Geophysical Research Abstracts
Vol. 21, EGU2019-7963-2, 2019
EGU General Assembly 2019

Investigation of aerosol optical properties in the European Arctic using Lidar remote sensing technique

Konstantina Nakoudi (1,2), Christoph Ritter (1), Roland Neuber (1), and Marion Maturilli (1)

(1) Alfred Wegener Institute for Polar and Marine Research, Atmospheric Physics, Potsdam, Germany (konstantina.nakoudi@awi.de), (2) Institute of Physics and Astronomy, University of Potsdam, Potsdam, Germany

Aerosol strongly affect the radiation balance, especially in the Arctic where climate change is significantly faster compared to lower latitudes. The interaction between aerosol and radiation can be either direct (scattering and absorption) or indirect (aerosol serving as cloud condensation nuclei and ice nucleating particles). Aerosol optical properties can be provided by Lidar (Light Detection and Ranging) systems with high spatial and temporal resolution. In this study, we utilize data from a ground-based Lidar system located in Ny-Ålesund, Spitsbergen and an air-borne system installed onboard the research aircraft Polar5.

Our focus is on a rare event of elevated aerosol layers, which persistently appeared over two different parts of the European Arctic during PAMARCMiP (Polar Air-borne Measurements and Arctic Regional Climate Model Simulation Project) campaign in spring 2018. Results show that the detected layers exhibit similar optical properties, namely aerosol backscatter coefficient, which is indicative of aerosol abundance and aerosol depolarization ratio, which is an indicator of the aerosol shape. The main hypothesis is that although the existence of those layers is rare, they impact on the radiation budget of the Arctic.

In the next steps of our research, we will investigate the occurrence of similar aerosol layers in the springtime of previous years using long-term measurements from the Lidar system located in Ny-Ålesund. Our goal is to assess the effect of different aerosol layers on the surface radiation budget and gain a better understanding of their role in the amplified Arctic climate change, utilizing radiation measurements from the Ny-Ålesund BSRN (Baseline Surface Radiation Network) station.