

Distribution of dust during two dust storms in Iceland

Agnes Ösp Magnúsdóttir, Pavla Dagsson-Waldhauserova, Ólafur Arnalds, and Haraldur Ólafsson
Univ. Iceland, Agricultural Univ. Iceland, Icel. Meteorol. Office (haraldur68@gmail.com)

Particulate matter mass concentrations and size fractions of PM₁, PM_{2.5}, PM₄, PM₁₀, and PM₁₅ measured in transversal horizontal profile of two dust storms in southwestern Iceland are presented. Images from a camera network were used to estimate the visibility and spatial extent of measured dust events. Numerical simulations were used to calculate the total dust flux from the sources as 180,000 and 280,000 tons for each storm. The mean PM₁₅ concentrations inside of the dust plumes varied from 10 to 1600 $\mu\text{g}/\text{m}^3$ (PM₁₀ = 7 to 583 $\mu\text{g}/\text{m}^3$). The mean PM₁ concentrations were 97–241 $\mu\text{g}/\text{m}^3$ with a maximum of 261 $\mu\text{g}/\text{m}^3$ for the first storm. The PM₁/PM_{2.5} ratios of >0.9 and PM₁/PM₁₀ ratios of 0.34–0.63 show that suspension of volcanic materials in Iceland causes air pollution with extremely high PM₁ concentrations, similar to polluted urban areas in Europe or Asia. Icelandic volcanic dust consists of a higher proportion of submicron particles compared to crustal dust. Both dust storms occurred in relatively densely inhabited areas of Iceland. First results on size partitioning of Icelandic dust presented here should challenge health authorities to enhance research in relation to dust and shows the need for public dust warning systems.