

A Network of Spectral Radiometers for the Study of Polar Aerosols

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Despite the important role that aerosols play in modulating the radiation balance of the high latitudes, our knowledge of their physical and optical properties, as well as their spatial and temporal variability, is inadequate. Historically, there have been few polar monitoring sites. To improve our knowledge of aerosols, a bi-polar network of sun and star photometers is being established to monitor aerosol optical depth (*AOD*) a measure of the opacity of the atmosphere. Through coordinated activities, data will be collected, archived and analyzed by participants from 40 research groups representing 22 countries. During the International Polar Year (2007-2009) measurements will be made at 15 Arctic and 16 Antarctic stations, including baseline observatories of the Global Monitoring Division of NOAA ESRL. The objective of the POLAR-AOD program is to characterize the means, variability and trends of the climate-forcing properties of aerosols in Polar regions. Archiving, data management, instrument inter-calibrations and research activities will be coordinated primarily by the Italian Institute of Atmospheric Science and Climate. Spectral *AOD* measurements will be used to characterize different aerosol types, infer their optical properties, and, in conjunction with radiation measurements, quantify their impact on the surface energy budget. Aerosol-induced perturbations to the surface-atmosphere thermal structure will be investigated through a set of closure experiments using observations in conjunction with radiative transfer models. In particular, coincident spectral *AOD* measurements can be used to distinguish natural from anthropogenic aerosols. Climatologies of aerosol seasonal and regional patterns will be established. Collectively, studies will provide a basis to improve parameterizations of aerosol processes in climate models and thus reduce the uncertainty in climate predictions. An overview of the POLAR-AOD project is given, with examples of preliminary results.

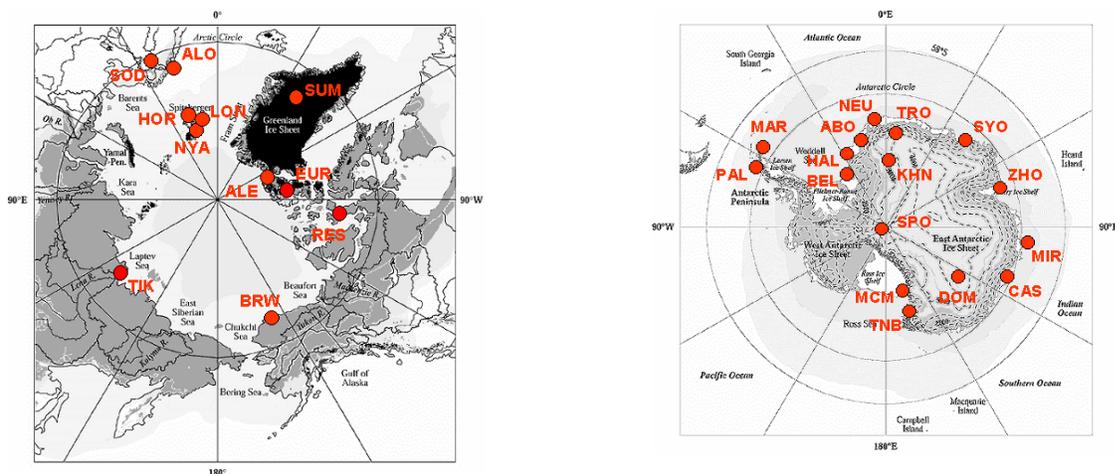


Figure 1. *Left*, Arctic and *right*, Antarctic stations that will conduct aerosol measurements during IPY.