METEO-FRANCE Operations for Forecast Division
Nowcasting Department

Civil engineer or post-doctoral position offer
Duration: 24 months – possible extension to 2x12 months

Applicants are invited for a 24 months post-doctoral or civil engineer position starting on **1st January 2023** on the following subject: "**Evolution of Convection Nowcasting products based on satellite data in a MTG context**".

The deadline for application is **1st November 2022.**

Context:

Since 2002, Météo-France has been involved in the NWCSAF[1] under the coordination of EUMETSAT[2]. The objective of this program is to develop, maintain and distribute software packages that allow the generation of satellite derived products with a direct application in Nowcasting like Clouds, Precipitation, Convection and Stability Products, High Resolution Winds, detection of meteorological features and Imagery Extrapolation. In this context, Météo-France's Nowcasting Department is in charge of two products that are deduced from geostationary satellites observations (GEO) : CI Convection Initiation and RDT Rapidly Developing Thunderstorm.

As both products are part of the NWCSAF CDOP4[3] phase 2022-2027, several deliveries are already foreseen in order to carry on their maintenance in operational conditions over the globe, i.e to ensure the continuity with MSG[4]. In addition, the progressive availability of MTG[5] data throughout 2023 will allow several improvements.

The work is a very much part of "*Objectives and Performance Contract between the French State and Météo-France for the period 2022-2026*". It is in particular linked to following objective "*To progress in the observation of hazardous phenomena by ensuring the integration and operational use of new data sources in additional maintenance and reinforcement of satellite and network data*"

Methods

CI focuses on warm cloudy pixels and estimates the probability of development into a thunderstorm. For that, spectral values issued form geostationary satellite like BT (Brightness Temperature), BTD (Brightness Temperature Differences) and their trends are associated to physical properties of convection like strong cooling rate, glaciation, etc.

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1   Satellite Application Facilities for Nowcasting and very short-range forecasting, see www.nwcsaf.org for more details
2   European operational satellite agency for monitoring weather climate and the environment from space, see www.eumetsat.int for more details
3   Continuous Development & Operations Phase 4
4   Meteosat Second Generation
5   Meteosat Third Generation

RDT focuses on more developed cells, track them and determines which ones are convective. Series of attributes are linked to the cell like cooling rate, overshooting top presence, lightning jumps. The past displacement of the cell is used for a forecast of the cell location up to one hour.

Compared to the actual SEVIRI onboard MSG, both products will benefit from the additional channels, the higher spatial and temporal resolutions of the FCI radiometer onboard MTG. For instance for RDT, the overshooting tops are likely to be better detected as the morphologic signatures of top of cumulonimbus will be better depicted, and the tracking will be improved. MTG will also carry a Lightning Imager (LI) that will be exploited for validation and for characterizing the level of severity of convective cells, equivalently to what is currently done with data from GOES-R series.

Work description

The work will take place in Nowcasting Department DirOP/PI in Toulouse within a 10 people team working with radar, NWP and satellite data to develop several nowcasting products. Amongst them, 3 people are in particular working on NWCSAF activities.

The successful applicant will be involved in:

- maintaining to the required level the operational production with respect to the evolutions of the global GEO network,
- working on new algorithms following what is already planed in CDOP4 . That means in particular the preparation of MTG Day1 (continuity with MSG) and Day 2 versions (improvements linked to the FCI Radiometer and the LI),
- improving in RDT algorithm the identification of cloud top features (overshooting tops, U/V shapes, cold rings),
- improve the tuning of the RDT discrimination process when using FCI radiometer,
- improving and tuning the CI algorithm using IA methods for a more accurate estimation of probability of convection development,
- contributing to all official NWCSAF deliveries: GIT repository, documentation update, review processes etc.,
- contributing to maintenance of the software, that includes assistance to end-users in case of any issue (HelpDesk functionality of NWCSAF website).

Required qualifications

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

- expertise in C-Language (which is almost exclusively used in the existing packages), Unix/Linux, Python,
- experience in atmospheric science, a good knowledge of meteorological satellite will be highly appreciated,
- fluency in English, with ideally notions in French,
- human and relational qualities necessary for teamwork.

Practical information

The successful applicant will be based at the Météopole in Toulouse, in the Nowcasting Department. The position will be funded by Météo-France, and will start preferentially on the 1st January 2023 for 24 months with two possible 12-month extensions.

The gross monthly indicative salary before taxes will range between 2500 and 4000 € depending upon the qualification and the experience.

For full consideration, an application letter shall include a detailed statement of research interest, along with a curriculum vitae (including research experience, publications and conferences, computing skills and different language practice) and the names, telephone and email address of 2 referees.

The package should be sent by email before the 1st November 2022 to jean-marc.moisselin@meteo.fr and thibaut.montmerle@meteo.fr. Same emails can be used for any scientific question.

Due to spam filters applied in Météo-France, without rapid acknowledgement of receipt by email from one of the two addressees, it is recommended to verify the correct receipt of the candidate's email with a phone call (Jean-Marc Moisselin: +33 (0)5 61 07 83 70).