VERTICAL PROFILES OF AEROSOL OPTICAL THICKNESS OVER SYOWA STATION, ANTARCTICA (ABSTRACT)

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Attenuation measurements of solar irradiance using an airborne sun photometer were performed for the first time over Syowa Station, Antarctica. The NIPR's Cessna 185 aircraft equipped with a sun photometer (Eko, Model MS-111) took 4 flights during JARE-25, on January 19, September 3, December 25 and 26, 1984. The aerosol optical thicknesses (AOT) at wavelengths of 0.369, 0.5, 0.675 and 0.862 μm were obtained at several altitudes up to 5 km on each flight.

The temporal change of vertical profiles of AOT confirmed that the decrease of AOT found in the ground-based measurements during 1984 (*cf.*, M. SHIOBARA *et al.*: Mem. Natl Inst. Polar Res., Spec. Issue, **45**, 93, 1986) reflects the depletion of stratospheric aerosols enhanced by the El Chichon eruption in 1982.

The tropospheric AOT over Syowa Station was estimated as 0.005–0.01 at 0.5 μm wavelength and was nearly comparable with the non-disturbed stratospheric AOT in contrast with the mid-latitude region where the tropospheric AOT constitutes most of the AOT of the whole atmosphere.

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EXPERIMENTAL STUDY ON "HALO" FORMATION IN THE POLAR REGION (ABSTRACT)

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When cirriform clouds or ice fogs lie down between the observer and the sun (or moon), refraction and reflection effects of light rays by small ice crystals (diamond dust) can lead to one or more "halo" phenomena (R. GREENLER: Rainbows, Halos and Glories. Cambridge, Cambridge Univ. Press, 1980). For example, the most common—the 22°—halo, which occurs when the cloud form is a veil of cirrostratus and when the predominant ice crystal form is that of hexagonal prism of uniform size, is explained form the fact that the angle of deviation (*i.e.* the angle of minimum bending from a straight line by refraction) is 22° for a triangle with apex angle of 60°. However, it has not as yet been satisfactory explained how the appearance of halo phenomena and the halo intensity depend on the basic properties of ice crystals such as morphology, spatial concentration, size distribution, and falling orientation (J. HALLETT: J. Opt. Soc. Am., **A4**, 581, 1987). The purpose of this study is to observe the halo phenomena in ice fogs made artificially in the laboratory and to clarify their formation mechanisms in connection with aspects of both crystal growth and meteorology.