

ABSTRACT

SOURCE IDENTIFICATION AND APPORTIONMENT OF FINE AND COARSE PARTICULATE MATTER IN METRO MANILA BY POSITIVE MATRIX FACTORIZATION

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Fine and coarse fraction particulate matter were collected in two sites in Metro Manila and analyzed for elemental content. The Manila Observatory (MO) data were collected from 2005 to 2007 while the National Mapping and Resource Information Authority (NAMRIA) data were collected in 2005. The Positive Matrix Factorization (PMF) receptor model was used to identify and apportion the possible sources of two particulate matter (PM) size fractions from each of the two sites. The likely directions of the identified sources were determined using Conditional Probability Function (CPF) which used wind speed and wind direction measured at the MO sampling site. Results showed that the possible sources of fine fraction PM in both sites were traffic, ammonium sulfate, biomass burning, sodium nitrate, aged seasalt, soil, construction, road dust, and tire wear. Among these sources, those that were combustion-related like traffic, ammonium sulfate, and biomass burning make up the majority of the fine fraction PM mass (with a combined contribution that ranged from 64 to 74 percent). For the coarse fraction PM, results showed that the possible sources were soil, construction, sea salt, aged sea salt, ammonium nitrate, sodium nitrate, sodium sulfate, and tire wear. Crustal and sea salt-related sources were the major contributors to coarse fraction PM with a combined contribution which ranged from 43 to 82 percent. For both fine and coarse fractions, the contribution of crustal-related sources decreased in the wet season. Crustal, traffic, and secondary sulfate-related sources were localized while biomass burning and sea salt-related sources were affected by the prevailing monsoon. Moreover, traffic and secondary sulfate sources (related to fuel combustion) were associated with major roadways in the vicinity of the sampling site.