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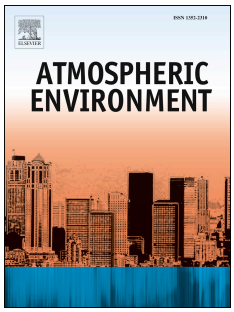

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Characteristics of Airborne Particle Number Size Distributions in a Coastal-Urban Environment

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Abstract

Particle number size distributions are among the most important parameters in trying to understand the characteristics of particle population. Atmospheric particles were measured in an interaction of mixed environments in the Southeastern coastal city of Wollongong, Australia, during a comprehensive field campaign known as Measurements of Urban, Marine and Biogenic Air (MUMBA). MUMBA ran in summer season between 21st December 2012 and 15th February 2013. Particle number concentrations measured during this campaign were indicative of the interplay between marine environments and urban air which met the objective of this campaign. Particle number size distributions ranging from 14 nm to 660 nm in diameter, as measured by Scanning Mobility Particle Sizer (SMPS) in this study, were grouped using Principal Component Analysis. Based on strong component loadings (value ≥ 0.75), three different factors were identified (i) Small Factor (N_S) : 15 nm $<$ Dp $<$ 50 nm, (ii) Medium Factor (N_M) : 60 nm $<$ Dp $<$ 150 nm and (iii) Large Factor (N_L) : 210 nm $<$ Dp $<$ 450 nm. The three factors describe 89% of the dataset cumulative variance. Particles in this region are dependent upon the interaction between the sources, and cannot be viewed as a simple mixture of biogenic and anthropogenic sources associated with various mechanical processes. The particles observed in the morning were found to be influenced by combustion emissions, presumably primarily from traffic, which is most obvious in N_L. The particle population during the day was found to be influenced by a mixture of marine sources and secondary aerosols production initiated by photochemical oxidation. The local steel works and the

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