Predicting atmospheric dust process from Icelandic soil sources

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Iceland is the largest European high-latitude desert. Sporadic but intense emissions of volcanogenic dust from local sources there are caused by strong winds. Physical and mineralogical features of this dust and its impact to environment are in general different from dusts originating from other continental deserts. For example, high content of Fe-rich minerals deposited to neighboring seas could be source of nutrients to the marine system more important than in other regions. Furthermore the Icelandic dust significantly affects ice albedo and increases melt rates. Finally, during intense dust storms, air quality in Island and surroundings could strongly decline. Quantification and prediction of atmospheric Icelandic dust process are issues important for assessing and predicting various effects on the environment of this specific dust aerosol.

In this study we present preliminary results obtained by a numerical modeling system developed to predict emission, transport and deposition of dust specifically originating from the Icelandic dust sources. The Dust Regional Atmospheric Model (DREAM) has been implemented for this purpose. The original model dust source specification has been modified by using the Agricultural University of Iceland soil database to specify geographic distribution of Icelandic dust sources and their erosion intensity. Particle size distribution and threshold friction velocities have been adapted for the Icelandic dust emissions as well. The modeling system has been tested for an intense dust storm episode and it has been setup for future operational predictions.