Informations générales

Intitulé de l'offre : (M/F) : researcher : Modelling organic carbon in a context of climate change: how reliable are the models? (H/F)
URL publique de l'offre : /Offres/CDD/UMR7583-ISALAM-007/Default.aspx
Référence : UMR7583-ISALAM-007
Nombre de Postes : 1
Lieu de travail : CRETEIL
Date de publication : jeudi 22 octobre 2026
Type de contrat : Chercheur en contrat CDD
Durée du contrat : 15 mois
Date d'embauche prévue : 1 décembre 2026
Quotité de travail : Complet
Rémunération : 3131 euros gross per month
Niveau d'études souhaité : Doctorat
Expérience souhaitée : 1 à 4 années
Section(s) CN : 21 - Système Terre : enveloppes superficielles

Missions

Volatile organic compounds (VOCs) in the atmosphere have an impact on air quality and climate, and are precursors for the photochemical formation of secondary pollutants such as ozone and fine organic particles. The complex chemistry of VOC oxidation can be explicitly represented, with millions of reactions, in highly detailed chemical mechanisms generated with the LISA GECKO-A tool (https://geckoa.lisa.u-pec.fr). However, it is represented in a very simplified way, with a few hundred reactions, in the reduced chemical mechanisms commonly used in chemistry and transport models.

This post-doctoral project aims to assess the ability of reduced chemical mechanisms to represent concentrations of gaseous compounds, and in particular those of VOCs and radicals, in a context of climate change. The method will consist of comparing in a box model several reduced mechanisms (MELCHIOR, SAPRC-07, SAPRC-22) which are currently used in the chemistry and transport model CHIMERE (https://www.lmd.polytechnique.fr/chimere/) to an explicit reference mechanism generated by GECKO-A. The simulations will focus on France during the summer of 2022, which is characterized by several hot periods, and can thus be used as an analogue of a future climate. Discrepancies in the predictions of the mechanisms will be documented for ozone, nitrogen oxides and radicals, as well as for the reactivity of VOCs with respect to OH and NO3. This comparison is an essential step in the evaluation of chemistry and transport models.

Activités

- to carry out a state-of-the-art review of the representation of organic carbon chemistry in models;
- to integrate the MELCHIOR, SAPRC-07 and SAPRC-22 reduced chemical mechanisms into the GECKO-A box model;
- to carry out 0D simulations using the reduced mechanisms for the various measurement sites of the ACROSS and EMEP campaigns;
- carry out comparisons between reduced and explicit mechanisms and detailed measurements;
- select the most reliable reduced mechanism for representing the formation of secondary pollutants (ozone, particulate matter);
- present the results at ECLAT project meetings;
- disseminate the findings at international conferences and write scientific articles.

Compétences

- PhD in atmospheric sciences, environmental sciences, chemistry or related disciplines
- Experience in chemical modelling, ideally of atmospheric chemical composition
AND/OR experience in analysing VOC observation databases
- Excellent knowledge of scientific programming (R, Python, Fortran, etc.)
- Knowledge of the Linux environment is an advantage.
- Rigour, independence and scientific curiosity
- Initiative, the ability to synthesise information and critical analysis
- Good ability to work as part of a team
- Good writing and oral communication skills in English

Contexte de travail

The postdoctoral researcher will be based at LISA (Inter-University Laboratory for Atmospheric Systems – http://www.lisa.u-pec.fr), within the Modelling group. He/she will work, under the supervision of Marie Camredon (MCF UPEC/LISA) and Matthias Beekmann (DR CNRS/LISA). The postdoctoral researcher will benefit from LISA's extensive expertise in 0D modelling and explicit chemical mechanisms, with contributions to the supervisory team from, Richard Valorso (IR CNRS/LISA, co-developer of GECKO-A) and Bernard Aumont (PR UPEC/LISA), in addition to Marie Caredon, and in 3D modelling with the support of Guillaume Siour (IR/CNRS/LISA, head of the national CHIMERE tool) and Arineh Cholakian (IE/CNRS/LMD), in addition to Matthias Beekmann. The research will be carried out as part of the ADEME funded ECLAT project (Learning from Summer 2022: what will air quality be like in a future climate?).

Contraintes et risques

no risk or hassle

Further information
LISA (Inter-University Laboratory for Atmospheric Systems), UMR CNRS 7583, is a joint research unit of the University of Paris-Est Créteil, the University of Paris Cité and the CNRS. It forms part of the EFLUVE Observatory for Universe Sciences and the IPSL Research Federation. Its main areas of research focus on understanding the behaviour of terrestrial and planetary atmospheres, and the impacts associated with changes in atmospheric composition caused by human activities. The methods used are based on real-atmosphere observations, experimental laboratory simulations and numerical modelling.