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Physical properties of suspended dust in Iceland

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Atmospheric Dust Measurements (ADMI 2013) of one of the most active dust sources in Iceland (Mælifellsandur) were conducted during season with high precipitation on August 8th-18th, 2013. We measured mass concentrations (PM2.5 and PM10), particle size distributions in size range 0.3-10μm and number concentrations during rather small dust event. Dust samples of the event were analyzed (morpho-textural observations, optical and scanning-electron microscopy).
Two TSI 8520 DustTrak Aerosol Monitors (light-scattering laser photometers that measure aerosol mass concentrations in range 0.001 to 100 mg/m3) and one TSI Optical Particle Sizer (OPS) 3330 (optical scattering from single particle up to 16 different channels - 0.3 to 10 μm - measuring particle size distribution) were used.
We measured a dust event which occurred during wet and low wind/windless conditions as result of surface heating in August 2013. Maximum particle number concentration (PM$\sim$0.3-10 μm) reached 149954 particles cm-3 min-1 while mass concentration (PM<10 μm) was 1757 μg m-3 min-1. Suspended dust was very fine with the highest number of particles in size range 0.3-0.337 μm, followed by particles 1.5-5 μm in diameter. Close-to-ultrafine particle size distributions showed a significant increase in number with the severity of the dust event. Number concentrations were well correlated with mass concentrations. The mineralogy and geochemical compositions showed that glaciogenic dust contains sharp-tipped shards with bubbles and 80 % of the particulate matter is volcanic glass rich in heavy metals. Wet dust particles were mobilized within < 4 hours.
Here we introduced a comprehensive study on physical properties of the Icelandic dust aerosol and the first scientific study of particle size distributions in an Icelandic dust event including findings on initiation of dust suspension.