# Aeolian Activity in High Latitude Cold Climate Environments

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## Project outline

Research into dust emissions has been largely skewed to hot arid desert regions. Emissions from High Latitude Cold Climate (HLCC) regions have been largely understudied and therefore our knowledge of these systems is limited. Understanding dust emission processes from HLCC regions is of increasing importance because future climate scenarios indicate a reduction in terrestrial ice masses and an expansion in glacial outwash plains which are the main dust sources in HLCC environments. The allocation of the BSG Postgraduate award provided funds for a 6 week field campaign in May/June 2015 on the Icelandic south coast. Markarfljot (Figure 1a) is a glacial river which is fed by Eyjafjallajökull and Mýrdalsjökull. The downstream outwash plain areas have been shown to be contemporary dust sources.

## Methodology

Aeolian monitoring was conducted for 6 weeks on a coastal outwash plain, east of the main river channel (Figure 1b). This included monitoring surface wind speeds with a vertical array of Vector A-100R cup anemometers, trapping wind-blown sediments with an array of Fryrear Big Spring Number eight (BSNE) sediment traps and monitoring fluxes of fine particulates using a TSI DustTrak DRX Aerosol Monitor 8533 and TSI DustTrak Optical Sizer 2. BSNE traps were also placed west of the river channel, directly next to an active ephemeral outwash plain. River suspended sediment samples were taken twice daily. Surface samples were taken for both sites and from 4 other Icelandic dust sources (identified by MODIS) for experiments to assess the impact of aeolian abrasion on dust particle generation.

## Preliminary results

Dust storms can be categorised based on their primary meteorological control, with surface wind speed being the major factor. Threshold wind speed for sediment transport appears to be approximately 5.5-6 m/s. Meteorological factors including soil moisture and the development of surface lag deposits prohibit dust emissions. Fine particulate magnitudes are comparable to those seen in the subtropics. Fine particulates were also measured in the city of Reykjavik during certain events. Increases in particulate matter concentration in Reykjavik can be attributed to fine particulates blowing from these sources. 80% of the Icelandic population live in Reykjavik meaning that dust events in Iceland are potentially a serious public health concern.

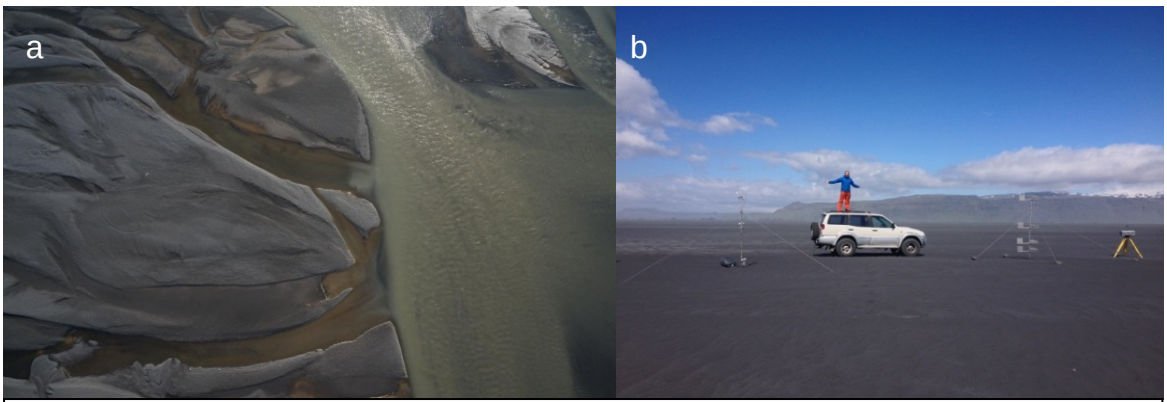


**Figure 1**: a) Markarfljot River, South Iceland b) Aeolian monitoring on Markarfljot Outwash plain (June 2015)