

Physicochemical Characterization of Iberian Wildfire Aerosol at Multiple European Sites

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Introduction

A major wildfire event on the Iberian Peninsula resulted in smoke plumes transported across Europe in October 2017. We report aerosol chemical speciation monitor (ACSM) data on fine particle composition and auxiliary measurements from Spain, France, Denmark and Sweden. Our aim is to elucidate the physicochemical properties of ageing biomass burning particles and contribute to estimates of impact on air quality of severe wildfire episodes.

Methods

We combine in-situ measurements of particle physicochemical properties with air-mass back trajectory analysis using HYSPLIT (Stein *et al* 2015). The in-situ techniques employed are chiefly Aerosol Chemical Speciation Monitors (ACSM, Ng *et al.* 2011), which measure non-refractory chemical composition though thermal desorption electron impact mass spectrometry (four French and two Scandinavian datasets are included) and filter based absorption measurements, e.g. Aethalometer data.

Conclusions

Preliminary analysis suggest the wildfire plumes intercepted in France are dominated by organic aerosol and black carbon, which is in accordance with expectations based on literature. The OA biomass burning tracer levoglucosan (based on the fraction of signal at m/z 60, f_{60}) was very variable in the datasets, peaking around f_{60} of 0.02. However, disentangling the contribution of more local sources (the French data is a few days downwind of the firezone) is still in progress.

The Scandinavian datasets (see Figure 1) show particle composition dominated by oxidized organic material and ammonium nitrate, with low levels of biomass burning tracers (e.g. signal at m/z 60 and brown carbon based on Aethalometer).

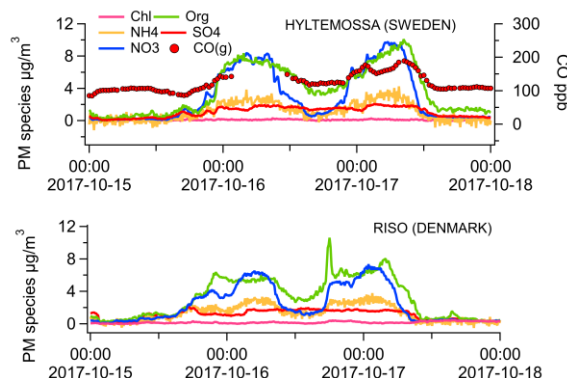


Figure 1. Danish and Swedish ACSM data of air mass approximately six days downwind the Iberian firezone.

While the presence of aged woodsmoke is clear from gas phase composition (e.g. elevated CO at the Swedish site) coupled to air mass back-trajectories, there is of course a myriad of particle and precursor emissions *en-route*. The relative importance of these other sources is an active area of investigation. Furthermore, formation of secondary aerosol in the plumes, which does not carry traditional biomass burning traces, poses a challenge to our source attribution efforts.

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