

Researcher/Scientific Developer at CNRM (Météo-France - CNRS) for the retrieval and analysis of satellite climate data records characterizing the surface

Application deadline: June 1st 2018 (at the latest). Candidates will be considered as applications are received.

Duration: 12 months (with the possibility for 3 renewals, subject to individual performance and organization)

Start: June-October 2018

Location: CNRM, Toulouse, France

Context

Surface albedo is an Essential Climate Variable (ECV), which is defined as the ratio of the radiation reflected from a surface to the total incoming radiation on the Earth's surface. Surface albedo is both a forcing variable controlling the climate and a sensitive indicator of environmental degradation. Albedo varies in space and time as a result of both natural processes (e.g. changes in solar position, snowfall and vegetation growth) and human activities (e.g. clearing and planting forests, sowing and harvesting crops, burning rangeland) (GCOS, 2004). Remote sensing offers the only viable method of measuring and monitoring the global heterogeneity of albedo. Nowadays the greening of the vegetation over several areas around the world may cause significant albedo trends. In addition, changes of land cover may affect the albedo values and the overall quantity of energy reflected back to space. The Copernicus program of the European Commission (<http://www.copernicus.eu/>) and the LSA-SAF program of EUMETSAT (<https://landsaf.ipma.pt/>) provide reliable and up-to-date information on how our planet and its climate are changing to help decision makers, businesses and citizens to define environmental policies and decide mitigation actions. In 2018, the first long term time series (called Climate Data Record, CDR) of satellite surface albedo will be made available to the community in the framework of Copernicus/C3S Phase1 project (around 40 years of data). In the next Phase of Copernicus/C3S project (4 year contract with ECMWF), Météo France will prepare the second collection of satellite albedo CDR products.

The objective of the open position is to take in charge the evolution of the existing scientific algorithms for the retrieval of surface albedo from different sensors and to prepare the second collection of satellite albedo CDR products in COPERNICUS/C3S. The candidate will improve them up to state-of-art research. The candidate will also take advantage of existing complementary sensors to propose a multi-sensor albedo product. Also the candidate will analyze inconsistencies between albedo and other satellite ECVs (LAI, FAPAR, Land cover, etc.). One key issue will consist in the detection of the potential trends (shift) in the time series and in quantifying the impact on climate at the global scale (change of radiative forcing). Improvements of the algorithms and trend analysis tools will also benefit to other projects in which the team is involved.

The open position is to join the remote sensing division of the CNRM laboratory (<http://www.umr-cnrm.fr/>). CNRM is the Météo-France research laboratory and contributes to the observation of land surfaces at the continental scale through spaceborne remote sensing techniques. In the last decades CNRM has gained experience in developing algorithms for analyzing satellite images. Today the remote sensing division of CNRM is interested in the retrieval of radiative properties of the Earth's surface (reflectance, BRDF, and albedo) and the overlaying atmospheric aerosols (content and type) in the visible and near infrared wavelengths.

Required skills

The existing algorithms at CNRM are written in C, Fortran and python. Most of the wrapping and input/output code (data are in HFD5 and NetCDF format) is written in python while the core

scientific code is in Fortran and C. According to her/his abilities and interest, the candidate will also have the opportunity to participate in the research activities of the team.

The candidate must hold good skills in various domains :

- Experience with using/processing gigabytes of data, such as 10000 x 10000 pixels images or climatic or weather models data, is required.
- Knowledge on radiative transfer and retrieval of physical properties of the surface or the atmosphere from satellite will be needed. A first experience in the field of remote sensing in the visible and near infrared domains will be highly appreciated. In any case, a solid background in physics will help. As mathematics and statistical tools are often use, the candidate should be not be put off by nonlinear equations, partial derivatives, multivariate regression, scatter plot, confidence intervals.
- Preferred programming languages are python, Fortran and C. Knowledge of appropriate python packages will be appreciated. Experience working with R or GIS software is a plus. A minimal proficiency in linux is required. Experience working at the interface between research and operational environments is a plus.
- The successful candidate should be a quick-starter and able to work on multiple tasks and be able to find innovative solutions when needed.
- A good level of English is necessary, for reading and writing technical product specifications, scientific articles, documentation and project reporting documents. Good skills in preparation of technical documents (ATBD, PUM) are mandatory.

It is expected that the candidate holds a PhD in optical remote sensing, but this is not compulsory. Other applications will be also considered.

Practical aspects

The candidate will be based at the CNRM laboratory in Toulouse. The open position is for July 1st, 2018. Candidates will be considered as applications are received. The successful applicant will be hired for 1 year with the possibility of 3 renewals (subject to individual performance and organization). The gross salary will be between 3000 and 3900 euros. The net monthly salary will be between 2600 and 3200 euros commensurate with experience. The net salary includes French social services and health insurance.

Application procedure:

Interested candidates should send the following documents by e-mail to Dr. Dominique Carrer (dominique.carrer@meteo.fr):

- Curriculum Vitae detailing experience in research and other skills. A list of publications and communications in conferences is mandatory;
- A sample of research publication or communication;
- Application letter explaining research interests and motivation for the job;
- The names and contact details of two referees (recommendation letters shall be appreciated but are not compulsory).