

# **Volatile Organic Compound Fluxes Above A Belgian Mixed Forest**

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## **Abstract**

Land-based ecosystems are the largest source of volatile organic compounds (VOCs) in the atmosphere, affecting atmospheric oxidative capacity, tropospheric ozone, and formation and growth of organic aerosols. While emissions of the most abundant biogenic VOCs (isoprene and monoterpenes) have been explored extensively, exchanges are less well constrained for other VOCs or during extreme phenological or meteorological events. To address this, a PTR-ToF-MS instrument (PTR-TOF4000, Ionicon Analytik, GmbH, AT) was deployed at a mixed forest site located in Vielsalm (BE). The station is part of the ecosystem component within the Integrated Carbon Observation System (ICOS) and is host to a 51 m high tower. The PTR-ToF-MS was installed at the base of the tower from early spring to late fall (2022, 2023) and recorded data at 10 Hz frequency. Air was sampled sequentially from the top of the tower or along the forest vertical profile (3, 11, 19, 27, and 43 m a.g.l.). Fluxes were calculated at the top of the tower using the Eddy-Covariance method and in 2023, a sonic anemometer was added at the lowest level to add flux capacities in the trunk space. Near daily analysis of mass-spectra were conducted with automatic peak detection using the Ionicon Data Analyzer. About 200 masses were frequently observed with concentrations above the limit of detection (1 min data accumulation). Significant fluxes were regularly observed at the top of the canopy for 33 of these masses, 10 of which account for about 90% of the exchanged mass between the forest and the overlying atmosphere. We will present the results of 2 years of observations and use FORCAsT, a 1-D forest canopy exchange model, to investigate how bio-physico-chemical processes occurring inside the canopy affect the vertical concentration profiles and the observed fluxes at the top of the canopy.

## **Early Career Scientist**

YES, I am an early career scientist.

## **IGAC Activities**

AMIGO: Analysis of eMissions usinG Observations, GEIA: Global Emissions Initiative