LANDEX - Episode zero: A preliminary atmospheric field study in the Landes forest (France)

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In the atmosphere, the secondary fraction constitutes an important part of organic aerosols at a global scale, and may even correspond up to 80% in specific locations (Jimenez *et al*., 2009). Understanding the processes governing Secondary Organic Aerosols (SOA) formation and fate is essential to assess the aerosol impacts on both air quality and climate change. Despite recent advances, chemistry-transport models representing SOA formation and evolution are not enough well-constrained (Hodzic *et al*., 2010). New field studies of poorly-documented ecosystems, are therefore essential to improve the understanding of atmospheric processes.

The objective of the LANDEX project is to assess the formation and the fate of SOA arising from the French Landes forest, which constitutes a suitable ecosystem to study SOA from biogenic origin (Simon *et al*., 1994; Aydin *et al*., 2014). Indeed, as one of the largest forests in Europe (1 million ha), relatively homogeneous with more than 90% of maritime pines *(pinus pinaster)* and with few anthropogenic inputs, the Landes forest represents one of the best places to assess the influence of parameters such as solar radiation (with strong episodes of sunshine) relative humidity, but also inputs of sea spray (from the Atlantic ocean) on the formation of SOA.

To achieve our goal, two preliminary field campaigns ('Episode zero') have been conducted in September 2013 and during summer 2014. A focus was made on the development and the optimization of methodologies to be implemented, leading to the first results concerning SOA formation in the Landes forest. Field campaigns consisted in measuring volatile organic compound (VOC) concentrations using both online-GC-FID and PTR-TOF-MS (including monoterpenes and their by-products). Particle size distribution was investigated using a SMPS, whereas a TEOM-FDMS was used to determine aerosol mass concentration. Ozone and nitrogen oxides (NO_x) were assessed by UV and chemiluminescence analysers. Local air masses were characterized by measuring meteorological parameters (such as T, P, RH, wind and solar radiation) and modelled calculating backward trajectories using the NOAA-Hysplit facility.

In addition, the quantification of heat fluxes, CO_2 and water vapor fluxes (allowing to evaluate the physiological status of the tree parcel) and ozone fluxes (estimating the amount consumed by its reactions with VOCs) were carried out using Eddy Covariance method. Particle flux measurement was performed using a PPS PEGASOR, specifically adapted here for the first time over a forest area. Simultaneously, VOC fluxes were derived from PTR-TOF-MS measurements using Eddy Covariance.

Original results, obtained during the preliminary campaigns, will be presented here, emphasizing the relevance of the Landes forest site for biogenic SOA studies.

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