

Outflow of anthropogenic substances from the Asian continent to the East China Sea through atmosphere

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Introduction

The growth of economic and population are rapidly increasing in developing countries of the East Asia. This means the increasing atmospheric emissions of pollutants due to intensive industrial and agricultural activities. According to the IPCC report prediction of the acid gas emission for 100 years from now as a whole of the earth, the amount of NO_x emission will rapidly increase, although the amount of SO₂ emission will decrease. The elevated N-containing compounds perturb terrestrial, aquatic, estuarine and marine ecosystems and influence atmospheric chemistry. The East China Sea located in downwind from the East Asia is considered to be an important oceanic region in terms of understanding the chemical properties and the mechanism of transport and deposition of anthropogenic and natural aerosols from the Asian continent to the open sea.

Method

Chemical composition of aerosols, gaseous substances and the number densities of particles measurements were conducted continuously over the regions of the Japanese and the South Korea economic waters in the East China Sea during Leg2 of the KH02-3 Cruise of the R/V Hakuho Maru from September 26 - October 9 2002.

Results

Anthropogenic plumes were observed at the middle of East China Sea. One of these episodes was almost equal quality of the urban atmosphere in Tokyo.

Concentrations of coarse particulate nitrate (particles with aerodynamic diameters larger than 2.5 μm) was from 1.6 to 13.6 (average 6.3) times higher than those of fine particulate nitrate (particles with aerodynamic diameters smaller than 2.5 μm). The volatile ammonium nitrate is a major constituent in atmospheric fine particles. In contrast, the coarse particulate nitrate can be formed through the reaction of gaseous nitric acid with coarse sea-salt particles in the atmosphere. Such a reaction occurs especially when maritime and polluted continental air mass are mixed. Formation of coarse particulate nitrate serves as a permanent removal pathway for nitrogen compounds.

In this marginal sea near the anthropogenic sources, such phenomena have occurred and it seems that these high concentration levels for nitrate during our observation period will influence the air quality and radiative forcing. And the marine ecosystem might be affected by supplying nitrogen to the ocean through the atmosphere.

Early aqueous alteration of hydrous asteroids inferred from Sayama CM2 chondrite

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Introduction

Sayama CM carbonaceous chondrite exhibits textures indicative of pervasive aqueous alteration (Yoneda *et al.*, 2001). We have made mineralogical and isotopic study of Sayama to describe and decipher the aqueous alteration in hydrous asteroids.

Results and Discussion

Chondrules are almost entirely replaced by serpentine and minor chlorite. Matrix is mainly composed of coarse serpentine with typically 50 to 100 μm across. Synchrotron X-ray diffraction (SR-XRD) showed that the serpentine 001 reflection appears at 7.20 Å, suggesting a low Fe³⁺/Si⁴⁺ ratio in the tetrahedral layers in serpentine and the high degree of aqueous alteration. Oxygen isotope ratios of dolomite and serpentine in matrix were measured by SIMS ims 6f at Kyushu University, with 1 sigma uncertainty up to ±2 ‰. The oxygen compositions of serpentine are clustered in a region close to the CM mixing line (Clayton and Mayeda, 1984) around +10 ‰ δ¹⁸O_{SMOW}. Relatively large, independently occurred, two dolomite grains with more than 100 μm in size were analyzed so far. The results showed that the two grains have similar compositions around +15 ‰ δ¹⁸O_{SMOW} and +5 ‰ δ¹⁷O_{SMOW}, giving the lightest values among the CM2 carbonates reported (Benedix *et al.*, 2003). The results obtained so far indicate that the δ¹⁸O fractionation between serpentine and dolomite ranges up to 8.4‰, which corresponds to the equilibrium at 120°C or higher in hydrothermal conditions (e.g. Zheng, 1993). The temperature is higher than that for other CM2s such as Murchison (0~25°C) (e.g. Clayton and Mayeda, 1984). The aqueous alteration at high-temperature might have resulted in the high degree of alteration of chondrules, the presence of chlorite and coarse serpentine, and the absence of PCP.

References

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