

**Postdoctoral position**  
(LOA: Laboratoire d'optique atmosphérique, Université de Lille)

## **South Indian marine aerosol-cloud interactions and coupling with ocean-atmosphere phenomena like ENSO, IOD, and large scale circulation of the MJO**

**Adviser:** Dr. Olivier Pujol (LOA)

**Co-adviser:** Dr. Jérôme Brioude (CIRES,USA /LACy), Dr. Stéphanie Évan (CNRS/LACy)

### **Context and scientific question**

The natural interplay between ocean, marine aerosols and clouds is still poorly understood while it might have a significant radiative impact in a changing climate. Indeed, small variations in aerosol concentration in pristine regions may have a large effect on clouds. According to recent studies, an increase in aerosol burden (especially at low concentration) can invigorate warm convective clouds [1], [2], [3]. The South Indian Ocean is a region where such an invigoration can be observed [1]. This region, poorly documented, presents the great advantage to be not impacted by terrestrial aerosol emissions so that the aerosol source origin is purely marine. *The proposed postdoctoral position concerns the coupling between ocean, marine aerosol and clouds.* This is an original scientific question for which the scientific community starts to put focus on. Precisely, how can the ocean-atmosphere thermodynamic parameters and the presence of marine aerosols impact convection in the Southern Indian Ocean ? Which hypotheses can be formulated about the most important physical mechanisms?

### **Methodology**

The candidate will investigate marine aerosol-cloud interactions and their relationship with coupled ocean-atmosphere phenomena such as ENSO and IOD as well as the large scale circulation of the MJO. The methodology will be based on all the available data of the thermodynamic state of the atmosphere and ocean, and aerosols and clouds distribution properties. Aerosol data from POLDER satellite, and cloud and precipitation data from TRMM, CLOUDSAT, and METEOSAT 7 will be used. Parameters describing the ocean and atmosphere state (salinity, sea surface temperature, temperature, wind) will be obtained from ECMWF reanalysis or satellite data.

The candidate will focus on applying different statistical methods on the dataset in order to identify the mechanisms implied in the ocean/marine aerosol/convection interactions. The candidate will collaborate with researchers at LOA and LACy laboratories.

### **Qualifications for the position**

- PhD in geoscience - Experience with manipulating and analyzing geophysical data
- Programming skills in Python, Matlab (or Scilab), Fortran or C++
- A very good knowledge in scientific speaking and written english is required.
- No specific french speaking level is required.

### **Contact**

The position duration is 12 months. The net monthly salary is around 2000 euros, commensurate with experience. This includes social services and health insurance.

The applicants need to send a detailed CV, a letter of motivation and the email address of two referees to Dr. Olivier Pujol (LOA, MCF HDR): [olivier.pujol@univ-lille1.fr](mailto:olivier.pujol@univ-lille1.fr)

[1] Koren et al. 2014: From aerosol-limited to invigoration of warm convective clouds. Science Reports, 344.  
[2] Rosenfeld et al., 2014: Climate Effects of Aerosol-Cloud Interactions. Science, 343.  
[3] Tao et al., 2012: Impact of aerosols on convective clouds and precipitation. Rev. Geophys., 50