

Carbonaceous aerosols observed in Noto peninsula: Their source and impact on aerosol CCN activity

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One of the least understood characteristics of aerosols is the source and contribution of the organics. Our recent observation in Noto (remote coastal site in central Japan) revealed that submicron aerosol particles in the outflow from Northeast Asia has a variable but high concentration of carbonaceous matter [1, 2]. In order to investigate on their source and transport pathways, we analyzed ¹⁴C concentration within fine carbonaceous particles.

We collected weekly PM_{2.5} samples at NOTO Ground-based Research Observatory (NOTOGRO, 37.45°N, 137.36°E) from 26th Jun, 2014 to 17th June, 2015. The analysis of ¹⁴C was conducted using AMS ¹⁴C system (High Voltage Engineering Europe, Model 4130-AMS). In addition, the other parameters including concentrations of specific organic compounds, δ¹³C, black carbon, PM_{2.5} and back trajectory analysis were combined to better constrain the carbon sources.

The results showed that contribution of carbonaceous matter originating from fossil fuel burning is generally small (30 pMC; percent modern carbon), whereas that from modern biological activity and/or biomass burning is large (70 pMC). Concentration of ¹⁴C in autumn samples were the highest in all seasons (90 pMC), and there were indications that large scale agricultural waste burning in Northeast China is the likely source. The lowest ¹⁴C concentrations in winter samples (55 pMC) can be linked to combustion of fossil fuel for domestic heating and little biological activity. The impact of such seasonality in carbonaceous matters (mainly organics) on the regional aerosol CCN activity will also be discussed in the presentation.

[1] Ueda et al. (2015) Atmos. Chem. Phys. Discuss., 15, 25089-25138 (accepted for ACP). [2] Iwamoto et al. (2015) Aerosol and Air Quality Research, DOI: 10.4209/aaqr.2015.09.0545.