

Chemical Analysis of Water Soluble Aerosol Composition in Northern Taiwan During Northeasterly Monsoon

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Abstract

This study analyzed the aerosol soluble composition and their depositions obtained during the northeasterly monsoon from winter of 2008 to spring of 2009 in Taipei, Taiwan. The coarse (PM_{2.5-10}) and fine (PM_{2.5}) parts of the aerosol compositions are analyzed. According to the principal component analysis, these compositions are grouped into three species, namely, the sea salt-related species, including Na⁺, Cl⁻, Mg²⁺, and K⁺; the crustal-related species, including Ca²⁺; and the pollution-related species, including NH₄⁺, non-sea salt SO₄²⁻, and NO₃⁻.

According to the analyses, the averaged concentrations of coarse and fine particles of sea salt, dust, and secondary pollutants can be retrieved as 3.9, 4.0, 2.9 μg m⁻³, and 1.4, 0.8, and 11.8 μg m⁻³, respectively, during the northeasterly monsoon. The water-soluble parts of dust particles show higher coarse particles in winter than in spring, whereas sea salt shows higher fine particle concentrations in spring. For the secondary pollutants, the concentrations of both coarse and fine particles are higher in spring than in winter.

Comparing with the total mass concentration (PM₁₀) from the fine and coarse particles, water-soluble ions accounts for approximately 46% of the total mass. Coarse particles are mainly composed of dust and sea salt, accounting for 18% and 17% of the coarse mass, respectively. The fine particles are mainly composed of secondary pollutants, accounting for 39% of the mass.