Aerosol trend and its spatial distribution over Arctic

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Atmospheric aerosols, one of the key constituents of the earth's atmosphere have significant potential to affect the climate and weather in various ways through their direct (scattering and absorption of solar and longwave radiation), indirect (change of cloud optical properties and lifetime) and semi-direct effects (evaporation of cloud droplet due to light absorption and heating). The Arctic region is highly sensitive to perturbations of the earth's radiative budget and hence the global climate. Recent studies reported that Arctic region is warming with a factor of twice than global average which is mainly due to air pollutants. In the present study, we investigate spatial distribution of aerosols and their trend over Arctic. With this objective, sixteen-year (2000 – 2016) aerosol optical depth data, obtained from MODerate resolution Imaging Spectroradiometer (MODIS) on board of Terra ad Aqua satellite, AErosol RObatic NETwork (AERONET, at Barrow and Hornsund only) and Modern Era Retrospective-Reanalysis for Research and Applications (MEERA), are analyzed for summer season (JJA: June, July August). Preliminary results suggest a large spatial distribution in aerosol loading over Arctic during summer. An increasing trend in aerosol loading is observed which is more prominent for organic carbon and sulphates aerosol suggesting the dominance of anthropogenic aerosol. AERONET data set suggest a bimodal aerosol volume size distribution over Barrow and Hornsund with relatively higher concertation of fine mode aerosol particles. The potential source contribution analysis suggests significant contribution of transported aerosol during the study period. The results from the present study will be helpful to reduce uncertainty in understanding of aerosol characteristic over Arctic. Further details will be presented during the conference.

Keywords: Arctic, aerosol optical depth (AOD), organic carbon, sulphate.