UNIVERSITÉ DE LA RÉUNION

PhD Position at Laboratoire de l'Atmosphère et des Cyclones (LACy) University of La Reunion, Saint-Denis, France

We invite you to apply for a PhD position on exploring the climate-altering potential of biomass burning aerosols from wildfire origin on the regional climate in the South West Indian Ocean.

Job description

Scientific context. At the scale of the planet, the Indian Ocean region is a rather clean area, often assumed to have a quasi-pristine atmosphere during certain periods of the year (Duflot et al., 2011). In this region, Duflot et al. (2022) demonstrated that one aerosol type, namely biomass burning, was responsible for two thirds of the aerosol optical depth (AOD) variability, and that, over all aerosol classes, the AOD in Reunion Island in the South West Indian Ocean (SWIO) had an increasing trend of +0.02 per decade. The main aerosol type responsible of that increase is yet to be investigated. The SWIO is also a crossroad of biomass burning aerosol transport from African, South American and Australian wildfire origin (Bègue et al., 2023; Duflot et al., 2022). Recently, and probably linked to the expansion of global drylands under a warming climate, unprecedently strong extreme bushfires have occurred in the Southern hemisphere (Khaykin et al., 2020; Bègue et al., 2021, 2023).

Objectives. This thesis project pretends to explore the climate-altering potential of biomass burning aerosols from wildfire origin on the regional climate in the South West Indian Ocean. The smoke belt (South America, Africa and Australia) is the targeted emission source. The thesis should bring light to the following scientific questions:

- Is the aerosol impact on regional climate in the SWIO driven by biomass burning aerosols?
- How comparable is this impact w.r.t. GHG climate impact?
- What is the impact at the regional scale?

Methodology. The thesis will be divided into 3 distinct parts where different methodologies will be applied:

- Mapping the occurrence, power, burnt matter, flaming phase, location and life time of all wildfires in the southern hemisphere reaching Reunion Island; classification; climatology; trends (if dataset is large enough).
- Mechanism analysis: injection schemes (Hysplit) vs. injection heights (FLEXPART); aerosol composition (pure black carbon (BC); BC cores coated in absorbing matter = brown carbon; BC cores coated in non-absorbing matter) and optical/radiative properties (in-situ and remote sensing at Maïdo); evolution during transport.
- Calculation of the radiative effect locally, and possibly at the scale of the SWIO. Effect of BB composition and transformation on its radiative effect.

The site of LACy/OPAR (Laboratoire de l'Atmosphère et des Cyclones / Observatoire de Physique de l'Atmosphère de la Réunion) is unique and ideally located in the South West of the Indian Ocean (SWIO). It also operates all the instrumentation necessary, i.e. in-situ and remote sensing, to pursue the local observations described in the thesis project.

The thesis is funded by the European project REALISTIC (centre of Excellence in AerosoL remote rensIng technology and Science in The Indian oCean, GA 101086690) of the Horizon Europe program (https://lacy.univ-reunion.fr/activites/programmes-de-recherche /realistic). It will be supervised by Michaël Sicard (ERA Chair of REALISTIC) and Nelson Bègue (REALISTIC researcher).

Requirements

Knowledge:

- Possess a scientific master's degree (or equivalent)
- Proficiency in research English (oral and written)

- Knowledge on atmospheric sciences, geophysics
- Previous professional experience in one of these fields would be a plus
- Knowledge and willingness to run a regional climate model would be a serious plus

Expertise:

- Practical experience of programming language such as Matlab, Python, etc.
- Autonomous and independent work
- Able to work in small teams
- Short and concise reports

Know-how:

- Intellectual rigor
- Self-criticism of his/her results
- Strong taste for thinking and research
- Responsivity to react under strong time constraints
- Oral and writing ease
- Sense of initiative

Conditions of employment

Doctoral candidates will be offered a 3-year period of employment.
Salary and benefits are in accordance with the conditions of the REALISTIC project. The salary will be 1787 € gross per month – with a potential monthly complement that is currently under negotiation with the University. As a PhD candidate you will be enrolled in the University of La Reunion Graduate School. The University of La Reunion Graduate School provides an inspiring research environment with an excellent team of supervisors, academic staff and mentor. The Doctoral Education Programme is aimed at developing your transferable, discipline-related and research skills.
The recruitment of the candidate will strictly follow the European Charter for Researchers - The Code of Conduct for the Recruitment of Researchers (ISBN 92-894-9311-9). In particular the precruitment process and the contractual employment will be carried out taking into account all aspects related to recognition of the profession, non-discrimination, research environment, working conditions, stability and permanence of employment, funding and salaries, gender balance, career development, access to mobility, and research training, intellectual property rights, co-authorship, supervision and teaching.

The University of La Reunion

The University of Reunion Island (Université de la Réunion) is a French university in the Academy of Réunion. It is the first and only European university in the Indian Ocean. Established in 1982, it has grown steadily over the years in terms of student population, geographical sites occupied, courses offered and partnerships forged with local, national and international institutions. The school's ambition is to be the reference university in Indian ocean.
The University is an equal opportunity employer and is committed to providing a workplace free from all forms of unlawful discrimination, harassment, bullying, vilification and victimization. The University is committed to all aspects of equal opportunity, diversity and inclusion in the workplace and to providing all staff, students, contractors, honorary appointees, volunteers and visitors with a safe, respectful and rewarding environment free from all forms of unlawful discrimination, harassment, vilification and victimization. The University values diversity because it recognizes that the differences in people's age, race, ethnicity, culture, gender, nationality, sexual orientation, physical ability and background bring richness to its work environment.

Laboratoire de l'Atmosphphère et des Cyclones (LACy)

The LACy is a joint research unit between CNRS, Meteo-France and University de La Réunion dedicated to the study of physical processes governing the tropical atmosphere. LACy has notably initiated the creation of the Maido atmospheric observatory, part of the Observatory of Atmospheric Physics of La

Réunion (OPAR), which hosts various instruments for atmospheric measurements, including lidar systems, cloud radar, spectro-radiometers and in situ gas and aerosol measurements, among others. The lab currently has 22 permanent staff (researchers, engineers, faculty members) and about 10 students.

REALISTIC

The candidate will join the REALISTIC team, composed of 3 researchers, 1 PhD, 1 Post-doctoral fellow, 1 Research Engineer and 1 Project Manager.

The overarching goal of REALISTIC is to develop a Centre of Excellence in aerosol remote sensing technology and science in the Indian Ocean, through the creation of a Chair, with La Réunion, a European Outermost region, as a strategic pivot point of the European Research Area. REALISTIC aims at attracting and maintaining a high-profile researcher (ERA Chair holder, Michaël Sicard) to lead a high-profile supporting team with excellent research and technical capabilities in the aerosol remote sensing domain. In particular, specific applications and research endeavours will be conducted in the area of quantifying the impact of wildfire and volcanic emissions on the tropical atmosphere composition and on the Earth-Atmosphere radiative balance. REALISTIC is designed to catalyse and maximise the impact of the ERA Chair in order to raise the research, technical and innovation excellence of the LACy, OPAR, the Observatory of the Universe Sciences of La Réunion (OSU-R), and the University of La Réunion (UR) to a level that makes them unique and essential references in the local R&I ecosystem, at the Indian Ocean-level as well as to the overall international community, and thus filling the R&I gap on atmospheric systems. REALISTIC will contribute to better integrate UR within the European Research Area, and better align with European standards and priorities.

Additional information

For additional information on the position and the application process, please contact Michaël Sicard (michael.sicard@univ-reunion.fr) and Nelson Bègue (nelson.begue@univ-reunion.fr).

Application procedure

Are you interested in this vacancy? Please apply as soon as possible by sending your application to Michaël Sicard (michael.sicard@univ-reunion.fr) and Nelson Bègue (nelson.begue@univ-reunion.fr). The application should contain:

- Letter of motivation
- Detailed CV
- List of grades/transcripts (bachelor and master)
- Contact information of 2 references
- If already available: your master thesis.

Please note:

- Please do not contact us for unsolicited services.