



# Vertical Profile and Aerosol Size Distribution Measurements in Iceland (Light Optical Aerosol Counter)

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## Overview

Iceland is an active source of dust from glaciogenic and volcanic sediments. The frequency of wind erosion events is  $\geq 34$  dust days annually (Dagsson-Waldhauserova, 2013a). Icelandic dust is of volcanic origin; it is very dark in colour and contains sharp-tipped shards with bubbles. Such properties allow even large particles to be easily transported long distances.

## LOAC (Light Optical Aerosol Counter)

The LOAC instrument measures the particle number concentrations in 19 size classes between 0.2 and 100  $\mu\text{m}$  while providing an estimate of the main nature of aerosols. Measurements are at 2 scattering angles:  $12^\circ$  where the scattered light is  $\sim$  insensitive to the nature of the aerosols

$60^\circ$  where the scattered light is very sensitive to the nature of the aerosols

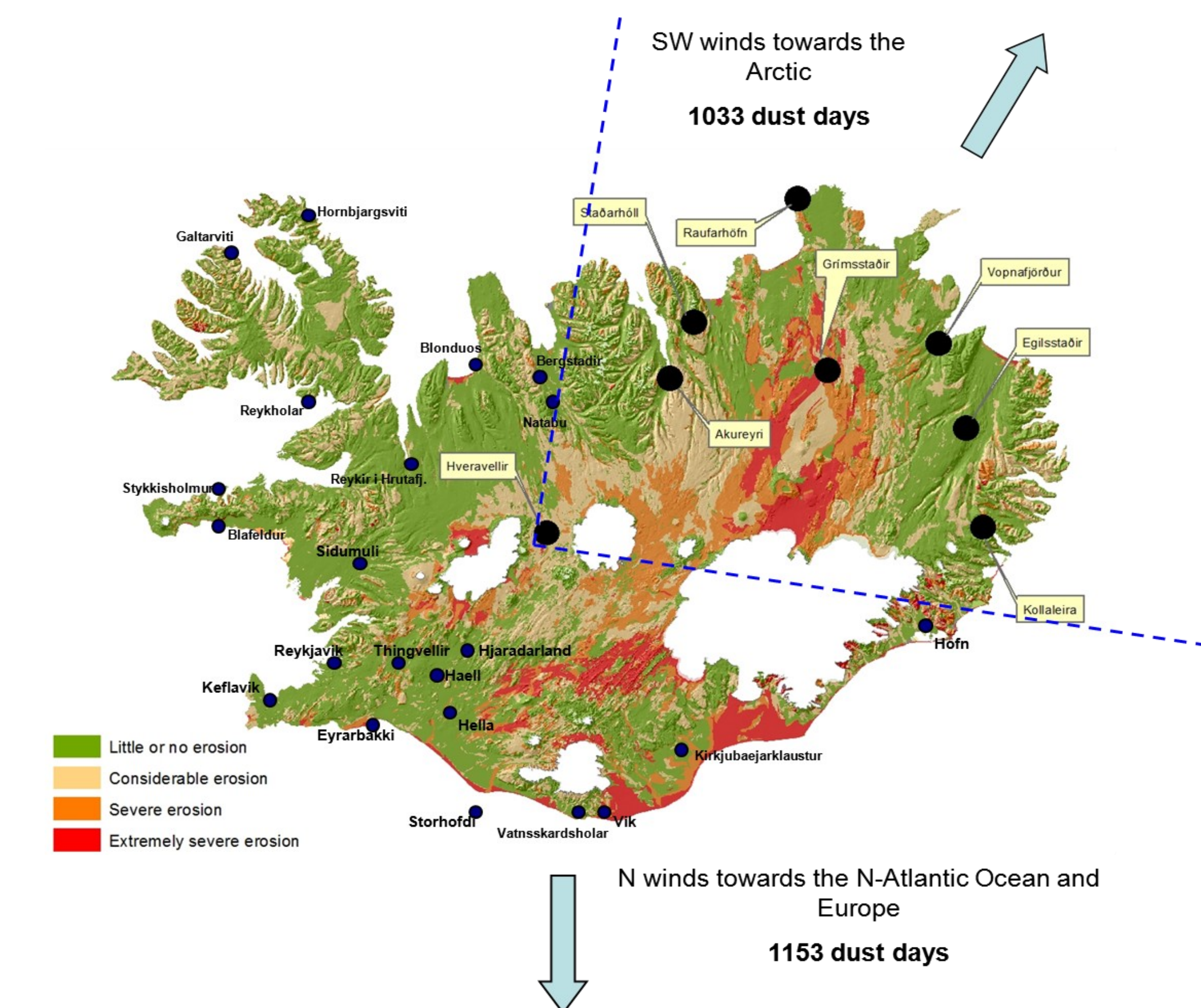
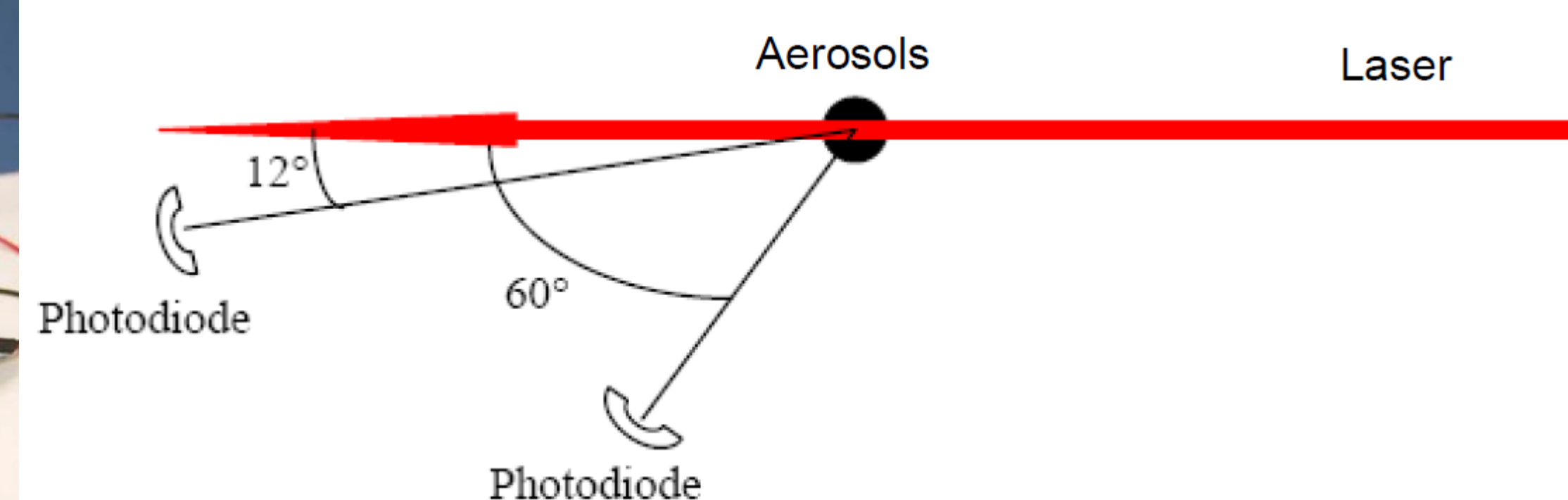
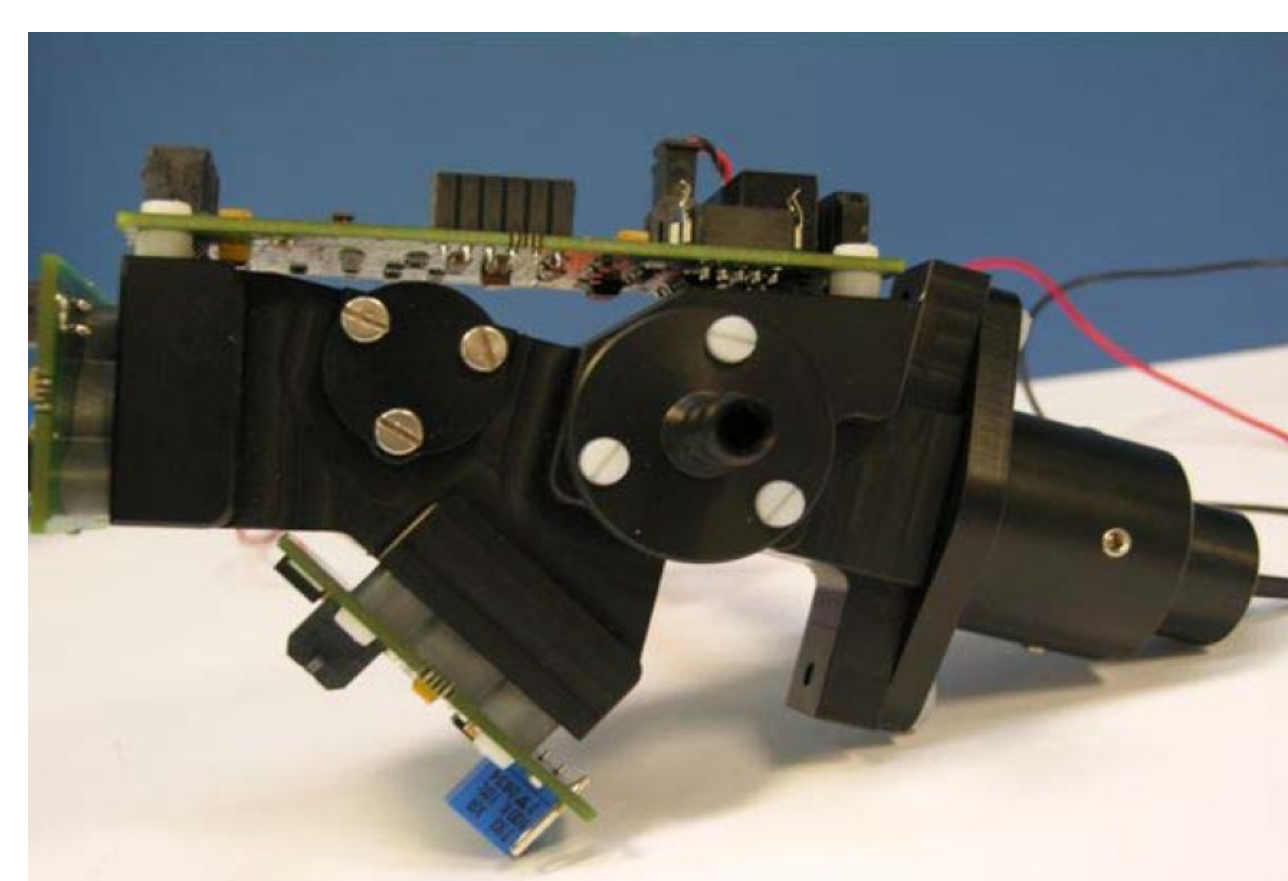


Fig. 1. A map of soil erosion and dust-day frequency (1949-2011) in Iceland.

## LOAC MEASUREMENTS IN ICELAND (summer 2011, winter 2013, planned May 2014)

### Summer campaign July 2011 'NON-DUSTY' CONDITIONS

Clean air conditions during low winds:

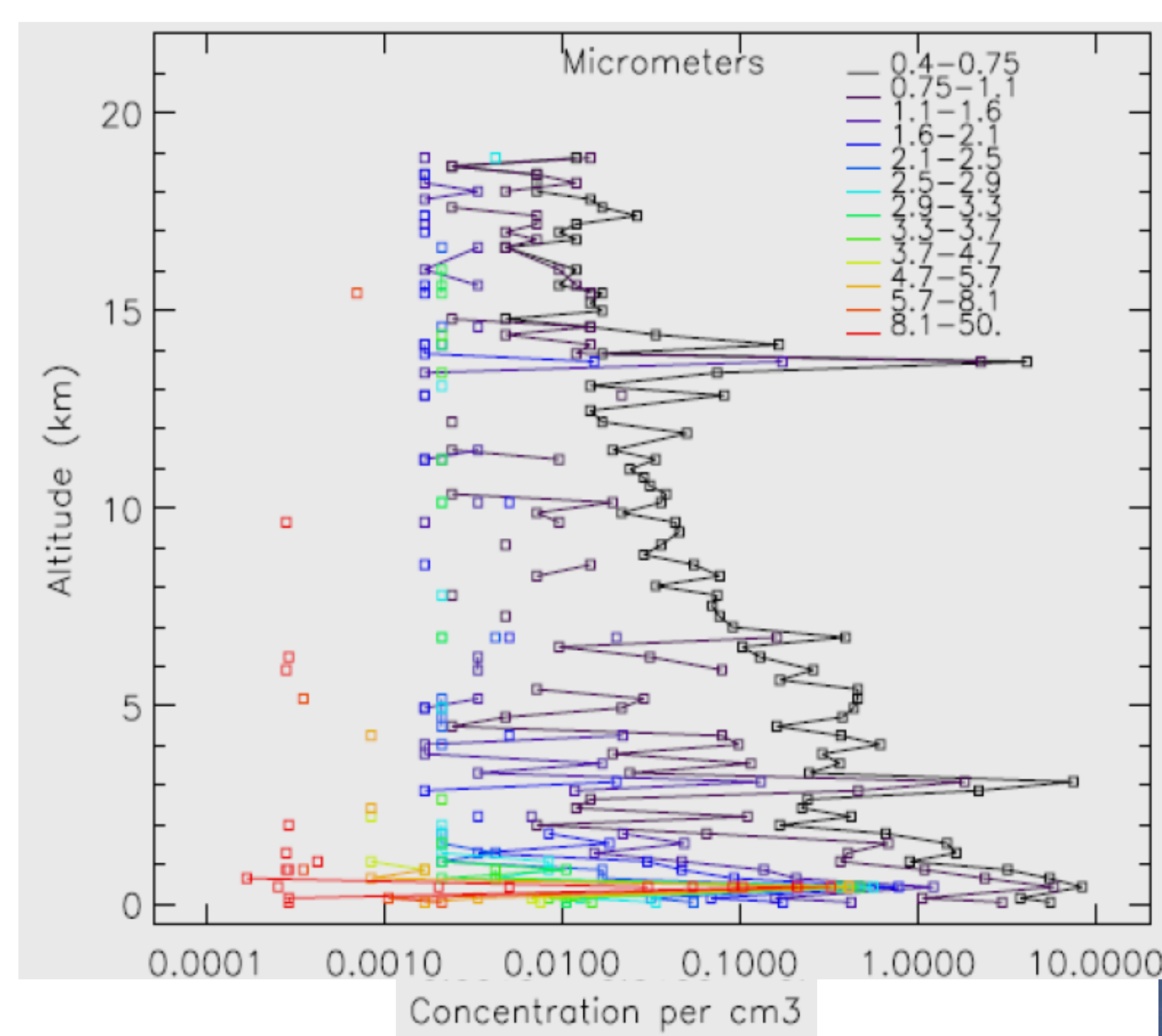


Fig. 2. Vertical profile of particle number concentrations during the LOAC launch on July 19th, 2011 in Keflavik, Iceland. Right: 3D flight path.

### Winter campaign November 2013 'AFTER DUST' CONDITIONS

Measurements one day after snow-dust event, launch during winds  $\sim 8 \text{ ms}^{-1}$ :



Fig. 3. Vertical profile of temperature and relative humidity during the LOAC launch on November 7th, 2013 in Reykjavik, Iceland.

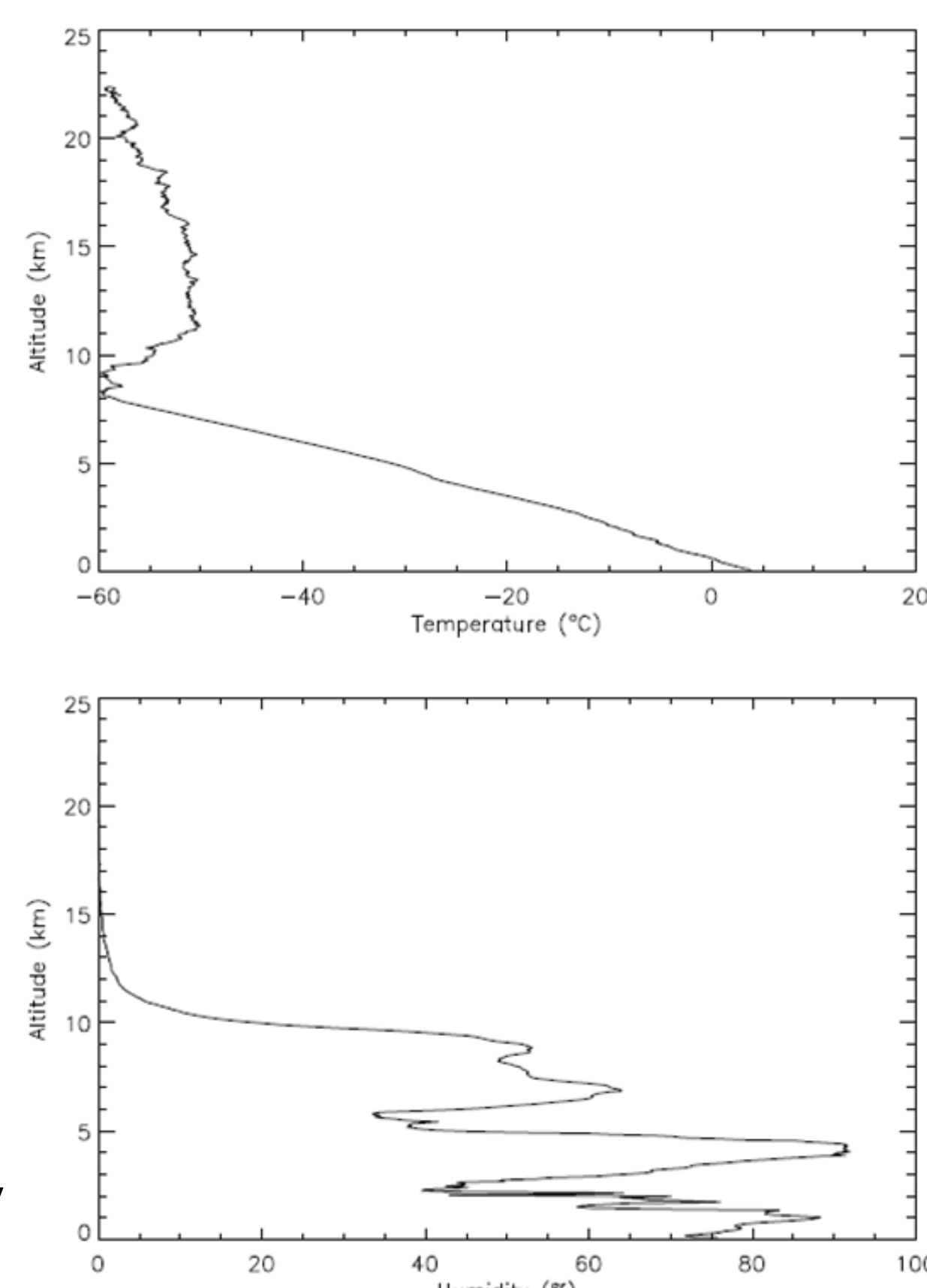
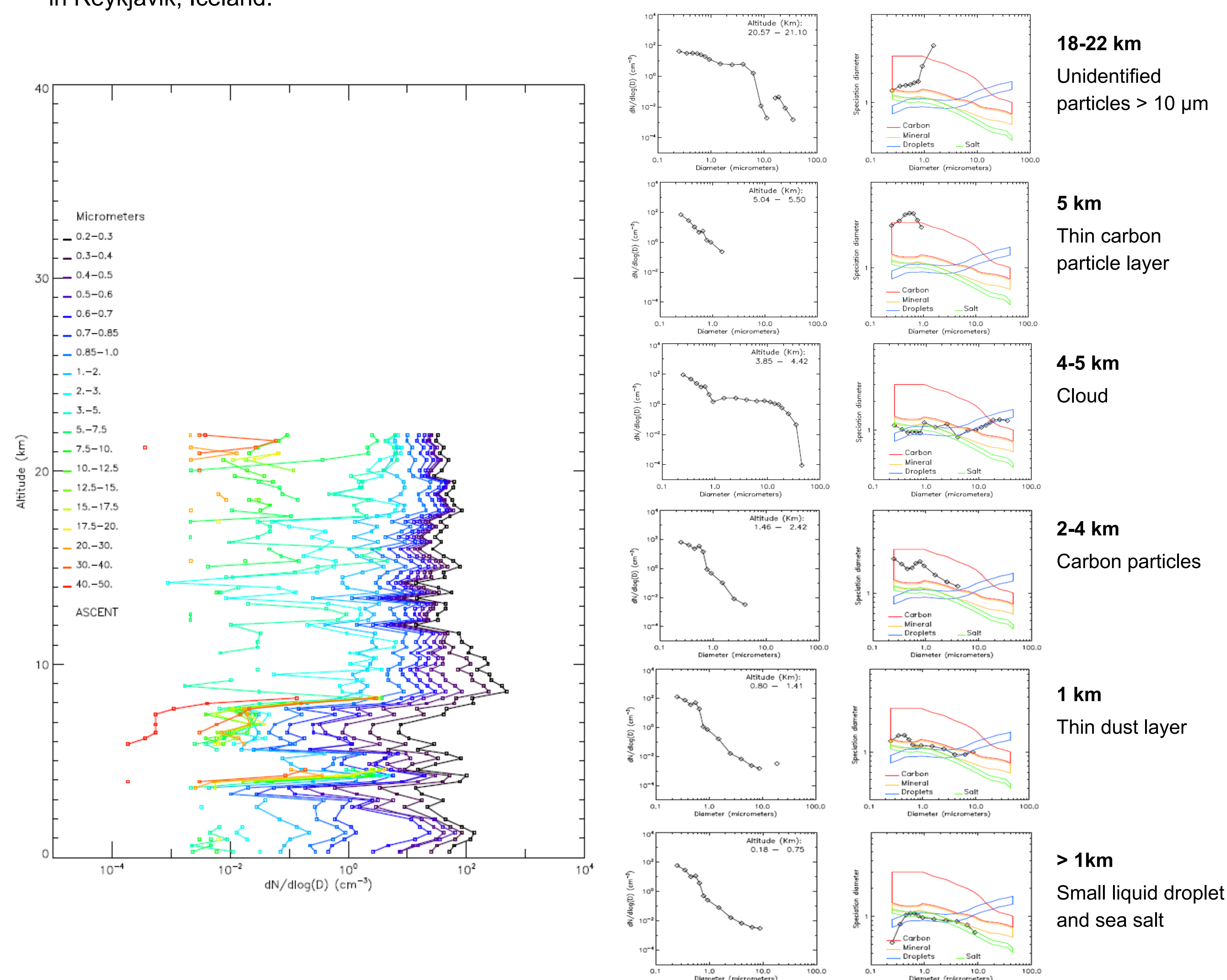


Fig. 4. Vertical profile of particle number concentrations during the LOAC launch on November 7th, 2013 in Reykjavik, Iceland.



### Spring campaign May 2014 (planned) 'DUST STORM' CONDITIONS

May is the driest month with the highest number of dust storm events in Iceland (Dagsson-Waldhauserova et al., 2013b). LOAC measurements of vertical profile of dust event are needed.

## CONCLUSION

Iceland is located far from the anthropogenic sources of air pollution, but it is one of the largest and most active high-latitude cold dust sources. Composition of the arctic/subarctic troposphere and stratosphere needs to be more investigated.

## References

- Pavla Dagsson-Waldhauserová, Haraldur Ólafsson, and Ólafur Arnalds. 2013a. Long-term variability of dust-storms in Iceland. Geophysical Research Abstracts Vol. 15, EGU2013-11578-1.  
Dagsson-Waldhauserova, P., Arnalds, O., Olafsson, H., 2013b. Long-term frequency and characteristics of dust storm events in Northeast Iceland (1949-2011). Atmospheric Environment 77:117-127.