

International Master 2 Atmospheric Sciences: Research Training 2022-2023

Laboratory: CERI EE

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Eventually CaPPA Work Package: WP 1 (From gas-phase to aerosols: biogenic VOCs as precursors for particles)

Investigation of the free radical budget during ACROSS

The Centre for Education, Research and Innovation in Energy Environment (CERI EE) from IMT Nord Europe was involved in an intensive field campaign as part of the ACROSS (Atmospheric Chemistry of the Suburban forest) project (across.cnrs.fr). **The main objective of ACROSS is to study the impact of urban plumes on the oxidation chemistry of biogenic volatile organic compounds.** In this context, an extended set of state-of-the art instruments was deployed at the Rambouillet forest located south-west of Paris for a duration of 6 weeks during summer 2022. **RO_x radicals (OH, HO₂ and RO₂)** and their gas-phase precursors & sinks, including Volatile Organic Compounds (VOCs) and inorganic species (O₃, NO_x), were measured at the top of a 40-m tower to investigate the radical chemistry above the forest canopy when the measurement site experiences pollution from Paris.

This internship will take advantage of the dataset acquired during ACROSS to investigate the RO_x chemistry with the aim of **providing novel information on the atmospheric budget of these radicals**, i.e. providing information about their main sources and sinks. This work will focus on using zero-dimensional modelling and state-of-the art chemical mechanisms of atmospheric chemistry.

The main objectives will be to:

- investigate whether atmospheric models are capable of reproducing observed levels of RO_x radicals
- assess the nature and strength of radical sources and sinks
- evaluate our understanding of the radical chemistry in mixed biogenic/anthropogenic air masses

The student will be trained on zero-dimensional box modelling and will become well-versed in atmospheric chemistry. This work will ultimately improve our knowledge on key factors that drive the oxidation of trace gases at suburban locations impacted by biogenic emissions.

Key words: Atmospheric chemistry, free radicals, field measurements, 0-D modeling