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# Lidar and modelling to study the Eyjafjallajökull ash concentrations

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Lidar measurements are new insights on the assessment of the likely mass concentration of aerosol ash plume. Following the eruption of the Icelandic volcano Eyjafjallajökull on 14 April, 2010, ground-based N2-Raman lidar (GBL) measurements were used to trace the temporal evolution of the ash plume between 16 to 20 April, 2010, above the south-west suburb of Paris. The nighttime overpass of CALIPSO/CALIOP, the 17 April, 2010, was an opportunity to complete GBL observations. The plume shape retrieved from GBL has been used to assess the size range of the particles size. The lidar-derived aerosol mass concentrations (PM) have been compared the model-derived PM concentrations, using the Polair3D transport model. The consistency between model and ground-based wind lidar, CALIOP and MODIS observations has been checked. The spatial and temporal structures of the ash plume are coherent between each instrument and with the Polair3D simulations. The ash plume was associated to mean aerosol optical thickness of $0.1 \pm 0.06$ km 1 and $0.055 \pm 0.053$ km-1 for GBL (355 nm) and CALIOP (532 nm), respectively. Such values are associated to PM$\sim$500-600 $\mu$g/m3 within the ash plume which is less than 0.5 km wide. The simulated ash plume is smoother leading to a severe underestimation of PM concentrations in the plume, even though the integrated mass is within the same order of magnitude ($\sim$250 mg/m2).