International Master 2 Atmospheric Sciences: Research Training 2021-2022

Laboratory: CERI EE

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CaPPA Work Package: WP-1 From gas phase to aerosols (for example)

## Investigation of VOC sources in the Landes Forest

This study aims at investigating the Volatile Organic Compound (VOC) budget, i.e. providing information about sources and transformations of VOCs, at a monitoring site within the Landes forest (southwestern France).

The Centre for Education, Research and Innovation in Energy Environment (CERI EE) from IMT Lille Douai was involved in the LANDes Experiment (LANDEX). The main objective of this research program is to improve our understanding of physical and chemical processes governing the formation and growth of secondary organic aerosols from biogenic VOCs (BVOCs). Within this framework, the main objective of this internship is to improve our knowledge on (1) sources of volatile organic compounds, including BVOCs, and (2) their chemical transformations in forested areas.

This study will make use of a large set of ambient observations acquired during an intensive field campaign performed in the Landes forest during summer 2017. The data (approx. 300 variables measured every 6 minutes for 1 month at several heights: concentrations of organic and inorganic gases, temperature and solar irradiance) will be analyzed using a statistical factor analysis method known as Positive Matrix Factorization (PMF). This analysis will help highlighting the main processes driving the observations' variability (anthropogenic and biogenic emissions, chemical transformations, etc.) and will allow assessing how these processes control the VOC budget. This work will ultimately help assessing the role of BVOCs in the formation of secondary organic aerosols.

The trainee will become well versed in managing and interpreting large datasets of atmospheric variables, developing skills in data processing and formatting, validation of observations, factor analysis, and model output interpretations. In addition, this internship will provide the trainee with a strong scientific background on trace gas emissions and transformations.

Key words: Volatile Organic Compounds, Source identification, Positive Matrix Factorization