

Sky-radiometer measurements for monitoring the aerosol optical properties in the Arctic and Antarctica

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Abstract

Atmospheric aerosol has a potential to change the global climate by direct and indirect effects on radiation balance in the planetary atmosphere. The direct effect is generally expected to be small in the polar regions, but the indirect effect may cause a large difference of cloud properties between the Arctic and Antarctic regions. National Institute of Polar Research (NIPR) promotes the atmospheric research in both polar regions, and employs remote-sensing instruments for aerosol and cloud studies. For investigating the aerosol optical properties, sky-radiometry based on a radiation inversion algorithm is powerful to retrieve the column-averaged aerosol volume size distribution, single scattering albedo and complex refractive index as well as aerosol optical thickness and Angstrom exponent. In order for long-term monitoring of the aerosol properties, NIPR operates Prede POM-02 sky-radiometers at both polar sites, i.e., Ny-Alesund Station (78.9N, 11.9E) in the Arctic and Syowa Station (69.0S, 39.6E) in Antarctica. And further we recently developed a new sky-radiometer POM-01 MK

III for ship-based measurements. In this paper, we will present a summary of the project and results from surface-based measurements in the polar regions and also those from ship-based measurements during the Antarctic cruises by the Icebreaking R/V Shirase for the Japanese Antarctic Research Expedition activities.