Service: CNRM (Météo-France,CNRS)

Scientist in charge: Lucie Rottner, Laure Raynaud

Subject: Design of probabilistic convection products for air traffic mangement

Expected start date: October 1st 2020 - Duration: 12 months

Applicants are invited for a 12 month post-doctoral or civil engineer position starting on **between 1st and 15th October 2020** on the following subject: "**Design of probabilistic convection products for air traffic management"** in the framework of Météo-France participation to the SESAR 2020 ISOBAR project.

The deadline for application is 20 July 2020.

Context

This subject is addressed in the framework of the SESAR 2020 ISOBAR project, in which Météo-France is involved. This project aims at integrating enhanced convective weather forecasts in order to predict imbalances between air traffic capacity and demand as well as employing artifical intelligence solutions to prescribe mitigation measures at local and network level.

In the framework of this project, Météo-France provides an expertise in the field of convection forecast with a focus on the use of high-resolution ensemble prediction systems to derive a probabilistic information. Météo-France will work in close connection with the spanish meteorological agency (AEMET).

Scientific Objectives

In order to cope with small-scale unpredictable details of mesoscale structures, model outputs can be processed following a fuzzy object-oriented approach to extract features which are associated with a higher predictability than the direct model outputs. This approach, described in Raynaud et al. (2019) and Rottner et al. (2019), is currently used to identify coherent precipitation objects within the convective-scale AROME ensemble prediction system (EPS). The purpose of the present contract is to extent this approach to the reflectivity field in order to target convection objects and meet ATM needs. The adapted fuzzy-object detection method will then be applied to the AEMET-EPS. The final purpose is to provide a multi-model probabilistic guidance of the convection risk.

The expected work of the position is (1) the adaptation and tuning of the object-based processing for the probabilistic prediction of convective activity, and (2) communication (reports, presentations) and dissemination activities to diffuse the probabilistic products to the ISOBAR partners.

Required skills

• Experience in numerical modeling of the atmosphere

• Very good knowledge in meteorology (particularly physics of convection, precipitations and boundary layer) and statistical tools (data analysis)

• Good computer level: shell development (Linux), python

• Aptitude for scientific work and written and oral communication in English, meetings abroad

The position will be in the National Centre for Meteorological Research (CNRM) at Météo-France in Toulouse, he or she will be as a post-doctoral researcher in the team in charge of AROME ensemble forecasting, with the necessary tools and environment for work (computer resources, office, and close supervision).

Expected Results

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• D1 – Month 6: Python software able to detect convection objects in the AROME-EPS members

• D2 - Month 8: Python software able to detect convection objects in the AEMET-EPS members

• D3 - Month 10: Multi-model probabilistic convection products for specific use cases and over a large historical period

• D4 - Month 12: Dissemination of probabilistic products to ISOBAR partners and final report

Practical information:

The successful applicant will be based at the Météopole in Toulouse, in the Centre National de Recherche Météorologique. The position will start preferentially on the October 2020 for 12 months .

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 20 July 2020 to laure.raynaud@meteo.fr and lucie.rottner@meteo.fr.

References

Raynaud, L., I. Pechin, P. Arbogast, L. Rottner, and M. Destouches, 2019 : Object-based verification metrics applied to the evaluation and weighting of convective-scale precipitation forecasts. Quart. J. Roy. Meteor. Soc.

Rottner, L., P. Arbogast, M. Destouches, Y. Hamidi, andL. Raynaud, 2019: The similarity-based method: a new object detection method for deterministic and ensemble weather forecasts. Advances in Science and Research,16, 209–213.