

24-month Post-doc position in surface modeling at Centre National de Recherches Météorologiques (CNRM, Météo-France/CNRS)

Position

Post-doc position on the impact and hydrological assessment of land cover change on regional reanalysis.

Application deadline: 28 February 2023

Duration of contract: 24 months, can be extended to 42 months

Expected starting date: July 2023

Location: CNRM, Toulouse, France

Context

The position is funded through the EU Horizon Europe Framework Programme CERISE project. CERISE is a research and innovation project targeting enhancements in the Copernicus Climate Change Services (C3S) reanalyses and seasonal forecasts, with a focus on land-atmosphere coupling. CERISE aims to develop new and innovative land initialization techniques to pave the way for the next generations of the C3S reanalysis and seasonal prediction systems, by fostering the exploitation of Earth system observations over land surfaces.

CNRM has a great experience for several years on regional reanalyses, in particular it produced the CERRA-Land¹ reanalysis over Europe. CERRA-Land consists of an off-line simulation (guided by atmospheric reanalyses) of the ISBA surface model, integrated to the SURFEX modeling platform, over several years to study the evolution of past climate, through the generation of essential surface climate variables. The surface parameters, necessary for ISBA, are characterized in SURFEX through a database representative of the 2000s, and therefore not necessarily realistic for simulations covering long periods in the past. In addition, the CNRM has developed the coupling between ISBA and the CTRIP routing model for the study and monitoring of the hydrology of large basins on a global scale. The evaluation by the discharges of numerical simulations is a tool used for reanalysis as well as for the numerical model forecasts. Within the framework of the CERISE project, a hydrological evaluation (comparison of river discharges) of several simulations made by other partners is also planned, and concerns seasonal forecast prototypes and global and regional reanalysis demonstrators.

Objectives

The successful candidate will be in charge of the CERRA-Land simulations and its evaluation, as well as the hydrological evaluation of the reanalyses and seasonal forecasts carried out within the project. The main tasks are the following:

- Set up a reference simulation of the CERRA-Land type, based on the most advanced version of SURFEX, as well as a simulation taking into account the annual changes of the land cover.
- Run the reanalysis in these two configurations for the period 1993-2019, and analyze and evaluate the impact of these changes on the surface and soil fields (soil moisture, surface fluxes, snow...).
- Set up simulations with the CTRIP routing model to calculate river discharges of the main European rivers to quantify the impact of the land cover change.

¹ <https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-cerra-land>

- Set up and run simulations with CTRIP using water flows (surface runoff and drainage) from seasonal forecasts and/or global and regional reanalyses performed during the project as input data, and perform an evaluation of the different systems with respect to discharges.

Required skills, expertise and experience

- A PhD degree in environmental science, meteorology, physics, hydrology or related fields.
- Very good knowledge in land-atmosphere interactions and land surface models, and relevant experience in reanalysis and/or land surface modeling and/or hydrology.
- Experience with processing and analyzing large volume of data.
- Very good programming skills in high-level programming language (Python, Fortran) and good Linux skills (including shell scripting).
- Some experience with computing on high performance computers (HPC) would be a plus.
- Good communication skills, and aptitude for written and oral communication in English.

Practical information

The successful candidate will be based at the Toulouse Meteopole (France) and will be hosted in the CNRM Mesoscale Meteorology Group. More precisely, in the SURFACE team in charge of surface modeling for numerical weather prediction and climate models of the Météo-France, and whose activity also includes regional reanalysis and hydrology of large basins.

The gross annual salary will vary from about 40000 € to 48000 € (health insurance included), depending on the candidate's experience.

Application procedure

The candidates should send the following documents by email to patrick.lemoine@meteo.fr:

- A curriculum vitae detailing experience and technical skills
- A motivation letter explaining the interest for the job
- The names, telephone and email address of two referees