

Young scientist position at LSCE

Inverse modeling of global NO₂, SO₂ and NH₃ emissions using satellite observations

The Laboratoire des Sciences du Climat et de l'Environnement (LSCE) is looking for a motivated postdoc / young scientist candidate for the ESA funded WOREM project aiming to produce new estimates of global emissions of greenhouse gases and pollutants

Job description

Nitrogen and sulfur dioxide, NO₂ and SO₂, are primary pollutants emitted by the combustion of fossil fuels and wildfires which impact climate, air quality and atmospheric chemistry. Ammonia (NH₃) is mainly emitted by agricultural activities, as well as industrial processes and wildfires. These species have a short lifetime in the atmosphere and produce nitrate and sulfate aerosols.

Satellite instruments like IASI/METOP and TROPOMI/Sentinel-5P measure the global column concentrations of these species over the entire globe on a daily basis. This job position aims to assimilate these observations into the global atmospheric chemistry transport model LMDZ INCA at a resolution of 1° globally to infer time varying emissions of these three key pollutants. The model calculates all atmospheric processes that control their chemical lifetime and atmospheric transport.

We propose to use a perturbation method where the LMDZ INCA model will be prescribed with varied a priori global emissions maps to calculate the local sensitivities of the concentrations of NO₂, SO₂ and NH₃ to surface emissions from fossil fuel burning, agriculture and wildfires, and use these sensitivities to invert emissions by matching IASI and TROPOMI observations. High profile publications are expected from the interpretation of emissions, and their changes during the COVID period.

The candidate is expected to build and test the inverse modeling system based on LMDZ INCA and produce periodical update of emissions. Engineering support will be provided by KAYRROS, a Paris-based fast-growing EO company. The research will be performed at LSCE in collaboration with Tsinghua University and key partners of the ESA-funded WOREM project, the Free University of Brussels and Max Planck Institute of Chemistry in Mainz, Germany, and Amsterdam University.

Requirements

- Programming skills, preferably in Fortran.
- Understanding and processing of satellite data and statistical analysis.
- Knowledge of atmospheric chemistry and transport modeling

Selection Criteria:

- PhD in atmospheric chemistry / aerosols modeling / inverse modelling
- Experience with using satellite observations
- Autonomy, ability to work in a team and time management skills.

- Skills for multidisciplinary team-based activities with the ability to effectively communicate with colleagues and with staff from the partners of the project.

What LSCE offer you:

LSCE is a world-class research laboratory established and a collaboration between CEA, CNRS and the University of Versailles Saint-Quentin (UVSQ). It is part of the Institute Pierre Simon Laplace (IPSL). LSCE hosts approximately 300 researchers, engineers and administrative staff including many PhD and master's students. LSCE will provide the employee with the opportunity to work directly on advanced methods with researchers from the LSCE and other institutions.

Location: (<https://www.lsce.ipsl.fr>) located about 20 km from the heart of Paris in the Orme des Merisiers green area.

The project will be performed in close collaboration with the team of Pr. Bo Zheng at Tsinghua University (<https://www.tsinghua.edu.cn/en/>)

Duration: Up to 24 months.

Starting date: The position is available from Jan 2021 and will remain open until filled.

Salary: Competitive with full social and health benefits, includes work experience.

Apply: Please submit an application package with (1) curriculum vitae including most important recent publications, (2) statement of motivation (3) answers to the selection criteria above (4) names, addresses, phone numbers, and email of at least two references.

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