2-Yr Postdoc position at the Institute of Research for Development (IRD) and Meteo-France on Regional Climate Simulations in the South Pacific

The CLIPSSA 2021-2024 project.

CLIPSSA (Climate of the Pacific, local knowledge and adaptation strategies) is a joint project developed by IRD (Institut de Recherche pour le Développement, https://en.ird.fr/), Météo-France (the French Meteorological Service) and AFD (Agence Française de Développement: https://www.afd.fr/en).

It aims at accompanying Vanuatu, New Caledonia, Wallis-and-Futuna and French Polynesia, in drafting adaption plans against climate change threats.

First, the project aims at building reliable estimates of the South Pacific regional future climates, at scales ranging from those of the South Pacific Convergence Zone to synoptic scales (e.g. tropical cyclones). Second, it aims at better understanding the fate of local climates for the targeted countries. Third, the project aims at providing key information on a few climate-related sectorial impacts as prioritized by these countries and territories. These three aspects are all necessary steps towards a better appropriation of the future of the South Pacific climates and societal impacts by the population and local authorities, in support of their national/local adaptation plans.

Scientific background of the opened position.

The South Pacific is made of a myriad of islands. Pacific island countries and territories (PICTs) are highly vulnerable to the effects of climate variability and longer-term changes. Even more than large and developed countries, these islands are highly vulnerable to the amount of precipitation that will dictate their water resources and they are deeply affected by a number of meteorological events ranging from extreme events (e.g. cyclones, heat waves, heavy rains) to the impacts of large-scale phenomena such as ENSO (El Niño Southern Oscillation). All of these can cause major social, economic and ecological damage on land and in lagoons and on their ecosystems as many of the island countries' resources depend on their coral ecosystems. Indeed, that region is also the region of the world where the coral reef area is the largest, with, for example, New Caledonia's lagoon, which is one of the largest lagoon in the world, listed as a UNESCO World Heritage Site.

Most of these phenomena are related to one of the most important convection zones on the planet, the South Pacific Convergence Zone (SPCZ). Its functioning, governed by complex interactions between the ocean and the atmosphere, is still poorly understood (e.g Brown et al., 2020; Dutheil et al., 2019). It is therefore not surprising to note that global climate simulations used as a basis for the IPCC reports on climate change display strong disparities in their SPCZ representation, that result on large uncertainties on its future evolution. These disparities are strongly related to common basin-scale biases in climate models, such as the so-called “cold and dry bias” in the central-eastern equatorial Pacific. Additional uncertainties also result from the coarse-resolution of climate models, which cannot resolve all the relevant scales (e.g tropical cyclones). The robustness of regional climate projections with respect to such biases hence needs to be evaluated.

These biases in climate model strongly impact the projection of the future evolution of key phenomena such as the El Niño/Southern Oscillation (Cai et al., 2020) but also of other climate phenomena such as extremes (e.g cyclones, heat waves, heavy rainfall, etc.). For instance, while it is

accepted that the frequency of cyclones will decrease in the region (with low confidence however), the rate of this decrease is however still unclear (Chand et al., 2019; Dutheil et al., 2020; Walsh et al., 2019). Other extremes such as heat waves and temperature records are likely to increase in the future (Power and Delage, 2019) but research is still needed to reliably quantify the magnitude of these changes in the future on a regional scale. All the uncertainties mentioned above raise the question of the reliability of climate projections in the South Pacific and at the island scales. Hence, the need for further research to understand if and how climate models biases can be somehow corrected in the region to better assess the sources of uncertainties in the South Pacific future climate at a regional and island level.

Postdoc specificities.

The CLIPSSA project offers a 2-year postdoc position starting mid-2021, to better quantify, understand and correct some of the major uncertainties in simulating the future of the South Pacific regional climate. The work should provide

- Future climate simulations for the South Pacific for the next 100 years by dynamical downscaling using the regional atmospheric model ALADIN (Nabat et al., 2020) with a number of CMIP6-derived boundaries and or multi-model ensembles means, in 3 SSP scenarii, 126, 370, 585 and 245 if time permits.
- Analyze the fate of the Pacific climate in terms of heat waves, rainfall, droughts and cyclonic activity, SPCZ, ENSO etc. with particular emphasis on the regions encompassing targeted countries such as New Caledonia, Vanuatu, French Polynesia and Wallis-and-Futuna
- Give insights on how the numerous uncertainties (e.g., boundary conditions from global climate models, internal variability, model parameterizations and grids, etc.) impact key regional climate features such as the SPCZ dynamics and its extremes, and which aspects can be corrected and better assessed.

The simulations produced, with an assessment of their limitations under SSPs will then be used by a second postdoc to downscale the climates at the targeted island scales and will be used by other postdocs in impact models.

Working conditions and financial conditions

The candidate will spend part of its time at Météo-France, Toulouse-France where the simulations will be produced. He/she will also spend time at IRD and Météo-France in New Caledonia with the project partners and connected with partners from the Secretariat of the Pacific Regional Environment Programme (SPREP, www.sprep.org), where the data will also be stored and processed for a database from which the PICTs can extract useful information regarding their adaptation and mitigation plans against climate change threats.

Given the sanitary situation, collaborations with the distant partners and missions will be adapted accordingly.

The salary will range between 2,500 and 3,500€ before tax deduction, depending on the candidate experience. Travels between partners and countries are provided as well as participations to key national and international conferences.

Candidate requirements and applications

The position is opened until May 15th 2021.

The candidate should have a good knowledge of spoken and written English

The candidate should have a PhD in climate sciences, preferentially in meteorology. Experience with regional climate modeling and climate issues and models are appreciated. Candidates are expected to send a detailed CV as well as a motivation letter emphasizing the work aspects that he/she would like to particularly develop within the modeling framework described above. Those should be sent to

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