

POLAR STRATOSPHERIC AEROSOLS  
AND  
GLOBAL ENVIRONMENT CHANGE  
-LIDAR MEASUREMENT-

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Aerosol processes in the polar stratosphere becomes a greater concern from stratospheric ozone depletion, and global budget of stratospheric sulfur and nitrogen. Heterogeneous reaction including PSC is believed to be an essential process controlling large polar ozone depletion. The polar air with low level ozone diffuses on the global scale after destruction of polar vortex, decreasing ozone content of the mid- and low latitudes. However, many problems concerning with nucleation of PSC remain unsolved. Lidar measurements suggested that a largely enhanced aerosol layer having very low depolarization ratio formed in the early phase of PSC event.

Electron microscopic measurements of particles collected in the Arctic winter stratosphere suggested liquid phase nitrate particles forming under the atmospheric condition of  $T \leq$  frost point of NAT. Many investigators pointed, from analysis of ice core collected at Antarctica and/or Greenland that various stratospheric materials were contained in ice. Descending motion of stratospheric aerosol layer was observed in the polar region after the Pinatubo eruption of 1991, suggesting the possibility of particulate matter sink in the polar stratosphere.

Polar stratospheric aerosol behavior will be discussed on the basis of lidar and balloon measurement at Arctic region.

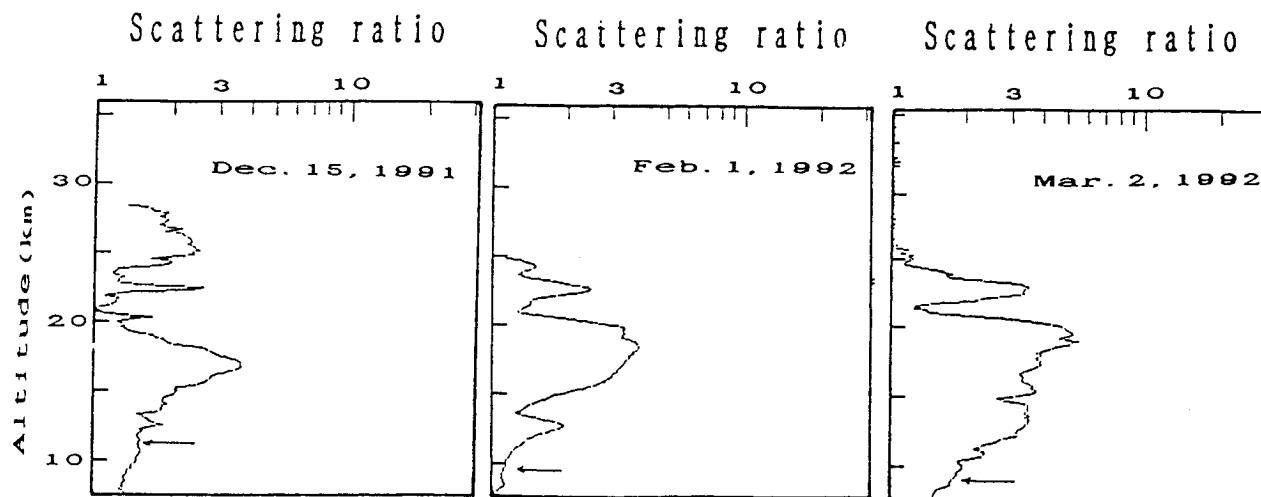


Fig. 1. Scattering ratio measured at Poker Flat, Alaska on December 15, 1991 (left), February 1, 1992 (center), and March 2, 1992 (right). Local tropopause height is shown by arrows '←'.

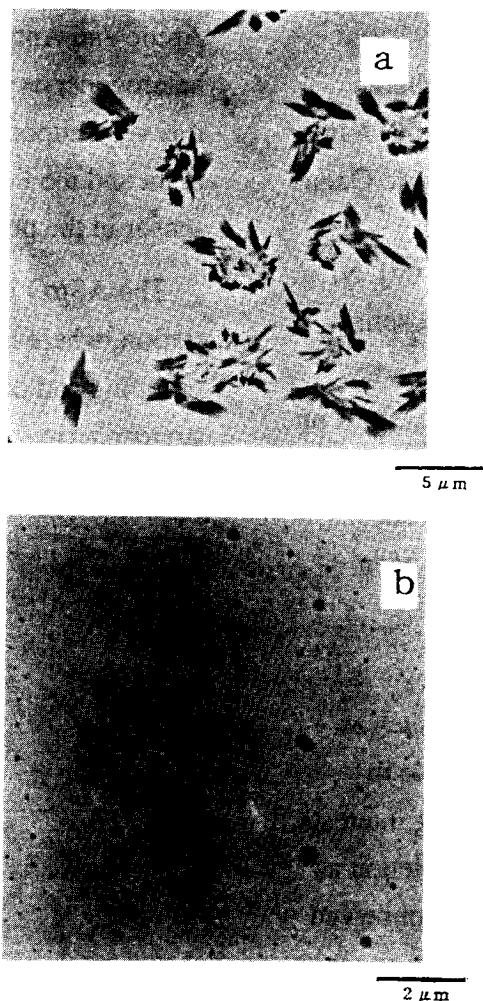


Fig. 2. Electron micrograph of particles of the sub-layer 2 collected on the surface of nitron film in 20.2–21.0 km (a) and carbon film in 19.6–20.2 km (b) on 31 January, 1990 at Kiruna (68°N, 21°E), Sweden. Most of particles collected on the nitron film surface have crystals like needle which forms through chemical reaction between nitrate in the particulate matter and nitron film.