SEASONAL VARIATION OF THE MOLECULAR STATE OF SULFATE AEROSOL PARTICLES IN THE ANTARCTIC ATMOSPHERE (ABSTRACT)

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Seasonal variation in molecular state of sulfate aerosols was examined in the 27th Japanese Antarctic Research Expedition (JARE-27) in the antarctic atmosphere. Aerosol particles were collected at Syowa Station, Mizuho Station, Asuka Camp, and along the traverse routes in inner regions from December 1985 to February 1987. Molecular state of sulfate particles was identified by calcium thin film method.

Particles containing sulfuric acid were predominant throughout the year. The degree of acidity of sulfate particles in summer was higher than in winter. In summer, H_2SO_4 particles were exclusively dominant and ammoniated sulfate particles were not found. On the other hand, in winter partially ammoniated sulfate particles, such as NH_4HSO_4 particles rather than $(NH_4)_2SO_4$ particles, were predominant. Number concentration of sulfate particles, especially in small particle size range, was larger in summer than in winter. These results implies that active photochemical formation of sulfuric acid particles was predominant in summer, whereas photochemical particle formation was suppressed and neutralization of sulfuric acid contained in particles with atmospheric ammonia took place in winter.

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GROWTH RATE OF DENDRITIC ICE CRYSTALS GROWING FROM THE VAPOR PHASE (ABSTRACT)

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Dendritic ice crystals have been formed on a glass substrate in air of 1.0×10^5 Pa and at -15°C and various excess vapor pressures over water.

The growth rates of the tip of dendritic ice crystals have been measured as a function of excess vapor pressure, tip curvature and tip thickness; the spacing of side branches has been also measured as a function of the growth rate of the tip. As a result, it has been found that dendritic ice crystals growing in air of 1.0×10^5 Pa depend not only on the volume diffusion of water molecules toward the crystal surface but also the surface kinetics of water molecules.

By comparing the spacing of side branches of natural snow crystals with the present experimental results, the humidity in natural snow clouds in which snow crystals are formed can be estimated.

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