*Applications are invited for a **24-month postdoctoral position,** in the climate research group of the CNRM in Toulouse, France (http://www.umr-cnrm.fr/) to work on the modelisation of snow cover over sea ice.*

Context:

The Arctic sea ice has experienced a drastic decline over the last decades, perceived as an emblematic sign of climate change. Substantial reductions in sea ice cover, and also thickness, among other modifications, have already impacted largely on local ecosystems, indigenous populations and possibly lower-latitude climate. A further reduction in the sea ice cover and thus more open water exposed to the atmosphere is expected in the near future. Two to four times faster surface warming has also been observed in the Arctic than at any other latitude over the last decades. This phenomenon is commonly referred to as the Arctic amplification. Although the available observational record is relatively short and the response of weather systems to a potential Arctic forcing is highly chaotic, both leading to major uncertainties, the Arctic climate change is thought to impact the mid-latitude atmospheric circulation to an extent and through mechanisms which are still highly debated.

Heat exchange between sea ice and atmosphere plays a crucial role on the rate of Arctic sea ice melting as well as on the teleconnections between polar and non-polar regions. A realistic albedo feedback amplitude, central to the Arctic amplification, requires a reliable representation of surface albedo, which heavily depends on surface characteristics such as the presence of snow or meltponds over sea ice. State-of-the-art representations of snow cover over sea ice in coupled climate models are crude compared to snow cover models developed for land surfaces such as CROCUS or ISBA-ES.

Mission:

This position is funded by the Horizon 2020 CRiceS project (Climate relevant interactions and feedbacks: the key role of sea ice and snow in the polar and global climate system). The CRiceS project focuses on improving model predictions of the role of polar processes in the climate system that consists of the oceans, ice and snow cover, and the atmosphere. It is crucial to understand the role of the polar processes, such as feedback loops, in the present and future polar and global climate. CRiceS will enhance climate models in terms of how polar processes are embedded in the model codes.

The postdoctoral research scientist will adapt advanced multi-layer snow cover schemes developed for land surface such as CROCUS or ISBA-ES to represent the snow cover over sea ice in the in-house coupled CNRM-CM model. Such snow

models will allow increasing the number of snow layers, refining the representation of snow metamorphism and radiation transfer through snow and introducing a spectral albedo into the CNRM-CM sea ice model. The postdoctoral research scientist will assess the added-value of those developments on the representation of the snow cover with respect to data from observational campaigns and satellites.

Environment:

The position will be held at CNRM (Centre National de Recherches Météorologiques) in Toulouse (France) in the GMGEC department (Groupe de Météorologie Grande Echelle et Climat) in the IOGA team (Interactions Océan-Glace-Atmosphère), in collaboration with the EST team (Equipe Système Terre). The GMGEC department is at the forefront of climate modelling and contributes to each phase of the Coupled Model Intercomparison Project (CMIP) with its in-home coupled model, CNRM-CM, co-developed with CERFACS. The IOGA team aims at improving the representation of ocean, sea ice and atmosphere exchanges and interactions in the CNRM-CM model and investigates coupled mechanisms and processes driving the climate system behaviour. The EST team focuses on the modelisation of land surfaces and its interactions with other climate system components. Both IOGA and EST contribute to the development of modelling tools used for climate predictions and projections and numerical weather predictions (for instance the SURFEX platform, used for air-ice and air-sea fluxes calculation and ocean-atmosphere coupling)

Required qualifications:

1. *Ph.D. in atmospheric dynamics, climate sciences, fluid mechanics or related*
2. *Knowledge of NEMO or CROCUS*
3. *Experience in modelling ocean, sea ice or snow,*
4. *Experience with HPC*
5. *Experience with Unix and Fortran*
6. *Knowledge of NetCDF encoding and related data analysis tools (cdo, nco)*
7. *Programming skill : scripting and visualisation (e.g. bash, R, python, ncl)*
8. *Good command of English.*
9. *Collaborative spirit and communication skill*

Applications should be sent to virginie.guemas@meteo.fr and bertrand.decharme@meteo.fr