

THE RELATION BETWEEN CHEMICAL COMPOSITIONS OF  
SNOW AND ATMOSPHERIC AEROSOLS IN ANTARCTICA  
(ABSTRACT)

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The nature and mechanism of chemical elements distribution among 3 phases, atmospheric air, aerosol particle and snow, were studied on the Mizuho Plateau and the inland area toward Dome Station, in the summer, December, 1992 to January, 1993. Aerosols and acid gases were sampled by the use of an air filtering system consisting of a 1-stage of 0.2  $\mu\text{m}$  Nuclepore Filter with 3 successive stages of alkali-impregnated filter paper at 5 locations where the fresh drifting snow was also sampled. The chemical species studied were  $\text{Cl}^-$ ,  $\text{NO}_2^-$ ,  $\text{NO}_3^-$ ,  $\text{SO}_3^{2-}$ ,  $\text{SO}_4^{2-}$ , MSA,  $\text{Na}^+$ ,  $\text{K}^+$ , and  $\text{NH}_4^+$  using an ion chromatograph.

At the point nearest the ocean, S16, atmospheric concentrations of gaseous acids ( $\text{HCl}$ ,  $\text{HNO}_2$ ,  $\text{HNO}_3$  and  $\text{SO}_2$ ) are quite high and far exceed those of aerosols, especially for  $\text{Cl}^-$ ,  $\text{NO}_3^-$  and  $\text{SO}_3^{2-}$  (determined as  $\text{SO}_4^{2-}$ ). However, at inland stations, gaseous concentrations fall to lower levels than those of aerosols, which also decrease inland. This behavior suggests that the source of these gaseous species is at the sea shore or at the sea surface and they are transformed to aerosol particles by condensation and/or scavenging in a short time.

In many cases, the concentrations of most chemical species in aerosols show a linear relationship to those in fresh snow. This suggests possible scavenging of aerosol particles with the same efficiency irrespective of particle size, and leads to a plausible conclusion that all concentrations as well as the composition observed in ancient ice reflect those of aerosols in the ancient atmosphere. However, in some cases, the above relationship tends to disappear, even at the same position, after few days. The factor which controls the mechanism of aerosol scavenging by snow particles is not clear; more observations are needed.

The fresh drifting snow sampling was also carried out on a foot traverse from the base camp, close to the coast of the Weddell Sea, to South Pole Station. The distribution of chemical elements in fresh drifting snow showed a shift to the inland-type distribution at altitudes higher than 2500 m as had been observed on the Mizuho Plateau.

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