



## Characterization of semi-volatile organic species in the particulate and gaseous phases in São Paulo, Brazil, and in the vicinity of Paris, France

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Semi-volatile organic compounds (SVOCs) exist in both gaseous and particulate phases in the atmosphere, and are important intermediate species for the formation of secondary organic aerosols. In this study, both phases of SVOCs are studied in the vicinity of Paris, France, and within São Paulo, Brazil aiming to better understand the coupling between anthropogenic and biogenic emissions in distinct urban settings. Both regions are representative of strong anthropogenic and biogenic sources of pollutants. These areas were within the scope of the ACROSS (Atmospheric Chemistry of the Suburban Forest) and BIOMASP<sup>+</sup> (Biogenic emissions, chemistry, and impacts in the Metropolitan Area of São Paulo) projects, respectively. The ACROSS campaign took place from June to July 2022 and data analyzed here were acquired at the Rambouillet (RMB) forested site, about 50 km southwest of Paris. BIOMASP<sup>+</sup> conducted intensive observations in April and May 2023, and data were collected at the Institute of Astronomy, Geophysics, and Atmospheric Sciences (Matão-IAG) urban site, within the University of São Paulo campus. Continuous measurements of ambient organics through a Chemical Analysis of aeRosols ON-line (CHARON) inlet coupled to a high-resolution proton-transfer-reaction time-of-flight mass spectrometer (PTR-ToF-MS) were carried out at both sites, as well as complementary variables such as aerosol chemical composition, regulated pollutants, and meteorological parameters, among others.

The concentration of submicron bulk organic aerosol was comparable at both sites during ACROSS and BIOMASP<sup>+</sup>, reaching 5.0 µg/m<sup>3</sup> and 7.3 µg/m<sup>3</sup> for RMB and Matão-IAG, respectively. These are higher than typical 1-year averages observed at urban sites in Europe (3-4 µg/m<sup>3</sup>) [1] and previous observations near Matão-IAG in October 2012 (4.8 µg/m<sup>3</sup>) [2]. Biogenic VOCs showed distinct concentrations and temporal variabilities between sites with isoprene levels of 0.51 ppb vs 0.26 ppb of monoterpene in Brazil and Paris (0.35 ppb of isoprene vs 0.23 ppb of monoterpene) thus potentially leading to important differences in the subsequent secondary organic aerosol

formation. Additionally, toluene, an anthropogenic marker, was higher at Matão-IAG (1.52 ppb) compared to RMB (0.25 ppb). This study will focus on SVOCs according to their mass spectra and temporal evolution and will compare the field observations to chamber experiments of biogenic and anthropogenic secondary organic aerosol formation. Those observations shall aid in understanding secondary formation processes and improve air quality modelling, as well as efficient pollution mitigation strategies in two contrasting large urbanized areas.

**Keywords:** SVOC, Sao Paulo, Paris, SOA, CHARON-PTR-ToF-MS

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## References

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