

بسمه تعالی

دوره پسا دکتری در مرکز ملی تحقیقات هواشناسی فرانسه

برآورد خصوصیات برف در مقیاس بزرگ (مدلسازی و سنجش از دور)

Post-doctoral at CNRM-METEO-FRANCE/CNRS

Applications are invited for a 6 month post-doctoral research post starting in the 2nd quarter of 2018, at within the Centre National de Recherches Météorologiques (National Center for Meteorological Research: CNRM: <<http://www.umr-cnrm.fr/>>), Météo-France in either the Mesoscale Modeling Group (Groupe de Météorologie de Moyenne Echelle: GMME) in Toulouse or at the Center for Snow Studies (Centre d'Etudes de la Neige: CEN) in Grenoble, France, to work on the following subject:

### **Estimating snow properties at the large scale using a combined model-remote sensing approach**

The snow cover is known to have a profound effect on the land surface primarily through modification of the surface albedo, roughness, and the insulating capacity of the snow. Snow coverage varies greatly in both time and space and modulates the radiative fluxes and the fluxes of heat, momentum, and moisture between the surface and atmosphere. Snow-atmosphere interactions have been shown to have a potentially large positive feedback in high latitude regions in climate change scenarios, thus there is an urgency to better understand the mechanisms. The hydrological cycle also is influenced, because a large component of the precipitation enters the soil significantly lagged in time because of storage by the snow cover. Near real time knowledge of the spatial extent and water content of the snowpack is required by different operational and research applications in meteorology and hydrology.

The purpose of this study is to develop a methodology for estimating the water equivalent of the snowpack using an optimal combination of physically-based models, field observations, and satellite data. Numerous products exist, each with their particular advantages and deficiencies. The first phase of this work consists in reviewing the current snow product state-of-the-art. This comprehensive study will seek to document existing methods and products which use remote sensing data, model simulations and ground-based observations (or some combination thereof). The current performance of the state of the art snowpack evolution models, such as ISBA-ES and CROCUS within the SURFEX platform developed at CNRM, will be described. In the second phase of this work, a method for estimating the water content of the snowpack will be proposed. This method will focus on a global approach, which can be applicable to different watersheds, and it should account for the sources of information identified in the first part of the study. The potential of new missions such as Sentinel (Sentinel-1, Sentinel-2, etc.), which offer a greater revisit frequency, or future missions, such as SWOT, will be presented. The work for this project will be performed in collaboration with CNES, Magellium and CNRM-Météo-France. The net monthly salary will vary from about 2100 to 2800 euros per month before income tax, depending on qualifications. Application should be done by email by sending a resume, a cover letter, and the names, telephone and email address of two referees to: [aaron.a.boone@gmail.com](mailto:aaron.a.boone@gmail.com)

**The closing date for applications is tentatively 28 February 2018.**

**The candidates should have knowledge of land surface or snowpack modeling and remote sensing. They should be familiar with programming data analysis in the FORTRAN programming language, with the Linux environment. They must be able to speak either French or English.**

دکتر مہری اکبری

مشاور بین الملل دانشکده علوم جغرافیایی دانشگاه خوارزمی

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