

## **Job description – Research position, ANR project**

**Job title :** Research position at Centre d'Etudes de la Neige (CNRM/CEN, Météo-France – CNRS, Grenoble, France)

**Working conditions :** Office hours

**Geographic localisation :** Grenoble, France

**Head:** PI of EBONI ANR project (Marie Dumont)

**Schedule :** The job is available on 15/04/2019 for 18 months (possible time extension). Applications are expected by mail to [marie.dumont@meteo.fr](mailto:marie.dumont@meteo.fr) before 15 Dec. 2018. Applications must include a CV and a cover letter. 1 to 3 recommendation letters may be attached. Applications will be examined during November and December 2018, including interviews of the pre-selected candidates, in order to choose the name of the selected candidate allowing the position to be taken up at April 15th 2019.

**Salary :** Salary will be provided according to CNRS salary rates. Depending on the background of the retained candidate, the net monthly salary will amount from 1900 € to 2800 €.

### **Overview and context :**

CEN is a unit of the Centre National de Recherche Météorologique (CNRM), a joint research unit of Météo-France and CNRS, based in Grenoble, France. It mainly focuses on research activities related to snow in the mountains. This concerns in particular studies of snow physical processes at all time and space scales through observations, experimentation and modelling, meteorological analysis and forecast in mountainous areas, snowpack remote-sensing and specific instrumentation.

The EBONI project intends to improve snowpack numerical modelling, among others by quantifying the role of light absorbing impurities in snow cover evolution and account for currently ignored physical processes in snow.

### **Content of the position:**

Light absorbing impurities (LAIs) such as soot or mineral dust are known to darken the snow surface when deposited on the snow cover. This darkening of the snow surface increases the amount of solar energy absorbed by the snowpack leading to enhanced metamorphism and potentially faster melt. The presence of LAIs in snow triggers and amplifies several snow albedo feedbacks, drastically modifying the snowpack evolution and the snow cover duration. Mineral dust deposition on snow is generally more event-driven than soot deposition and usually exhibit a high inter and intra-annual variability. The higher French mountains range, namely the Alps and the Pyrenees, are affected by large dust deposition events originating from Sahara, that modify the snow cover evolution.

This work aims at quantifying the role of Saharan dust deposition on the snow cover evolution in the Alps and the Pyrenees. Such a study requires (i) meteorological forcings adapted to the sub-

cited mountain ranges, (ii) deposition fluxes for LAI (dust and soot), (iii) a snow model able to represent the impact of LAI in snow and (iii) an evaluation dataset.

For the past period (1979-2018), the meteorological dataset will consist in the SAFRAN reanalysis (Durand et al., 2009) that is suited to the French mountain ranges. Regional and global dust deposition reanalyses will be used to drive the deposition flux in Crocus. . The detailed snowpack model Crocus with an explicit representation of impurities (*Tuzet et al., 2017*) will be used in its ensemble version (*Lafaysse et al., 2017*) to account for the snow model uncertainties. Evaluation datasets include in-situ and remotely sensed (MODIS, Sentinel2) observations. The work will primarily focus on the past period since 1979, but future projections are also envisioned.

This work will be performed in collaboration with *Paul Ginoux (NOAA)*, *Pierre Nabat (CNRM)*, *Martin Menegoz (IGE)*, *Simon Gascoin (CESBIO)* and *Matthieu Lafaysse (CNRM/CEN)*.

**Skills:**

This job requires interest and recognised skills in snow physics and numerical modelling (good knowledge of Git, Fortran90 and python). It requires an interest for team work and technical support.

Fluency in written English is expected.