

1.217 Source apportionment of PM_{2.5} and analysis of long-range transport from Northeast Asia Continent to Niigata in Eastern Japan.

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Abstract:

Intensive measurement of PM_{2.5} mass and chemical composition was implemented for two weeks during each of four seasons from May 2015 to February 2018 at a rural site in Niigata, eastern Japan. Daily mean concentrations of PM_{2.5} ranged from 2.3 to 33.4 μg m⁻³ during the observation period. All daily means were lower than the Japanese Environmental Quality Standard for PM_{2.5} (35 μg m⁻³). The major chemical components of PM_{2.5} was SO₄²⁻, NO₃⁻, NH₄⁺, OC, EC. Compared with the data at other urban sites in Japan, lower concentrations of EC and NO₃⁻ and a higher OC/EC ratio were observed, which may result from no significant stationary source and low vehicular traffic around the observation site. PM_{2.5} source apportionment was conducted using positive matrix factorization (PMF) analysis, and the results inferred four major sources: sea salt (10.2%), biomass combustion (18.9%), soil dust (13.2%) and secondary aerosol (44.4%). The potential source contribution function (PSCF) analysis demonstrated that the major source regions for secondary aerosol and sea salts were domestic in southwest Japan and the Sea of Japan coast, whereas those for biomass combustion and soil dust were both domestic and the Northeast Asian continent (NEA) due to long-range transportation. Comparing with the previous source apportionment studies in western Japan, this study showed a larger domestic contribution of southwest Japan for secondary aerosol, while a

larger contribution of the NEA was observed in the previous studies. The central mountains in Japan which will hinder transportation from Tokyo metropolitan area is one of major reasons of the larger contribution of southwest Japan. Furthermore, the PSCF analysis for each season showed that significant contributions of biomass combustion in autumn and soil dust in winter were originated from the NEA, which is uniquely observed in this study.