RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

METEO FRANCE
À VOS CÔTÉS, DANS UN CLIMAT QUI CHANGE

English version

Surface properties at the hectometer scale for “what-if” land-use simulations as part of the “Destination Earth On DEmand” project. (F/M)

SUBMIT YOUR APPLICATION BY CLICKING HERE

All applications must be submitted using this link to be considered

⇒ Information about the job position

Direction/Recruiting service

DESR/CNRM/GMME/SURFACE

Location of the position (postal adress)

42 avenue Gaspard Coriolis, 31057 Toulouse Cedex 1

Project concerned

Destination Earth On Demand (DEODE)

Information related to the project

Destination Earth (DestinE) is an ambitious initiative of the European Union (EU) to create a digital twin – an interactive computer simulation – of our planet. DestinE will be used to better understand the effects of climate change and environmental disasters and to permit policy makers more effectively respond to these issues. The European Centre for Medium-range Weather Forecasts (ECMWF), the European Space Agency (ESA) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) are the three organisations entrusted by the EU to achieve this unprecedented endeavour for climate, weather and computing sciences.

A key milestone is the launch of the first two digital twins by December 2023. One of these will be the Digital Twin on Weather-Induced and Geophysical Extremes. Managed by ECMWF, this digital twin will provide capabilities and services for the assessment and prediction of environmental extremes.

Météo-France, contractor and leading partner of a European team composed of 28 environmental institutes and national meteorological/hydrological services, took part in the procurement procedure, launched by ECMWF for the provision of the On-demand Extremes Digital Twin in

March 2022. The proposed solution is to make on-demand configurable digital twin engines for forecasting of environmental extremes at sub-km scale. The DE_330 tender was successfully evaluated, negotiated and signed. The first DE_330 contract (20-month) between ECMWF and Météo-France started on 1st September 2022 and the third phase started the 1st May 2026.

Type of position (research engineer, researcher, PhD student,...)

engineer

Requested contract starting date

15/10/2026

Duration of the contract

21 months

01/09/2026

Email contacts for any further information

patrick.lemoigne@meteo.fr

Salary range

4 111,15 € brut mensuel, niveau expert

⇒ Detailed information about the position

Direction/service description

Météo-France's Higher Education and Research Department is made up of around 290 permanent staff, 150 non-permanent staff and 280 students.
The DESR comprises :
- A Research division in which the CNRM plays a central role, under the dual supervision of Météo-France and the CNRS.
- A Higher Education division, which includes the École Nationale de la Météorologie (National School of Meteorology).
- Partnerships and Academic Management.

The CNRM's Groupe de Météorologie de Moyenne Echelle (GMME) is structured into research teams focusing on non-hydrostatic modelling and parameterisation of cloud processes; precipitating convective systems in temperate latitudes; convection and clouds in the Tropics; modelling of exchange processes in the soil-plant-atmosphere continuum; characterisation of continental surfaces using satellite remote sensing and data assimilation; city-atmosphere exchanges and urban climate.

The activities of the GMME group's SURFACE team focus on developing and improving the modelling of soil-plant-

atmosphere and lake-atmosphere exchange processes for applications in medium-scale numerical weather prediction and hydrology. The team is also responsible for coordinating the development of the SURFEX surface code within the CNRM and the user community, as well as maintaining and developing the ECOCLIMAP land cover database. The team is also responsible for setting up a permanent system for high-resolution reanalysis of continental surfaces at the scale of France for the needs of Météo-France, in particular for monitoring water resources.

Job description

CNRM has extensive experience in land surface modeling, and has developed the SURFEX modeling platform, which is coupled to most of the ACCORD NWP consortium forecast models. The surface parameters required by the different physical models are characterized in SURFEX using the ECOCLIMAP database. Recently, the ECOCLIMAP-Second Generation database at 300 m resolution has been published for a use at hectometric scale.

As part of the DEODE project, a series of « What-If » scenarios is planned, to assess the impact of modified surface land-cover conditions for high-stakes situations. In addition, the stochastically perturbation parameterizations (SPP) will be adapted to an advanced soil model physics (based on the diffusion of heat and moisture over a multi-layer soil) to improve the ensemble forecasts.

The main tasks are as follows:

Surface and physiography:

- Consolidate methods to merge ECOCLIMAP-SG and OSM data into harmonised high-resolution land-cover maps.
- Refine auxiliary datasets (LAI, albedo, elevation, soil type) using new satellite and ML-supported products.
- Establish flexible scenario pipelines for land-use change, urbanisation, vegetation changes, and user-driven “what-if” configurations.
- Ensure that all CSC configurations converge toward a consistent SURFEX parameterisation framework compatible with DEODE workflows.
- Produce domain-specific physiographic datasets for storyline and scenario cases

Physically-based ensembles:

- Maintaining SPP to be in line with evolving physics
- Extending uncertainty quantification for the surface and the multi-layer scheme. The surface perturbations (soil/land use and variables such as soil moisture) will also be used for the climate DT downscaling and what-if scenarios.

Profile description

Required Skills, Abilities, and Experience

Masters Degree in atmospheric sciences/computer sciences processing or engineer diploma, obtained before the date of the application. Following criteria will be taken into account for the evaluation of candidates:

- expertise in GIS, Unix/Linux,
- experience in numerical computation, Python,
- experience in land-atmosphere interactions and land surface models
- fluency in English, with ideally notions in French,
- human and relational qualities necessary for teamwork.

⇒ Information related to applicants

Required level of education/ Diploma

A levels / BTEC National diploma ☐

Two-year degree ☐

Bachelor's degree ☐

Master's degree [x]

PhD ☐

Required level of experience

Beginner ☐

Advanced ☐

Expert [x]

Required level in french

Not required [x]

Introductive [ ]

Intermediate [ ]

Middle [ ]

Advanced [ ]

Autonomous [ ]

Fluent [ ]

⇒ Teleworking friendly

YES [x] NO [ ]

If the answer is yes, how many days per week ?

1

⇒ Management

YES [ ] NO [x]