

## Going deeper on the characterization of the biogenic SOA by combining on-line and off-line approaches during F-BEACH 2014

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Secondary Organic Aerosols (SOAs) are resulting from reactions of Volatile Organic Compounds (VOCs) emitted into the atmosphere either from anthropogenic or biogenic sources. Although SOA represents an important fraction of the total organic aerosols mass, up to now models mostly underestimate the ambient SOA concentrations, indicating that some of the SOA formation mechanisms and/or sources are still not well characterized or missing. One of the dominant SOA sources is related to biogenic emissions from plants and trees.

In order to better assess biogenic SOA, an intensive field campaign took place at the forest research station of the University of Bayreuth (Germany) in July 2014 (Fichtelgebirge – Biogenic Emission and Aerosol Chemistry, F-BEACH 2014). A complementary set of real time mass spectrometers, including a High Resolution Time-of-Flight Aerosol Mass Spectrometer (HR-ToF-AMS), a Chemical Ionization Atmospheric-Pressure interface Time-of-Flight Mass Spectrometer (CI-APiToF-MS) and an Aerosol Flowing Atmospheric-Pressure Afterglow Mass Spectrometer (AeroFAPA-MS), was deployed. Additionally, off-line analysis on day-night regime of High-Volume filter samples (Digitel PM<sub>1</sub>) performed in parallel was made and targeted to Biogenic SOA tracers (*e.g.*, monoterpene tracers, organosulfate and nitroxyorganosulfate compounds), carboxylic acids, carbonyls, imidazols, amines and amino-acids as well as HOM tracers. Source apportionment was performed using Positive Matrix Factorization (PMF) based on the high-resolution AMS mass spectra.

In contrast to the traditional PMF approach, inorganic fragments were added to the organics mass spectra matrix, in order to distinguish inorganic and organic sulfate and nitrate compounds, and therefore, investigated the complete non-refractory near PM<sub>1</sub> (NR-PM<sub>1</sub>) particle composition measured by the AMS. Validation of the PMF results was made by comparison with off-line results. It was therefore possible to clearly distinguish two groups of factors: one associated to long-range transport/regional background (three different factors representing approx. 44% of the NR-PM<sub>1</sub> mass) and several local SOA factors. From the last group, it was possible to distinguish a nitrate related OA associated to semi-volatile compounds, an organo-nitrate related factor, a freshly locally formed monoterpene SOA factor, a non-monoterpene SOA factor and a possible primary biogenic OA factor (all together 56% of the NR-PM<sub>1</sub>). Details on the source apportionment results and factors identification will be presented.