snow and firn physical variables to improve the modeling of seasonal and perennial snow. Drawing on advanced observations of snow and firn, the proposal has three objectives:

- (1) Understand the role of water vapour transport in snow and its subsequent impacts on the groundthermal regime governing permafrost evolution;
- (2) Understand how initial changes in surface snow microstructure are transferred deeper into the firn and affect ice core records;
- (3) Determine the contributions of snow-climate feedbacks, triggered by changes in the albedo and insulating capacity of snow to the past and future of snow cover and ground temperature.

Activities

The post-doctoral fellow will be in charge of evaluating new evolution laws for snow settlement and metamorphism, in natural alpine and arctic snowpack conditions. The evolution laws to be tested will be the new ones developed within the IVORI project and from the literature. The evaluations will be based on high-resolution winter-long snow observation data from alpine and arctic environments,

which include the datasets collected at Col de Porte (French Alps), Weissflujoch (Switzerland) and currently collected at the High Arctic CHARS station (Canada) in the framework of the IVORI project. The fellow will first evaluate the snow evolution laws in the well-established frame of the operational snowpack model Crocus. Then, comparisons will be extended to the IVORI snow model, which is currently developed by the IVORI team and would allow for a more complete capture of the snow processes, such as water vapor transport. The work will include cleaning and processing the collected observation data and developing methodologies for refined comparisons between models and observations at high temporal and spatial resolutions, as obtained from the SnowMicroPen and X-ray tomography data. The fellow is expected to participate to the arctic campaign in spring 2024 for 2 months.

The work will be supervised by Matthieu Lafaysse, Neige Calonne, and Marie Dumont (CNRM/CEN). The position will take place at CNRM/CEN in Grenoble, France. The position will benefit from a motivating scientific environment in the context of the research project ERC IVORI and of the various activities led by the snow modeling team of CEN. Intense collaborations are expected with several laboratories, including WSL/SLF (Davos, Switzerland) and Sherbrooke University (Sherbrooke, Canada). The CNRM is the research center of Météo-France, it is a joint unit of the CNRS. With about 230 permanent staff, its mission is to develop the knowledge and tools that Météo-France needs to produce its forecasts of weather, air quality or climate. One of the six units forming the CNRM, the CEN, focuses on the study of snow. With about 25 permanent staff, CEN has been involved for many years in snow modelling and observations.

Keywords

Snow, modeling, measurements, microstructure, porous media, arctic.

Skills

This job requires strong interest for numerical modeling as well as field and laboratory work in cold environment, including X-ray tomography. Skills in numerical language, including python, are required. Skills in work autonomy, work organization, and team work. A general interest in snow science is an asset.