

4.232 Seasonal characterization of PM2.5 mass and its chemical composition associated with visibility reduction observed at IORS in the East China Sea.

Early Career Scientist

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Abstract:

There are often decreasing dramatically visibility represented by intense haze in the early summer over East Asia despite reduced aerosol mass. We conducted the measurements of PM_{2.5} mass and its chemical compositions during December 2004 ~ June 2008 at Ieodo Ocean Research Station (IORS, 32.07N, 125.10E) where represents background air quality in East Asia. The mean concentration of PM_{2.5} mass during experimental period was 21.8 $\mu\text{g}/\text{m}^3$ with the maximum of 35.3 $\mu\text{g}/\text{m}^3$ (March) and the minimum of 11.2 $\mu\text{g}/\text{m}^3$ (September). The seasonal variation of PM_{2.5} mass shows the similar pattern of O₃ owing to synoptic scale meteorological conditions, which seasonally causes Chinese outflows containing air pollutants including SO₄²⁻, OC, and EC. The major chemical components of PM_{2.5} shifted from SO₄²⁻ in winter to OC and SO₄²⁻ in early summer in seasonal variations. In summer, the PM_{2.5} mass starts to decrease due mainly to the enhanced impact of the aged marine air masses and the vigorous wet scavenging during the Asian monsoon. Due to the synoptic air transition, the poorest visibility with the most intensive haze occurred in June (early summer), which is also supported by maximum MODIS AOD (June). We found that OC concentration was distinctively high with high OC/EC ratio (~9.5) in June. In this period, the clearing fire of agricultural residues is common in China and is a major source of aerosol. These results show that one of the leading source of high OC in early summer is the managed agricultural fire in China as well as the continental fossil fuel combustion.