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Fire plumes transported by hurricane Ophelia: 3D observations by ground-based, aircraft and satellite data

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With the remnants of hurricane Ophelia reaching the British Isles, a rare pollution event crossed Europe in October 2017, with transport of dust from the Sahara and of thick smoke from disastrous wildfires in northern Portugal/Spain. On October 15-16, both dust and smoke were rapidly advected by Ophelia-energized strong southerly winds into the Bay of Biscay, north-western France and across the UK.

Two unusual events were intersecting: a tropical storm and high intensity late-season fires. We now benefit from a range of observations above Europe allowing us to track the transport of such pollution plume. Using radiance observations from the IASI thermal infrared remote sensors onboard the two Metop satellites, global scale maps of dust, carbon monoxide and ammonia (two proxies for fire plumes) can be derived. The European lidar/ceilometer network can establish that the dust plume preceded the smoke plume by several hours and travelled at an altitude of 2-4 km. The IAGOS network on passenger aircraft also reported large peaks of CO during departures and landings, with a measured CO concentration matching well with the IASI observations.

Finally the distributions will be compared with the maps provided by the Copernicus Atmosphere Monitoring Service (CAMS) model from their averaged analysis outputs, for the different aerosol optical depth components (dust and biomass burning).