

Hygroscopicity of ambient submicron particles in urban Hangzhou, China

Jianmin Chen[†];

[†] Fudan University, China, People's Republic of

Leading author: jmchen@fudan.edu.cn

In this study, the hygroscopicity of size-segregated ambient submicron particles in urban Hangzhou was studied from 28th Dec. 2009 to 18th Jan. 2010, using a Hygroscopicity-Tandem Differential Mobility Analyzer (H-TDMA). The measured hygroscopic growth factors (GFs) for 30-200 nm particles were in the range of 1.1-1.5. The campaign-averaged GFs increased with the initial dry particle size and then leveled off. The hygroscopic growth diagram of size-segregated particles showed bimodal distribution, suggesting external mixing of two major components. Deconvolution of the hygroscopic growth diagrams indicated that the trend for the GFs of the more hygroscopic components were similar to that of campaign-averaged GFs while the GFs of the less hygroscopic components remained almost constant for the whole size range studied. In addition, the fraction of the more hygroscopic components also increased with the initial dry particle size and then leveled off. The diurnal cycle for the GFs was insignificant, suggesting a minor role of photochemistry-produced compounds in the particulates. Our results imply that submicron particles in urban Hangzhou were almost entirely externally mixed, and the hygroscopic properties of ambient particles were mainly a function of sizes and chemical composition.