

Measurements of spatially explicit surface-atmosphere fluxes in complex landscapes

Permanent researcher position of an experimental physicist @ INRAE, University Paris-Saclay, France

Lab: ECOSYS, INRAE, AGROPARISTECH, Université Paris-Saclay, 91120 Palaiseau, France

Web site : <https://ecosys.versailles-grignon.hub.inrae.fr>

Region: Ile-De-France

Assessing and predicting emissions and deposition of key compounds (greenhouse gases, ammonia, pesticides, volatile organic compounds) between the atmosphere and land surfaces in agricultural areas is key in the context of climate and land use change. Quantifying these fluxes in a spatially explicit way remains a challenge. The objectives of this profile are to develop **innovative experimental approaches for measuring spatially explicit surface-atmosphere fluxes and scale-dependent uncertainties**. These developments aim at validating continental surface models at the scales used to assess public policies.

You will develop **new approaches** for measuring spatially explicit fluxes. In particular, you may adapt the turbulent covariance methods for **tall towers, aircraft or drones**, and develop **LIDARs or scintillometers** flux measurements. You will **combine measurements** of fluxes, concentrations and forcing variables, **at several spatial resolutions in a landscape** (surface measurements, tall towers, airborne measurements, terrestrial and spatial remote sensing, georeferenced inventories), and **use surface and atmospheric transfer models to map surface fluxes**. You will have access to ICOS (climate) and ACTRIS (atmospheric chemistry) research infrastructures, as well as models developed by the laboratory and partners.

We are seeking an **experimentalist of atmospheric measurements**, with the ability to develop innovative methods based on surface-atmosphere fluxes. This will require strong **skills in complex data processing** (Python, Labview, or other programming), and ability to **combine spatially explicit measurements with geo-referenced data and models**.

You will carry out **observation campaigns in field conditions**, in France and abroad, sometimes requiring several weeks' travel. You will **work in close collaboration** with engineers, researchers and technicians from the lab and partner labs in France and abroad. You will be required to work at height (towers). A driving licence is recommended, and you may be required to pass the E driving licence to transport certain instruments in the field.

Studies and knowledge on biogeochemical cycles is desirable. Experience in measurement of gases or aerosols in the atmosphere and their fluxes or spatial variability is expected. The ability to design, implement or develop complex data acquisition and processing chains is expected. Experience in combining observation, surface models and geo-referenced data would be a plus.

The lab :

The lab is an INRAE-AgroParisTech, University Paris-Saclay lab, leading researches on biosphere-atmosphere fluxes of greenhouse gases (CO₂, N₂O) and reactive pollutants (NH₃, O₃, NO_x, VOC, PM, pesticides), and carbon and nitrogen cycles. The lab is leading the ecosystem French part of ICOS and has ongoing projects and strong relations with ACTRIS. The lab is equipped with state-of-the-art instrumentations for flux measurements including several multi-species QCL, and CRDS, a PTR-Qi-TOF-MS, and several IRGA, as well as aerosol instruments (SMPS, Welas, impactors). The lab has strong collaborations with key laboratories in France (LSCE, LMD, LAERO, LISA) and Europe (via ICOS and ACTRIS).

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