

15-month post-doc offer on “Analysis of the atmospheric water cycle from a multi-satellite perspective”

The “Laboratoire Atmosphère, Milieux, Observations Spatiales” (LATMOS-IPSL) and the “Laboratoire des Sciences du Climat et de l’Environnement” (LSCE-IPSL) are offering a 15-month post-doctoral position on the analysis of the tropical atmospheric water cycle based on statistical modelling and the merging of satellite observations at various spatial and temporal scales. This position is part of the “SPACE-OBS” Strategic Research project, supported by the Paris-Saclay University, and will be based at LATMOS (Guyancourt, France).

Context:

A part of the SPACE-OBS project aims at better understanding the physical aspects of the tropical water cycle and assessing its role in the global climate and in the occurrence of tropical extreme events. This will be achieved by bringing together, for the first time, multivariate satellite observations of (i) the tropical water vapor and energy budgets provided by the sensors of the Megha-Tropiques mission (SAPHIR and ScaRaB), sampling the diurnal cycle owing to its unusual orbit, (ii) the detailed vertical distribution of cloud and precipitations provided by the series of instruments of the A-Train constellation (CALIOP/Calipso and CPR/CloudSat), and (iii) the tropospheric wind profiles measured by the newly launched ADM-Aeolus satellite. In order to deal with the different space and time resolutions of these instruments, a statistical downscaling approach has been recently designed to build a robust synergy between the observations, thus providing a new ensemble of pseudo-observations. This original dataset will be used to look at the atmospheric water cycle with new perspectives, such as the occurrence of extreme events, the scales of co-variability of water/clouds/rain over the tropical belt, the organisation of clouds (the so-called “iris hypothesis” or the aggregation of cloudy cells), etc.

Description of post-doc work:

The post-doc fellow will analyse the relationships between different observing systems of the tropical atmosphere: A-Train constellation (CALIOP/Calipso; CPR/CloudSat; CERES/Aqua), Megha-Tropiques satellite (SAPHIR, ScaRaB) and the newly launched Aladin/ADM-Aeolus satellite. In particular, he/she will focus on the physical analysis of the newly-merged observational dataset to deepen our process-based understanding of the tropical atmosphere. The work will specifically consist in:

- Handling the statistical downscaling method (iterative Quantile Random-Forest) already developed for the merging of relative humidity (SAPHIR) and cloud profiles (CALIOP/Calipso), and add a precipitation information (CPR/CloudSat);
- Evaluating this scaled dataset with in-situ references obtained from field campaigns (e.g. NARVAL 1 & 2: airborne water vapor lidar; HS3: dropsondes);
- Analysing the water vapor/clouds/rain relationships and their scales of variability;
- Collaborating with LATMOS & LSCE engineers and researchers for the data processing over the period 2012-present;
- Collaborating on adjustments of the approach to meet the scientific needs of the other scientific questions within the project;
- Communicating the results through international conferences and at least one scientific article in a peer review journal.

Start, duration and salary: The post-doctorate fellow will be hired by the Université de

Versailles-Saint-Quentin (UVSQ) for 15 months with a net monthly salary around 2 000 euros (including social services and health insurance), commensurate with experience. The work will start as soon as possible in 2019.

Required experience: a PhD is required, preferably in remote sensing, atmospheric or climate sciences, with an experience in statistical analysis and statistical theory. Ease in using UNIX, shell scripting, and other programming languages (ideally R) is necessary, as well as being able to work in teams.

Contact for applications: Applications should be submitted by e-mail to H. Brogniez (helene.brogniez@latmos.ipsl.fr), M. Vrac (mathieu.vrac@lsce.ipsl.fr), and H. Chepfer (helene.chepfer@lmd.polytechnique.fr) as soon as possible and must include

- a CV
- a statement of research interests
- the names of at least two references including e-mail addresses and telephone numbers.

Related teams:

- Statistique Processus Aérosols Cycle de l'Eau (SPACE at LATMOS):
<http://www.latmos.ipsl.fr/index.php/en/space>
- Extremes – Statistics – Impacts – Regionalization (ESTIMR at LSCE):
http://www.lsce.ipsl.fr/en/Phocea/Vie_des_labos/Ast/ast_groupe.php?id_groupe=56
- Dynamique et physique de l'atmosphère et des océans (DPAO at LMD):
<http://www.lmd.jussieu.fr/recherche/equipes/equipe-dpao>