

3.105 Characterization of organic aerosols at a forest site in Kii Peninsula, Japan, based on PMF analysis of aerosol mass spectra.

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Abstract:

In the forest atmosphere, both of the local formation of biogenic aerosol and the inflow of regionally-transported aerosol may contribute to the burden of submicrometer organic aerosols, resulting in complex temporal variations of the compositional characteristics. We investigated the compositional characteristics of organic aerosols at a forest site in Kii Peninsula, Japan, based on an on-line aerosol mass spectrometry. The atmospheric observation was performed at Wakayama Forest Research Station, Kyoto University, during July-September 2014. The mass spectra of aerosol components were acquired using a high-resolution time-of-flight aerosol mass spectrometer. Black carbon was analyzed using a particle soot absorption photometer, and aerosol optical thickness was analyzed based on the measurement using a skyradiometer. Aerosol mass spectrum signals associated with ions from organics and signals of NO^+ and NO_2^+ were subjected to the PMF analysis. Three among five factors from the five factor solution show diurnal variation patterns with the enhancement in the daytime, suggesting the contribution of locally-formed biogenic secondary organic aerosol. The diurnal variations of the other two factors were not clear. One of these two factors shows a strong positive correlation with sulfate, suggesting the association with in-cloud processing and/or anthropogenic sources. The other of the two factors is characterized by strong signals of nitrogen containing ions, suggesting the association with nitrogen containing components. Based on the elemental analysis of the aerosol mass spectra and the estimate of the contributions of locally-formed and regionally-transported organic components to PMF

factors, the oxygen-to-carbon ratios of locally-formed organic components were estimated.