

Job description

Typical occupation or job: Post-doctoral researcher on the impact of future aircraft emissions on climate

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>

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 proposed work is funded by the Climaviation project (<https://www.climaviation.fr/en/>), a partnership between Sorbonne University and the French Aerospace Lab (ONERA), funded by the Direction Générale de l'Aviation Civile (DGAC). This project aims to improve the scientific understanding of the climate impacts of aviation. The objectives of the project are: 1) To better quantify the climatic impacts of aviation, in particular the non-CO2 impacts of contrails, aerosol cloud interactions and atmospheric chemistry, 2) To evaluate the impacts linked to new fuels such as synthetic hydrocarbons or hydrogen, 3) To propose solutions to minimise these climate impacts.

Main tasks and activities

Aviation exerts a relatively well quantified forcing of climate through CO₂ emissions. In addition, aviation also exerts a potentially stronger but more uncertain radiative forcing through changes in atmospheric chemistry, aerosols and clouds. Aviation has the triple challenge of (1) decarbonising, (2) achieving net-zero CO₂ without increasing non-CO₂ effects, and (3) eliminating these non-CO₂ effects. These last two points imply a reduction in uncertainty on non-CO₂ forcing through a better understanding of the relevant physical and chemical mechanisms, and a better representation of these mechanisms in climate models based on realistic future aviation scenarios. It is with this objective that the French Directorate General of Civil Aviation of the Ministry of Ecological Transition is funding the multi-annual Climaviation project (<https://www.climaviation.fr/en>).

We are proposing a grant-funded position to a person to be involved in research activities in our team in the framework of this Climaviation project. The successful candidate will participate to the development of the OSCAR-Aviation compact Earth System Climate Change Model (ESCCM) built in Python to investigate the impact of the aviation sector on climate. The OSCAR model is a compact coupled biogeochemical cycles and climate change model that calculates the global concentration and time evolution of CO₂, CH₄, N₂O, halogenated compounds, tropospheric ozone and aerosols by balancing their historical anthropogenic emissions against their removal from the atmosphere. OSCAR is a meta-model whose modules are designed to emulate the behaviour of a more specialized model: the representation of the key processes including the model climate sensitivity are all calibrated against more complex models.

The candidate will:

- Adapt OSCAR to the aviation sector and include the various climate impact of aviation based on the results of the LMDZ(-INCA) complex climate model with chemistry and aerosols used in our institute.
- Determine the future time evolution of the aviation climate impact based on various scenarios for aircraft emissions
- Investigate the sensitivity of the results to key parameters considered for decarbonising aviation in order to provide guidance on future option for a sustainable aviation.

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 degree in physics, chemistry, environmental sciences or equivalent
- Concrete and meaningful skills in numerical modelling (programming in Python, work on LINUX systems, handling of large computer programs and datasets)
- Experience with large-scale modelling of climate and/or atmospheric composition is desirable

Skills:

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

People skills:

- Scientific rigour
- Excellent autonomy
- Ability 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: The position will be based at Laboratoire des Sciences du Climat et de l'Environnement (LSCE) in Gif-sur-Yvette (25 km SW of Paris), France and at Sorbonne University, Jussieu campus, Paris 5th arrondissement.

Type of contract: 24 month fixed-term contract

Gross monthly salary: Depend on previous work experience and includes full social and health benefits

Desired start date: 1st November 2023

To apply, please send a motivation letter and a CV to Nicolas Bellouin (nicolas.bellouin@ipsl.fr) and Didier Hauglustaine (didier.hauglustaine@lsce.ipsl.fr).

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