Geophysical Research Abstracts
Vol. 18, EGU2016-10425, 2016
EGU General Assembly 2016

Climatology and Characteristics of Aerosol Optical Properties in the Arctic

Lauren Schmeisser (1,2), John Ogren (3), John Backman (4), Eija Asmi (4), Elisabeth Andrews (1), Anne Jefferson (1), Michael Bergin (5), Peter Tunved (6), Sangeeta Sharma (7), and Sandra Starkweather (1)

(1) CIRES, University of Colorado, Boulder, United States (betsy.andrews@noaa.gov), (2) University of Washington, Seattle, United States, (3) NOAA/ESRL/GMD, Boulder, United States, (4) Finnish Meteorological Institute, Helsinki, Finland, (5) Duke University, Durham, United States, (6) Stockholm University, Stockholm, Sweden, (7) Environment and Climate Change Canada, Toronto, Canada

Within the Arctic, climate forcers like atmospheric aerosols are important contributors to the observed warming and environmental changes in the region. Quantifying the forcing by aerosols in the Arctic is especially difficult, given short aerosol lifetimes, annual variability in illumination and surface albedo, stratified atmospheric conditions, complex feedbacks, and long-range aerosol transport. However, in-situ surface measurements of Arctic aerosol optical properties can be used to constrain variability of light scattering and absorption, identify potential particle sources, and help evaluate the resulting forcing. Data from six WMO Global Atmosphere Watch stations are presented: Alert, Canada (ALT); Barrow, Alaska (BRW); Pallas, Finland (PAL); Summit, Greenland (SUM); Tiksi, Russia (TIK); and Zeppelin Mountain, Norway (ZEP). These sites contribute to the International Arctic System for Observing the Atmosphere (IASOA), which facilitates Arctic-wide data collection and analysis. Climatologies of aerosol optical properties from each station show differences in magnitude and variability of observed parameters. For example, most stations (ALT, BRW, SUM, TIK, ZEP) experience maximum scattering in winter/spring, while PAL exhibits maximum scattering in the summer. The observed range in scattering across these sites is large (almost an order of magnitude) - SUM has the lowest annual median scattering at 0.82 Mm-1 while BRW has the highest at 6.9 Mm-1. A closer look at systematic variability between optical properties at each station, as well as site back trajectories, suggest differences in aerosol processes, sources and transport. The development of consistent climatologies and additional analyses like the ones presented here can help provide a better understanding of trans-Arctic aerosol variability, which can be an asset for improving aerosol models in this unique and remote region.