5.057 Analysis of sulfate species and trace elements in aerosols collected at Noto Peninsula.

Early Career Scientist

Presenting Author:
CHIHIRO MIYAMOTO, Department of Earth and Planetary Science, Graduate School of Science, The University of Tokyo, Tokyo, JAPAN, chihimiya446@eps.s.u-tokyo.ac.jp

Co-Authors:
Atsushi Matsuki, Institute of Nature and Environmental Technology, Kanazawa University, Kanazawa, JAPAN
Yoshio Takahashi, Department of Earth and Planetary Science, Graduate School of Science, The University of Tokyo, Tokyo, JAPAN

Abstract:

The Asian continent is one of the most significant source regions of anthropogenic emissions in the world (Street et al., 2003). Sulfate (SO_4^{2-}) aerosol concentration around the area has been high in recent years because of large energy consumption in China and influences various problems such as air quality, human health, and climate change, and its influence will differ depending on their chemical species. In this study, to understand sulfate species in aerosol and their chemical process during transportation, we collected size-fractionated aerosol samples (seven fractions) at Suzu, the Noto Penisula which is isolated from major anthropogenic source in Japanese main island. The site is appropriate to focus on materials emitted from Asian continent and their long-range transportation to Japan and the Pacific. Then, concentration of sulfate and other soluble ions were measured using ion chromatography. Sulfate chemical species were determined by X-ray absorption fine structure spectroscopy. Concentrations of trace elements were measured using inductively coupled plasma mass spectrometry.
When air mass came from Asian continent, major sulfate species were gypsum in coarse particles, while fine particles consisted of ammonium sulfate, ammonium hydrogen sulfate, and hydrated sulfate. When air mass did not pass through Asian continent and was mainly transported from Japan sea, however, fraction of gypsum to sulfate in coarse particles was small, and hydrogen sulfate fraction in fine particle was larger than the former samples. In addition, size-distribution of trace elements such as zinc, lead, nickel, and vanadium, which are emitted by combustion process similarly to sulfur dioxide and used as markers of flue materials, was different between the samples. These results suggested that (i) sulfate species in aerosols collected at Noto differed depending on the influence of Asian continent and that (ii) trace elements are useful to estimate emission source and/or materials of sulfate.