

Stage de recherche Master2

Proposed subject: ***Secondary Organic aerosol Formation by Organic waste Recycling in Agriculture***

Laboratories: INRAE, Unité « Écologie fonctionnelle et écotoxicologie des agroécosystèmes»
<https://www6.versailles-grignon.inrae.fr/ecosys>
Centre d'Enseignement et de Recherche en Environnement Atmosphérique
<https://www.cerea-lab.fr/>

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DESCRIPTION

Agriculture and its activities affect local, regional and global air quality and global climate by its significant sources of emissions of ammonia, greenhouse gases but also through VOC and aerosols emissions. The agriculture also represents a major ground-level ozone sink. The valorisation of different types of organic waste products (OWP) from farms, urban origin or industrial is currently promoted as a substitute for mineral fertilizers. OWPs have a wide variety of characteristics due to their origin and the treatments that they may undergo before spreading and this diversity of characteristics could have a significant impact on gaseous emissions following soil application.

The agricultural soils emit volatile organic compound (VOC) that contribute to the formation of secondary pollutants such as ozone but also to the formation of secondary organic aerosols (SOA), both pollutants being under regulation.

The present project is focused in the study of SOA formation due to ozone reactivity at the soil-atmosphere interface. Laboratory based measurements will investigate the emissions of VOC from OWPs and their subsequent reaction with ozone to form SOA. The experiments will be performed in an atmospheric simulation chamber coupled a proton transfer mass spectrometer. The interested candidate will also participate to aerosol modeling using the SSH-aerosol model. The SSH-aerosol model represents the physico-chemical processes involved in the formation of aerosol and SOA from diverse VOCs precursors. This model describes the aerosol dynamic with a discretization of the size and composition of particles, the gas/particle partitioning of organics using SOAP, and the oxidation of VOC precursors.

The candidate will be in charge of:

- quantify the VOC emissions from OWP and the aerosol formation due to their reaction with ozone
- identify the VOCs emitted by the OWP that are present/missing in the SSH-aerosol model
- represent the formation of SOA of the missing VOCs using laboratory experiments and literature available data.

This project is addressed to agronomist, physicist or chemist candidates interested in the experimental and modelling aspects of the research and motivated by the atmospheric impact of aerosols.

A thesis grant is available on the same topic. The candidate should have a good academic

background and a strong taste for research in the perspective of a PhD thesis carried out following the internship; the desire to perform a PhD will be appreciated.

Laboratories: CEREAs and INRAE

Period: from February 1st 2022 to June, 30 2022

Gratification: €554.40 per month

Keywords: volatile organic compounds, organic waste products, aerosols, mass spectrometry