

EVAPORATION OF SNOW CRYSTALS AND SNOWFLAKES (ABSTRACT)

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Experiments to evaporate natural snow crystals and snowflakes under a polarization microscope were carried out at Sapporo in 1987. Evaporation of snow crystals and snowflakes occurred preferentially at pointed ends and shapes of evaporating crystals were similar to their growth forms although their pointed ends had rather rounded surfaces. However, the following two kinds of phenomena were also observed when dendrites, rimed plates and irregular poly-crystals were evaporated at $-3\sim-9^{\circ}\text{C}$. (1) Fracture: fractures of pointed ends. Fractured parts were folded, moved intermittently or rotated on the surfaces of mother crystals. (2) Fragmentation: fractured parts were frequently ejected as fragments.

Laboratory experiments to evaporate artificial snow crystals at temperatures between -0.5 and -12°C and at relative humidities between 40 and 97% were also carried out in order to confirm the occurrence of these phenomena. In the case of needles it was found that not only fractures and fragmentations but also deformations to form curled pointed tips occurred at relative humidities between about 55 and 85%.

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SPATIAL DISTRIBUTION OF AEROSOL-STATE METHANESULFONIC ACID OVER THE ANTARCTIC OCEAN (ABSTRACT)

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During the austral summer of 15 November 1986 to 3 March 1987, bulk aerosol sampling by Andersen high-volume sampler was carried out on board the icebreaker SHIRASE in her relief voyage of the 28th Japanese Antarctic Research Expedition to Syowa Station, Antarctica. The aerosol samples were collected on Toyo Roshi GB100R as impaction surfaces at air flow rates of about 566 l/min. These filters were changed at intervals of four days. The collected samples were analyzed by an ion chromatograph (column: TSK gel IC-Anion-PW) to examine the concentrations of methanesulfonic acid (MSA: $\text{CH}_3\text{SO}_3\text{H}$) as an oxidation product of dimethyl sulfide (DMS: CH_3SCH_3) in the formation of sulfuric acid aerosols.

Methanesulfonate (CH_3SO_3^-) concentrations ranged from the value beyond the detection limit (10 ppb) to $0.067\ \mu\text{g}/\text{m}^3$. The increases in the concentrations near the Antarctica suggested that DMS was produced actively by marine algae near the Antarctic coastal regions with high primary productivity. Methanesulfonate concentrations in marine aerosols above the 50%

cutoff diameter of 1.1 μm were the values beyond the detection limit. This result suggested that MSA in the atmosphere was formed through a gas-to-particle conversion process. The same bulk aerosol sampling had been also carried out during the KH-86-3 cruise of the R/V HAKUHO MARU from 3 June to 1 August 1986 in the Northern Pacific Ocean (M. YAMATO 1988: pers. commun.). The maximum methanesulfonate concentration was observed off the Kurile Islands with high primary productivity. There is a significant positive correlation between MSA and excess SO_4^{2-} in the Antarctic coastal region and the Northern Pacific Ocean. The mean MSA/excess SO_4^{2-} was 0.068 (correlation coefficient $r=0.78$, $N=17$). The y -intercept of the regression line is negligible. The positive correlation between MSA and excess SO_4^{2-} is likely to support that DMS is a major precursor component of sulfuric acid particles.

We forecasted high concentrations of the excess SO_4^{2-} in the Northern Pacific Ocean, because the influences of human activity on global environmental pollution are remarkable in the Northern Hemisphere. However, the excess SO_4^{2-} concentrations were not different between the Northern and Southern Hemisphere. The mean excess SO_4^{2-} concentration was $0.29 \mu\text{g}/\text{m}^3$.

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THE TEST OF MARINE AEROSOL SAMPLING ABOARD THE RESEARCH VESSEL "SHIRASE" (ABSTRACT)

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The research vessel "SHIRASE" was used for test sailing from Tateyama in Chiba prefecture to Nagoya via Miyake Island in September 1987. Marine aerosols were measured aboard every hour by β -ray absorption method, together with ozone monitoring by ultra-violet absorption method. The concentration of marine aerosols increased abruptly on occasion, when the concentration of ozone decreased in the same manner. It is concluded that these phenomena were due to some contamination of the self-exhaust from her chimney. According to change of the elemental composition of the marine aerosols observed during this sailing, the following conclusion was obtained. When the contamination happened during the sampling, the ratio of Zn to Cu in the aerosol samples increased obviously in comparison with uncontaminated samples. It is concluded that the ratio of Zn to Cu in the sample is an indication of the contamination degree due to the self-exhaust during marine aerosol sampling.

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