Oral | Symbol A (Atmospheric, Ocean, and Environmental Sciences) | A-AS Atmospheric Sciences, Meteorology & Atmospheric Environment

[A-AS22_1PM2]Atmospheric Chemistry

Convener:*Nobuyuki Takegawa(Research Center for Advanced Science and Technology, University of Tokyo), Yousuke Sawa(Geochemical Research Department, Meteorological Research Institute), Yugo Kanaya(Research Institute for Global Change, Japan Agency for Marine-Earth Science and Technology), Kenshi Takahashi(Research Institute for Sustainable Humanosphere, Kyoto University), Hiroshi Tanimoto(National Institute for Environmental Studies), Chair:Nobuyuki Takegawa(Research Center for Advanced Science and Technology, University of Tokyo)

Thu. May 1, 2014 4:15 PM - 6:00 PM 511 (5F)

This session provides a forum for the presentation of the broad spectrum of tropospheric and stratospheric chemistry, including various research topics (air quality and climate), approaches (modeling, field measurements, satellite data analysis, and laboratory studies), and species (gas and aerosol). This session also provides an opportunity for discussing possible future collaboration with other research fields relevant to atmospheric chemistry.

4:15 PM - 4:30 PM

[AAS22-P03_PG]Properties of Fe-containing particles and structure of mineral particles in the mountain, urban, and marine atmosphere

3-min talk in an oral session

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Keywords:aerosol, Fe, water-soluble materials, water-insoluble materials, long-range transportation

Atmospheric aerosol particles play an important role in global material cycles and global climate by acting as an agent which transports materials over long distances. Iron (Fe) is an essential element for marine phytoplankton growth especially in high nutrient and low chlorophyll (HNLC) area. Long-range transportation of atmospheric aerosols from the continent and subsequent deposition is an important process to supply Fe to the ocean. The dry and wet depositions of aerosol particles depend on the particle size and the mixing states with water-soluble materials. In order to study the properties of Fe-containing particles and modification of individual particles, we collected aerosol particles at the top of Mt. Fuji, at Kagurazaka, Tokyo, and on the ship over the mid-latitude western North Pacific Ocean during the KH-12-1 (EqPOS) Leg 2 cruise of the R/V Hakuho Maru. We collected aerosol particles with a low pressure impactor. Collected particles were analyzed using a transmission electron microscopy (TEM) with a water dialysis method and an energy-dispersive X-ray (EDX) analysis. We chose the samples which were collected in the long-range transportation events from the continent on the basis of 5-day backward air trajectory analysis, number size distribution of aerosols measured by an optical particle counter (OPC), and the results of the TEM-EDX analysis. Water-insoluble materials such as mineral dusts and industrial anthropogenic metals are main sources of Fe. This study focused on water-insoluble materials and performed the EDX analysis. In each sample, most of water-insoluble materials were internally mixed with water-soluble materials (internal mixed particles). The volume percent of the water-soluble materials in the mixed particles on a marine sample was higher than that of other samples, indicating that water-insoluble materials as well as Fe-containing particles were mixed with water-soluble materials during transportation.Structures of some mineral particles were verified using the

focused-ion-beam (FIB) technique. Particles larger than 5 μ m collected on the Ti-plate were sliced into 200 nm in thickness. We performed selected-area electron diffraction (SAED) on the cross section of the sliced particles. On the basis of the diffraction patterns and EDX results, structures of the mineral particles were verified. $CaCl_2$ was found on the surface of the particle and bounded on $CaCO_3$, suggesting that CO_3^{2-} was replaced by Cl^- ($CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$). Fe was included in the particle. There is a possibility that changing insoluble $CaCO_3$ to soluble $CaCl_2$ changes the ability of cloud nuclei and/or ice nuclei and the solubility of Fe.