

Individual Particle Analysis of Marine Atmospheric Aerosols Collected over the Bering Sea and the Western North Pacific Ocean

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Atmospheric aerosol particles including black carbon (BC) can play a vital role in the climate change because they influence the radiative forcing on the Earth through the absorbing and scattering of solar radiation. Furthermore, it is well known that they can also affect the cloud formation by acting as cloud condensation nuclei (CCN). However, since the information of atmospheric aerosol properties is still limited, their influence on the climate change has large uncertainty. Therefore, more information of aerosol particles is required. Especially, the information of marine atmospheric aerosols is not sufficient. In this study, the morphology and chemical compositions of atmospheric aerosols over the Bering Sea and the western north Pacific Ocean were characterized by the individual particle analysis.

Observation and samplings of atmospheric aerosols were carried out during R/V MIRAI MR-16-06 cruise (2016/8/22-10/5). The ambient BC mass concentrations were measured by a single particle soot photometer (SP2). In this study, we focused on relatively high BC mass concentration events over the Bering Sea at 58.04°N, 179.29°E on 9/26/2016 and the western north Pacific Ocean at 46.05°N, 159.32°E on 9/29/2016. The atmospheric aerosols collected in both events were analyzed using a transmission electron microscope and an energy dispersive X-ray spectrometer.

The number fractions of carbon-rich (C-rich) particles were about 50% and 70% in the samples collected over the Bering Sea and the western north Pacific Ocean, respectively. The average size of C-rich particles was 0.43 μm . C-rich particles collected over the western north Pacific Ocean were mostly identified as tar balls. The backward trajectory analyses with the fire emission data suggested that the air masses of both events were affected by Siberian forest fires. The aging process of aerosol particles in the transportation will be discussed in the presentation.

Keywords: Marine atmospheric aerosol, Black carbon, Tar ball, the western north Pacific Ocean, the Bering Sea, TEM-EDX