MISSION

Functions :	Research engineer / post-doctoral fellow in the framework of the project entitled “HydrES: Hydrological and socio-economic risks linked to Extreme rainfall in Reunion Island” financed by the 2023 Call for Expressions of Interest (P.O. FEDER / INTERREG VI 2021/2027)
Job Description	
Catégory : **Corps :**	A Fixed-term contract agent Recruitment at the level: Research Engineer (Post-doctoral)
Affectation	
Administrative : **Quotité de travail** **Géographique :**	University of Reunion Island / Unit: LACy (Atmosphere and Cyclone Laboratory) Full time Saint-Denis, La Réunion (French Department in Indian Ocean)
Condition du contrat	
Starting date: **Length :** **Financing :**	March 1, 2026 at the earliest 24 mois FEDER VI et Contreparties nationales PO 2021/2027 Net Monthly Salary : ~ 2.450 €
Missions	

Research context :

Tropical cyclones (TCs) rank among the most devastating natural hazards, not only because of their intense winds but also due to storm surge, ocean waves, and the heavy rainfall they produce. These rainfalls can lead to catastrophic flooding, even far from the cyclone's core, as illustrated by TC Belal. Although Belal (2024) passed near La Réunion Island, torrential rains occurred not only over Réunion but also in Mauritius, located about 200 km away.
To date, assessments of TCs using numerical models have primarily focused on intensity-related variables (i.e., wind speed and central pressure), while rainfall remains a critical yet less predictable hazard. Numerous studies (Lin et al., 2015; Huang et al., 2025; Yang and

Toumi, 2025) have demonstrated that the distribution and intensity of TC-related precipitation are modulated at different scales by sea surface temperature (SST). Locally, SSTs influence surface enthalpy fluxes, which in turn affect moisture availability within the atmospheric boundary layer, creating either favorable or unfavorable conditions for precipitation development. At a larger scale, precipitation distribution is not homogeneous. A substantial fraction of TC rainfall is organized into spiral-shaped convective bands known as rainbands. These structures are commonly divided into inner rainbands, closer to the eyewall, and outer rainbands, which can extend far from the cyclone center and propagate both radially and azimuthally. While the precise mechanisms governing the formation of outer rainbands remain debated (Emanuel 2018), the literature converges on the idea that their behavior and intensification are closely tied to environmental factors such as atmospheric stability and SST gradients (Xu et al., 2014; Moon and Nolan, 2015; Ji et al, 2025). Accurately capturing processes that control SST variability (e.g., ocean surface cooling induced by TCs and vertical oceanic motion) through coupled ocean–atmosphere modeling is thus crucial to improving the realism of simulated precipitation patterns.
In the framework of the HydrES project, the objectives of this two-year postdoctoral research mission are threefold. First, to assess the role of ocean–atmosphere coupling in the representation of TC-induced torrential rainfall, both in terms of spatial distribution and intensity. Second, to provide a pysical understanding of the dynamics of outer rainbands and how air–sea interactions modulate these. Finally, to define and propose a new index characterizing TC intensity based on rainfall properties, offering a complementary perspective to traditional wind- and pressure-based indices.
Tropical Cyclone Belal serves as an excellent case study for this research. First, it produced intense rainfall over Reunion Island. Second, it passed very close to La Réunion Island and also generated a broad, active outer rainband that affected Mauritius, providing an ideal opportunity to use observational radar data to characterize the associated precipitation. This event will be analyzed using both state-of-the-art coupled ocean–atmosphere modeling and observational data from ground-based and satellite platforms. Numerical simulations will be carried out beforehand using two coupled French community models: Meso-NH (for the atmosphere) and CROCO (for the ocean).
Candidates should hold a PhD in meteorology, oceanography, or a closely related field. They must have experience working with large datasets and be proficient in analyzing numerical model outputs. A solid command of the Python programming language, particularly in a Linux environment, is essential. Prior experience with regional numerical modeling will be considered an asset. Strong English writing skills are expected, particularly at a level appropriate for scientific publications. The ability to work collaboratively within a research team is also essential for this position.

Corresponding Assigned Activities :

As part of the project entitled "HydrES: Hydrological and Socioeconomic Risks Associated with Extreme Rainfall in Reunion Island," selected under the FEDER VI 2023 AMI funded by the FEDER/INTERREG 2021/2027 OP, you are recruited within the LACy unit for a period of 24 months as a research engineer to provide technical support to the project under the supervision of Ms. Hélène VEREMES, project co-leader for LACy.

In this context, you will be assigned the following tasks and actions : Action 2 “Intense Precipitation: A Major Hazard for Reunion Island”

You will contribute to Action 2 by completing the following tasks:
● Conducting coupled ocean-atmosphere (O-A) simulations using numerical models (tools mastered at LACy)
● Characterizing extreme precipitation events (intense rainstorm systems and tropical cyclones) through their precipitation field
● Assessing the contribution of a better representation of the ocean (i.e., O-A coupling) to the representation of rainfall associated with EPEs, particularly spiral bands and heavy rainfall within the eyewall
● Understanding the dynamics of spiral bands in tropical cyclones: the relationship between cyclone intensity and the organization of spiral bands and The intensity of

associated precipitation
● Comparison/validation of numerical simulations on case studies with satellite and radar observations
Forecastingly, you will be required to allocate 100% of your working time to this Action 2.

At the end of your assignment, you will be required to submit your work to Ms. Hélène VEREMES, the project co-leader, in the form of data from the numerical simulations and a scientific report.

Special working conditions:

As part of your assignment within the "HydrES: Hydrological and Socioeconomic Risks Associated with Extreme Rainfall in Reunion Island" project, you must report your activities monthly to the project leader using the SINCHRO application.

In the event of a significant variation in your working hours compared to the aforementioned forecast, you must promptly notify your line manager and the project leader.

You must strictly respect the confidentiality of the work to which you contribute or become aware within the unit.

To successfully complete your assignment, you will have access to the following laboratory equipment:

● Computer workstation
● Access to numerical computing resources
● Access to bibliographic resources

Application

Contact:	clement.soufflet@univ-reunion.fr
Application material :	Curriculum Vitae and Motivation Letter To be sent to « recrutement-biatss@univ-reunion.fr » And clement.soufflet@univ-reunion.fr ; keunok.lee@univ-reunion.fr remi.laxenaire@univ-reunion.fr
Deadline	Deadline to apply : December 31, 2025, 11:59 pm (GMT +4)