

## **Scientific software developer/engineer at CNRM (Météo-France - CNRS) for the retrieval of surface properties from satellite remote sensing images**

**Place:** CNRM laboratory, Toulouse, France

**Application deadline:** August 25th 2017 (at the latest)

**Duration:** 1 year renewable contract

**Available from:** November 1st 2017

### **Context**

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 coming from space missions in the framework of programs coordinated by EUMETSAT and the European Commission. 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.

The Copernicus program of the European Commission (<http://www.copernicus.eu/>) provides 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 take correct actions. The objective of the open position is to take in charge the evolution of the scientific algorithms that are used in the CNRM for the retrieval of radiative variables of the Earth surface (reflectance, BRDF, and albedo). The evolution will allow the processing of satellite images coming from the Land Monitoring Service of the Copernicus program (<http://land.copernicus.eu/>) in order to offer a continuous monitoring of the status of land territories.

The existing scientific algorithms at CNRM were developed for other satellite sensors and need to be adapted to process data from the Copernicus program. In particular the successful candidate will deal with images acquired by the Copernicus satellite Sentinel-3 that is equipped with the OLCI and SLSTR cameras. These two instruments make possible the observation of the Earth with 21 spectral bands in the visible and near infrared domain. The main objective of the successful candidate will be to develop and provide an unique tool that will be used to retrieve Earth radiative properties from different optical remote sensing cameras (including Sentinel-3 and the instruments used nowadays by the CNRM). The existing algorithms at CNRM are written in C, Fortran and Python. A Python wrapper will be developed to take care of inputs and outputs (in hdf5 and netcdf format). Also, the computational optimization of the scientific codes is foreseen.

Scientific algorithms at CNRM are nowadays evaluated by a set of validation tools that compare satellite-derived products against other reference measurements. The successful candidate will build a comprehensive validation framework based on the evolution of these tools that will allow the continuous monitoring of the quality of the land satellite image products. The existing tools are in Pwave, Python and Fortran. An unique tool for validation is also foreseen.

If candidate has a PhD degree, he/she will also have the opportunity to participate in the research activity of the team. In particular the team will investigate the new potential offers by the 21 bands of Sentinel-3 to have a better proxy of the health of vegetations.

### **Required skills**

The candidate must hold good skills in programming, software developing and graphic software. Preferred languages are Python, Fortran, C, IDL, R, etc. A first experience in the field of remote sensing in the visible and near infrared domains will be highly appreciated. Experience on radiative

*transfer and retrieval of physical properties of the surface or the atmosphere from satellite data will be a plus. Knowledge in web design would also be appreciated. A good level in English is necessary.*

***Practical aspects***

*The candidate will be based at the CNRM laboratory in Toulouse. The open position is for November 1st, 2017. Candidates will be considered as applications are received (no later than August 25th). The successful applicant will be hired for 1 year with the possibility of renewing for one more year. The net monthly salary will be between 2600 and 3200 euros commensurate with experience. This includes French social services and health insurance.*

***Application procedure***

*Interested candidates should send the following documents by e-mail only, to Dominique Carrer ([dominique.carrer@meteo.fr](mailto:dominique.carrer@meteo.fr)):*

- a CV detailing research experience and information about the above skills. It is essential to provide a checkable list of publications and conferences,*
- an application letter explaining research interests and motivation for the job,*
- the names, telephone and e-mail address of two referees and if possible referee recommendation letters,*
- if possible, a sample report from previous scientific and technical work.*