RECRUTEMENT

Titre du poste/stage à pourvoir :

Post-doctoral position at IEES Paris and LSCE

Impact of urban environment on plant ecophysiology and BVOC emissions

Descriptif du poste (missions, activités, compétences, contexte) :

Scientific context

Urban policies of many large cities, like Paris, encourage greening projects for their ecosystem services. Indeed, in addition to favor our general 'well-being', vegetation and particularly trees in urban areas can contribute to heat reduction and acts as a support for pollution deposition. However, urban plants, are subjected to stresses that they are meant to alleviate. Moreover, through its emission of Biogenic Organic Volatile Compounds (BVOC), urban vegetation contributes to the formation of gaseous pollutants (such as O_3) and particulate matter (such as secondary organic aerosols, SOA). In Paris, a recent study performed in the framework of the Street project (https://street.cnrs.fr/) suggested an increase in ozone and organic aerosol, of up to 3.5% and 12% locally respectively, taking into account the VOCs (isoprene, terpenes) emitted by the trees in Paris (Maison et al., 2024, https://doi.org/10.1016/j.scitotenv.2024.174116). Plant BVOC emissions are strongly dependent on the environmental conditions. If the dependence with some environmental parameters (temperature, light) are well documented, the impact of some other stress (like drought) are still poorly understood, in particular under urban conditions.

In this context, the multidisciplinary InteGREEN project "Integrated urban services from greening strategies to improve city resilience " (PEPR Solutions pour la Ville Durable et Bâtiments Innovants) beginning in January 2025 aims to identify solutions for a resilient green city and their integration into urban policies. A multidisciplinary network will be developed to characterize urban ecosystem services and disservices provided by revegetation solutions and scenarios under resource-constrained conditions (e.g. water, space). Different vegetation strategies, based on case studies and scenarios will be evaluated according to their impacts on health and well-being (thermal stress, quality of air), social justice (social functions, vulnerability), and the management of infrastructure by the city (water and vegetation management, carbon footprint, biodiversity, food).

The proposed postdoctoral position is focusing on the experimental approach of InteGREEN in the domain of ecophysiology and air quality, which consists on the preparation and participation into one main field campaign. The field campaign will take place in June-July 2025 in a green space of Paris, including several "new" plant species, seen as representative of future planting scenarios, adapted to climate change and with optimal ecosystem services.

The candidate will be involved in two types of measurements, carried out by two different teams (iEES+LSCE): ecophysiological and chemical (with a focus on volatile organic compounds and air quality related compounds). Those measurements will consist in:

Ecophysiological measurements: (these parameters will be monitored until spring-summer 2026)

- Water status (water potential, stomatal conductance)
- Photosynthesis (carbon assimilation, chlorophyll fluorescence, pigments content)

Chemical measurements:

- Using dynamic chambers developed in the LSCE Chimie Atmosphérique Expérimentale (CAE) team, BVOC emissions (mainly isoprene and terpens) will be followed using a PTR-MS (Proton Transfer Mass Spectrometer) and a gas chromatograph (GC-FID) directly connected to the chambers. Daily fluctuations in BVOC emissions will be related to the variations in climatic parameters characterizing urban areas.

- The *in situ* characterization of the gaseous and particulate air composition, during a one month campaign (June-July 2025) over a urban site under BVOC influence in urban conditions, in order to assess the influence of the local biogenic source on the urban pollution, in particular on the SOA formation. Different Parisian sites are already foreseen. The focus of the post-doc work will be on VOCs measurements (PTRMS, GC-FID), but a small participation to some aerosols measurements will be possible.

In addition to the preparation (laboratory tests and organization) and the participation to the field campaigns in 2025, the candidate will be in charge of:

- the treatment of the obtained data and their computation into the experimental databases needed for the modeling tasks
- the complete interpretation of the obtained experimental results for their presentation in international workshops and publications
- co-supervision of Ms students

The candidate will be fully included in the Integreen consortium and will participate to the different meetings of the project (including academic institutes and stakeholders).

Requirements **Either Ph-D in atmospheric sciences**
Experience in experimental work and analytical chemistry, in particular Mass spectrometry and / or gas chromatography
Some biological skills appreciated
Some field work requires daily handling operations; a good physical condition will be useful

Or Ph-D in plant ecophysiology

Experience in ecophysiological measurements in field experiments (gas exchanges, chlorophyll fluorescence…) and data analyses.

Some chemical skills appreciated

According to the candidate's profile, the biological or chemical skills will be developed during the project.

Places of work

- Laboratoire des Sciences du Climat et de l'Environnement (LSCE)

Chimie Atmosphérique Expérimentale (CAE) team.

CEA Saclay, Orme des Merisiers, Bât 701/703 - 91191 Gif-s/-Yvette

- Institut d'Ecologie et des Sciences de l'Environnement de Paris (IEES Paris)

Site de l'Université Paris Est Créteil- 61 av. du Gal de Gaulle, 94010 Créteil cedex

Durée du contrat : Planned starting date: February 1st 2025 (latest March 2025)
Duration: between 18 and 24 months

Date limite pour postuler : 15 novembre 2024

Mots-clefs : Physiologie végétale, écophysiologie, chimie atmosphérique, émissions de COV plantes, urban stress,

Key-words: Plant physiology, ecophysiology, Atmosphere chemistry, plant VOC emissions, urban stress

Interlocuteur(s) pour cette offre (NOM, Prénom, Fonction) :

Send a letter motivating your interest and a detailed Curriculum Vitae to

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