Measurement of Aerosol Chemical and Optical Properties at Two Regional GAW Stations in the Eastern Part of China

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Since April 2003, field observations of aerosol chemical, physical, and radiative properties at two regional Global Atmosphere Watch (GAW) monitoring stations in the eastern part of China were conducted under the auspices of the "Measurement of Aerosol Chemical, Physical, and Radiative Properties in Yangtze Delta Region" and the "Observational Study on the Continental Baseline Air Over China" projects. The measurements at Lin'An (Zhejiang Province) and Shangdianzi (about 150 km northeast of Beijing) lasted over 1 year and included measurements of aerosol light scattering and absorption coefficients, size-resolved aerosol mass, ions, and elements in the aerosols, EC/OC compositions, and aerosol optical depth. Primary analysis of the aerosol scattering and absorption properties and a portion of the chemical composition results are presented.

Scattering and absorption coefficient measurements at the Lin'An site showed the monthly mean absorption coefficient (at 521 nm) during the observational period ranged between 52 to 123 Mm^{-1}, the scattering coefficient (at 525 nm) was 152 to 364 Mm^{-1}, and the single scattering albedo (SSA) at 525 nm was 0.72 to 0.82. This SSA was much lower than the mean values of SSA in the northern hemisphere obtained from AERONET [Dubovik et al., *J. Atmos. Sci., 59,* 590– 608, 2002] and also much lower than the previous measurement made by Xu et al., *Atmos. Environ., 36*, 161-173 [2002] at the same site in November 1999. In the 1999 measurements, the mean (standard deviation) of the absorption coefficient was 23 (14) Mm^{-1}, scattering coefficients were 353 (202) Mm^{-1}, and SSA scattering albedo was 0.93 (0.04). The monthly mean absorption coefficient at the Shangdianzi station was 11 to 40 Mm^{-1}, scattering coefficient was 76 to 282 Mm^{-1}, and SSA was 0.81 to 0.94. The seasonal variation of absorption and scattering coefficients in the two regions showed both scattering and absorption coefficients were lower in summer and higher in winter at Lin'An. The monthly variations were more complicated at Shangdianzi, mainly because of the related wind in that region.

Size-resolved ions and EC/OC summer-time aerosol chemical compositions at Lin'An for 2002 and 2003 show that because of significant differences in weather condition between the two summers (summer 2003 being the hottest and driest in the past 40 years), aerosol sulfate and OC concentrations in 2003 were nearly half of those measured in the summer of 2002. The cause of this difference is not yet totally clear, but less industrial activities in Eastern China brought on by the shortage of power supplies because of the regional drought and heat-wave may be a plausible explanation.