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Ongoing atmospheric monitoring activities at Noto peninsula

Atsushi Matsuki[1*]

[1]Institute of Nature and Environmental Technology, Kanazawa University

Anthropogenic emissions are now perturbing biogeochemistry and climate, and it is particularly actualized in the parts of East Asia. The long-range transport of atmospheric pollutants is increasingly recognized in the downwind regions of rapidly growing industry and urban activities. There is a growing concern on the environmental consequences. Currently, there is an urgent need for high quality observational data to be collected and shared, in order to accurately estimate the health and climate impacts of the East Asian aerosols and trace gases, and eventually have the assessed impact reflected into the regional environmental policies.

Noto peninsula stems from the western coast of mainland Japan and extends approximately 150 km into the Japan Sea. Long-term record of polycyclic aromatic hydrocarbon (PAH) concentrations (Yang et al., 2007) has proven that geographical location of Noto peninsula is ideal for a baseline atmospheric monitoring station in East Asia, since it is surrounded by the sea and isolated from any neighboring major city or other pollution sources.

In order to reinforce the aerosol monitoring capabilities at Noto peninsula, the NOTOGRO (acronym for NOTO Ground-based Research Observatory) station was established in Suzu city (37.45oN, 137.36oE) at the tip of the peninsula. The instruments are housed in a room on the top level of a 3-storey building facing the eastern coast of Suzu city. The PM10 inlet located directly above the room provides sample air into the room for the aerosol in-situ measurements. The sample air is then shared by various instruments via an isokinetic flow splitter. The core instruments deployed at the station for long-term aerosol monitoring consist of those endorsed by the Global Atmospheric Watch Network (GAW/WMO) including e.g. aerosol chemical speciation monitor (ACSM). In addition to the aerosol in-situ measurements, atmospheric trace gas measurements (CO, O3, NOx, SO2) as well as column aerosol optical depth measurements are being conducted at the station in collaboration with domestic partner institutions.

The growing long-term record has revealed, for example, periodic transport of atmospheric pollutants characterized by increased levels and variable fractions of elemental carbon, sulfate, and organics within fine particles, especially in spring and autumn. Air-mass trajectory calculations suggested distinct transport patterns depending on the seasons, and often associating the major pollution sources to be within the continent. However, such analysis remains rather inconclusive when identifying the exact emission source. Therefore, expectations are high for the finger-printing aspect of the related elements using isotope ratios for the more precise source apportionment.

Keywords: atmospheric aerosols, trans-boundary pollution, ground-based observation