



Vertical distribution of volatile organic compounds in a pine forest during the summer 2017 LANDEX campaign

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Understanding biosphere-atmosphere exchanges of trace gases and aerosols is important to assess future changes in atmospheric composition at various scales. Forests are major emitters of Volatile Organic Compounds (VOCs) such as isoprene, monoterpenes, and sesquiterpenes and such primary compounds may be rapidly oxidized into oxygenated species. Depending on their volatility and chemical reactivity, the oxidation products may be further oxidized, while remaining in the gas phase or being transferred to the particulate phase. These compounds may also be transported away from the source region, or lost through deposition within the canopy. A good understanding of biogenic VOC emissions, transformations and deposition processes is therefore a prerequisite to assess the impact of forest emissions on air quality and climate change.

Trace gas and aerosol measurements were performed during the summer 2017 LANDEX (the LANDES EXperiment) campaign in one of the largest European pine forests (95% *Pinus pinaster*) located southwestern France. A large set of complementary instruments were deployed, including a Proton-Transfert Reaction Time of Flight Mass Spectrometer (PTR-ToFMS) and three online-gas chromatographs to characterize primary biogenic emissions and the formation of secondary VOCs. Of particular interest, the PTR-ToFMS instrument was setup to sample ambient air at 4 different heights below, within and above the canopy. Here, we will present a preliminary analysis of the spatial and temporal VOC distribution, focusing on vertical concentration gradients observed for both primary and secondary species. These results will be discussed to provide insights into chemical processes occurring within and above the canopy and to assess their impact on atmosphere-biosphere exchange.