

## International Master 2 Atmospheric Sciences: Research Training 2021-2022

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**CaPPA Work Package:** Workpackage 3 - Aerosol Observations

### Semi-volatile aerosol source apportionment focusing on mixed anthropogenic/biogenic air masses

Aerosol particles play a key role on climate and has a well-known effect on human health. A significant part of their fine fraction originates from secondary formation, i.e. when gaseous compounds react in the atmosphere, typically leading to species with a lower volatility, condensing into pre-existing aerosols and thus increasing aerosol loadings. Such processes are highly complex and involve thousands of different compounds, including key species/processes that have yet to be identified to devise efficient abatement strategies.

For the past decade, aerosol mass spectrometers have revolutionized the understanding of the aerosol formation dynamics from their detailed chemical characterization, combined with low detection limits at a near-real time measurements, providing a broad overview of submicrometric aerosols, albeit with limited molecular information on the aerosols due to high fragmentation. A new generation of Chemical Ionization Mass Spectrometers, coupled with online aerosol thermo-desorbing unit, allows for new insights into aerosol formation, particularly focusing on gas and particles using the same instrument. One of those instruments is the Proton-Transfer-Reaction Mass Spectrometer (PTRMS), of IMT Lille Douai, which recently has been fitted with a CHARON (CHemical Analysis of aeRosol ON-line) inlet.

The objective of this study is to work with a cutting-edge analytical technique, PTRMS-CHARON, particularly focusing on the identification of aerosol tracers and sources using different ionization methods when operating the mass spectrometer. This shall be performed based on recently conducted field campaigns on urban or mixed urban/biogenic backgrounds. This project can be considered in preparation for a funded PhD thesis in the scope of BIOMASP+ project (<https://anr.fr/Project-ANR-20-CE01-0019>), aiming to deploy PTRMS-CHARON within the Sao Paulo megacity in the spring of 2023.

**Key words:** Secondary Organic Aerosols ; biogenic atmosphere