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The 13 September 2011 storm of resuspended volcanic ash

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During an event of synoptic-scale moderate winds on 13 September 2011, large quantities of ash from the Grímsvötn eruption were resuspended into the atmosphere and transported over SE-Iceland.

From airborne observations of the dust stroke, satellite imagery, observations of visibility and analysis of previous plumes, the rate of suspension is estimated to be of the order of 1000 kg/s which is roughly one order of magnitude less than a typical Bodele dust storm and almost half the magnitude of the ash transport in the second intense phase of the Eyjafjallajökull eruption in 2010.

As in the Bodele depression, the dust is suspended due to topographically generated strong winds. However, unlike the Bodele dust storms, which are associated with relatively large scale channeling of the winds, the present windstorm has a smaller spatial extension and is associated with gravity waves on the downslopes of Vatnajökull glacier.

Numerical simulations of the flow confirm that the surface friction velocity below the gravity wave has values close to 1 m/s. Elsewhere, the values are much less, and below the critical threshold for extreme suspension of dust. Downstream of the wave, there is a hydraulic jump, followed by a well mixed and about 2 km deep boundary layer.