Comparison of remote sensing datasets and ground-based meteorological observations for understanding dust originating in the Arctic.

Sam Poxon, Matt Baddock, Jo Bullard

Loughborough University

The wind-blown entrainment, transportation, and deposition of mineral dust originating in the Arctic plays a significant role in atmospheric, cryosphere, marine and terrestrial environments at the regional scale. Remote sensing (RS) and earth observation (EO) methods have been pivotal in characterising dust across hotspots. However, this has left research gaps regarding the systematic use of remote sensing data to better understand Arctic dust. How well remote sensing datasets characterise dust in comparison to well established ground-based meteorological observations in the Arctic is also unclear. The **Mod**erate Resolution **I**maging **S**pectroradiometer's (**MODIS**) Aerosol Optical Depth (AOD) is a remote sensing dataset that measures the extinction of light in a column of air due to the presence of aerosols in the atmosphere. It is used extensively in systematic dust and aerosol research studies globally and presents opportunities for application in the Arctic. The research uses two datasets to characterise dust activity in Iceland; (i) MODIS' AOD Level-3 gridded data products (1° x 1° resolution) across Iceland for a twenty-year period (2001 – 2022) and (ii) Observed surface meteorological records for 80 stations across Iceland for the same time period (2001-2022) . Iceland is an actively dusty region driven by aeolian processes, volcanic activity, and glacial sediment supply. It is relatively well studied on the ground, with a spatially distributed weather observation network that will allow for ground-truthed comparison. The research aims to produce a systematic analysis of MODIS AOD products, quantify the spatial and temporal variability of AOD and then compare and evaluate the AOD record against ground based meteorological records.