Job vacancy: fixed-term scientific position at CNRM-UMR, Toulouse, France

Topic: rainfall prediction using ensemble forecasts

Starting date: year 2019 - Duration: 10 months

Applicants are invited for a 10 months research engineer position, starting during 2019 on the topic described here. The position is located at the CNRM laboratory in Toulouse, France.

Scientific objectives

Flash-flood hydrological forecasts require accurate predictions of rainfall accumulations a few hours into the future, at the river catchment scale which is typically of 1 to 1000 km². Due to their large forecast uncertainties, rainfall predictions from numerical models need to follow a probabilistic approach. Using stochastic atmospheric modelling techniques, several likely forecast scenarios can be prepared in real time for driving hydrological prediction models in order to estimate flooding risks. The aim of this work is to produce such scenarios, in the context of the PICS project (http://pics.ifsttar.fr/) funded by the French Agence Nationale pour la Recherche. The overarching goal of the PICS project is to build and evaluate integrated nowcasting suites for direct prediction of flash-flood impacts. The work proposed here is the first component of such suites, so it is essential for useful predictions.

The objective of this work is to test, validate and optimize a software suite that converts numerical weather forecasting data into ensembles of rainfall predictions for hydrological models. The dataset will include nowcasting data, deterministic and ensemble numerical weather prediction data over a sample of flood-prone test cases. The quality of the results will be monitored using probabilistic objective verification against rainfall observations, keeping in mind the needs of the hydrological and impact prediction. A key challenge will be the conversion of heterogeneous model output into rainfall scenarios that adequately sample forecast errors, while preserving the space- and time-consistency of the predicted scenarios.

The selected candidate will have access to an archive of precipitation observations and meteorological model output, to python/fortran tools for processing the data and for diagnosing performance indicators. He/she will develop and test improvements to this system using techniques such as ensemble calibration, probability dressing, parameter tuning, visualization of weather charts on case studies, etc. Personal initiative to contribute new and improved techniques will be encouraged.

The proposed work is expected to contribute to the PICS project objectives and yield valuable results for the international scientific community. If the work delivers as anticipated, he/she will be encouraged to give **presentations to scientific conferences** and to **publish in peer-reviewed journals**.

Required skills

- good knowledge of atmospheric physics and/or hydrometeorology
- experience in advanced data analysis and statistical methods
- ability to work and develop with python (and, ideally, fortran-90 and Unix shell)
- proven aptitude for scientific teamwork, written & oral communication in English.
- an academic level of civil engineering, Ph.D or equivalent (depending on job history)

Practical aspects

The successful applicant will be hired as a collaborator and integrated into the CNRM/GMME/PRECIP research team with adequate scientific management, technical support and close supervision within the CNRM laboratory (Centre National de Recherches Météorologiques at Toulouse, France). He/she will be paid by CNRS (Centre National de la Recherche Scientifique). CNRM is a joint research centre of Météo-France and CNRS (http://www.umr-cnrm.fr/).

The main supervisor, F. Bouttier, has over 20 years of experience in meteorological research, scientific and project management at Météo-France and ECMWF, he currently is a senior scientist in ensemble prediction for weather forecasting.

The contract will conform to the French law regarding fixed-term contracts. Funding is secured for a salary that will follow the current CNRS scale for fixed-term contracts, which depends on qualification and job experience, and is currently between 22 and 34 Keuro per year (net salary before income tax).

Foreign candidates are welcome, but there is no funding available for expatriation expenses.

Application procedure

Interested candidates should send the following documents by e-mail only, to francois.bouttier@meteo.fr and olivier.caumont@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,

Applications can also be sent to https://emploi.cnrs.fr/ when the offer is open on the website.

The call for applications will remain open until a suitable application has been found. Feedback is given to applicants whenever possible. Please direct questions to francois.bouttier@meteo.fr.