**Job description**

**Typical occupation or job: Post-doctoral researcher on atmospheric data analysis**

**Job type: Researcher**

**Category: A**
**Body: Researcher**

*The activities that make up the job description are subject to change in line with knowledge of the profession and service requirements.*

## Presentation of Sorbonne University

Sorbonne University is a multidisciplinary, research-intensive university. Continuing the Sorbonne's humanist tradition, it is committed to meeting the scientific challenges of the 21st century and passing on the knowledge generated by its laboratories and research teams to its students and to society as a whole.

It provides training for 54,000 students, including 4,700 doctoral students and 10,200 international students, and employs 6,300 teachers, teacher-researchers, researchers and 4,900 library, administrative, technical, social and health staff. Its budget is €670m.

Sorbonne Université, mainly located in the heart of Paris, has first-rate potential and is extending its presence to more than twenty sites in the Ile-de-France region and beyond.

Sorbonne Université has an original organisation with three faculties - Arts, Medicine and Science and Engineering - which have considerable autonomy to implement the university's strategy within their own boundaries on the basis of a contract of objectives and resources. University governance focuses on promoting the university's strategy, steering its activities, developing partnerships and diversifying its resources**.**

Within Sorbonne University, the Faculty of Science and Engineering covers a wide range of scientific disciplines.

It comprises 79 research laboratories, 22 training departments and 6 UFR (Unité de Formation et de Recherche) in chemistry, engineering, mathematics, physics, life sciences and Earth, Environment and Biodiversity. It also includes the École Polytechnique universitaire - Polytech Sorbonne -, the Institut d'Astrophysique de Paris, the Institut Henri Poincaré, and three marine stations located in Banyuls-sur-Mer, Roscoff and Villefranche-sur-Mer, the latter three having, with the ECCE-TERRA structure, the status of observatories for the sciences of the Universe.

It is home to 20,800 students, including 2,700 doctoral students, and has 4,800 staff - teachers, lecturers, researchers and 3,252 administrative and technical staff.

## Presentation of the structure

**This position is available in the Faculty of Science and Engineering - http://sciences.sorbonne-universite.fr**

**Location (Department) : IPSL-SIRTA**

The IPSL, Institut Pierre Simon Laplace (https://www.ipsl.fr/en/home-en/) brings together the expertise of 8 laboratories and 2 associated teams whose specialities concern one or more specific aspects of climate and environmental sciences and the exploration of the solar system. Nearly 1,500 people (researchers and teacher-researchers, engineers, technicians and administrative staff, doctoral students, post-doctoral students and trainees) are spread over ten sites in the Paris region.

The SIRTA observatory (Site instrumenté pour la recherche en télédétection atmosphérique, http://sirta.ipsl.fr/) is a French national observatory dedicated to the study of clouds, aerosols, dynamics and thermodynamics in the boundary layer and free troposphere. The SIRTA observatory is a mid-latitude site (48.7 N, 2.2 E) located in a semi-urban area on the Saclay plateau, 25 km south of Paris [Haeffelin et al. 2005], where 150 instruments are installed. In particular, we have a multi-wavelength Raman backscatter lidar, developed jointly by several manufacturers and deployed for several years at SIRTA (https://sirta.ipsl.fr/), which enables us to observe and reproduce the optical properties of particles in the troposphere. The IPRAL Lidar emits a laser beam at three wavelengths in the UV, visible and near infrared, the photons of which interact with the particles present in the atmosphere and are backscattered and collected by telescopes, enabling the quantity of backscattered light to be quantified using detectors. This backscatter depends on the type of particles, their concentration and the wavelength.

The proposed work is funded by the Climaviation project, which is an ambitious research initiative to understand and quantify

the climatic impacts of aviation (https://climaviation.fr/en/ ).

Its aim is to integrate various techniques and methods for analysing data from the IPRAL multi-wavelength lidar installed at SIRTA since 2015 to (1) restore macro and microphysical products of natural or anthropogenic high-altitude clouds and (2) water vapour profiles between the surface and altitude of high clouds.

## Main tasks and activities

This work will be based on the analysis of multiple sources of observations:

- Active remote sensing measurements produced by the IPRAL lidar: backscatter profiles at 355, 532 and 1064nm, depolarisation and extinction profiles;
- Active remote sensing measurements produced by the CHM15K rangefinder: backscatter profiles at 1064nm;
- Thermodynamic profiles produced by the Trappes radiosondes: in-situ temperature, humidity and wind profiles;
- Total sky images produced by the sky-imagers installed at SIRTA: fine localisation of condensation trails;

This strong instrumental synergy gives us the opportunity to better document and characterise the heterogeneities on very fine spatio-temporal scales of contrails and their immediate environment.

- Initially, we will focus on reconstructing the base and top altitudes of contrails, their optical thickness and cloud extinction profiles over a significant set of situations of the order of a few dozen. The idea will be to have situations that are synchronous with satellite measurements and to associate an uncertainty with each macro-physical and optical product.
- Secondly, the Raman profiles from the IPRAL lidar will be used to produce water vapour profiles. An assessment will be carried out using the Trappes radiosondes.
- Thirdly, the techniques for reconstructing the microphysical properties of the contrails will be optimised to increase temporal resolution and, if possible, achieve 30-second resolution in order to document the strong spatial and temporal heterogeneity of these condensation trails.

The work should result in at least one peer-reviewed scientific publication each year.

**Project management:** Not planned
**Supervision:** Not planned

*As part of their duties, they may be required to share their knowledge, run in-house training courses and take part in competitions as a member of a selection board.*

## Knowledge and skills

**Knowledge**

- PhD in atmospheric physics
- Knowledge of the Python computer language and scientific libraries
- Knowledge of cloud physics, atmospheric remote sensing and in-situ measurement instruments
- Experience in analysing remote sensing data (lidar, radar, radiometer) appreciated

**Skills:**

- Excellent drafting of scientific articles in English
- Good oral communication skills

**People skills:**

- Scientific rigour
- Excellent autonomy
- Attractive and able to work in a team

## Exposure to professional risks and special working conditions

**Exposure to occupational risks:** No

**Special working conditions:** No

## Additional information

**Work place :** Palaiseau, Essonne (91), France

**Type of contract:** 12 month fixed-term contract (with the possibility of a further 12-month extension)

**Gross monthly salary:** Depending on experience, starting at 36k€ gross per year

**Desired start date:** 1st November 2023

To apply, send a CV, including a list of scientific publications, and a detailed covering letter stating your interest in the proposed research project to Jean-Charles Dupont, jean-charles.dupont@ipsl.fr .

**In accordance with the appendix to the order of 18 March 2013 (NOR: MENH1305559A).*