POST DOC POSITION IN STATISTICAL HYDROLOGY

- Recruitment grade: young researcher (i.e. with PhD)
- Location: Antony, France and Anglet, France
- Duration: 12 months, starting late 2019 (October – December 2019)
- Deadline: 31 August 2019
- Gross Salary Range: 2969 euros / month

Context and aims

The continuous increase of data volume and diversity brings the most challenging issues raised in Computational Ecology and Environmental Sciences (C.E.E.S): more parameters to estimate than observations, non-linear effects, heterogeneous data types and changing relationships between variables over time and space. To handle these challenges, it is urgent to develop suitable statistical methods and confront them to high-stakes socio-environmental issues.

Recent technological advances in E.E.S. fields have given rise to numerous large-scale but often poorly-structured datasets. The progress in E.E.S will, for the foreseeable future, continue to depend upon data collected across a wide range of scales on various sites with a great variety of data processing techniques. One main danger for the E.E.S. data is then to remain largely hidden from view in a myriad of disconnected data silos and then to generate a huge assortment of conclusions from local studies and specific methods with little way to judge how general those scientific findings might be. A major challenge is to make available efficient and operational tools for data analytics to the scientific commmunity, in a spirit of data and methods sharing, scientific transparency and reproducibility. Aiming to feed the global integrative research effort and to address the methodological challenges related to the size and complexity of the data, the present project will provide a generic toolbox for E.E.S. at the forefront of innovation. The aim of this project is two-fold: (i) to enhance and further develop the current toolkit for integrative analysis of massive datasets, especially for spatio-temporal data and, (ii), to provide direct applications in high-stakes environmental topics, in the general context of global climate change and continuously increasing human pressure.

The post doc will take part in the development of statistical and computational methods for analyzing long-term hydrological data and will make the link between the hydrological-related work package and the coastal risk-related work package.

Tasks and proposed methodology

- Implementation of a semi-distributed hydrological model, GRSD, to the catchment of the River Adour, in order to simulate and forecast river discharge. Local peculiarities will be taken into account to improve the modelling based on discussions with local water managers. The robustness of GRSD, i.e. its spatial and temporal transferability, will be analysed in order to ensure its adequate applicability to the Adour case study.

- Development of a methodology to regionalise the model for the tide-affected part of the catchment (river mouth area). As discharge cannot be inferred from water level in these areas, the model, which does not account for tide, cannot be calibrated against discharge. We will therefore develop methods to simulate discharge that would occur if tide had no effect.

- Indirect evaluation of the GRSD discharge simulations with 3D hydrodynamic models. Two 3D hydrodynamic models are applied in the project to simulate the water level over the coastal area close to the River Adour mouth in order to predict marine surges. These models need the River Adour inflow to be run, however this cannot be measured close to the mouth due to the tide. An original

solution and evaluation of GRSD would be to use GRSD simulations and assess their impact on the 3D hydrodynamic models. Compound events (e.g. high tide and strong precipitation events) are among the most destructive events but their knowledge and predictability are still poor. We expect to improve those in the project.

- Development and adaptation of data assimilation methods in GRSD for the River Adour catchment. Data assimilation methods are advanced statistical methods used to integrate observed information into models, keeping in mind the model and observations uncertainties within probabilistic frameworks (e.g. MCMC methods). Such methods will be applied and their impact and different configurations will be assessed in terms of GRSD outputs and impacts on the 3D hydrodynamic models.

Funding

This post doc position is funded by the project E2S-UPPA (Energy Environment Solutions) whom core scientific domain focuses on Environment and Energy to meet challenges related to the energy transition, geo-resources, aquatic habitats and the environmental effects of natural and anthropogenic changes (https://e2s-uppa.eu/en/index.html).

Location

This post doc position will be based in Antony (France) at Irstea in the HYCAR Research Unit (https://webgr.irstea.fr). Visits to the UPPA LMA lab in Anglet (France) are foreseen.

Supervision and Contact

Supervision team: Guillaume Thirel (guillaume.thirel@irstea.fr) and Olivier Delaigue (olivier.delaigue@irstea.fr) at Irstea: National Research Institute for Science and Technology in Environment and Agriculture at Antony (92761) France.

Head of project: Benoit Liquet (benoit.liquet@univ-pau.fr) at the LMA: Laboratory of Mathematics and its Applications, UMR CNRS 5142 (https://lma-umr5142.univ-pau.fr/fr/index.html) on the campus of Anglet (64600) France. The LMA is one of the lab of the University of Pau and the Pays de l'Adour (UPPA), I-site laureate with its project E2S-UPPA.

For additional information and proposal, please contact: Dr Guillaume Thirel, Tel: +33 1 40 96 65 69 or Pr Benoit Liquet, Tel: + 33 6 95 46 10 61
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Young Researcher skills required

- The applicant should have a Phd preferably in hydrology, hydrometeorology or related fields. Candidates with a PhD in computer science or in statistics will be considered but must have knowledge of the basic concepts of hydrological modelling.

- Strong experience with programming, good communication skills and interest in working in a cross-disciplinary team will be an advantage.

Salary

The salary of the successful candidate will be based on level chart for teaching and research personnel in the salary system of French universities. The salary will be 2969 euros/month (gross salary), including allowance for 64 hours teaching per year.

Applications and deadline

Please submit your application by email to guillaume.thirel@irstea.fr. Please attach the following documents as a single pdf file: motivation letter (max 1 page), CV (max 2 pages) and publication list. Include also contact information of two persons who can provide a reference letter upon request.

The deadline for submitting the application is 31 August 2019.