



## **Mixing state and particle hygroscopicity of organic-dominated aerosols over the Pearl River Delta Region in China**

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In this study, we performed simultaneous measurements of aerosol hygroscopicity and particle phase chemical composition at a suburban site over the Pearl River Delta Region in the late summer of 2016. By using a self-assembled Hygroscopicity Tandem Differential Mobility Analyzer (HTDMA), hygroscopic growth factor (HGF) of particles of four different sizes (30 nm, 60 nm, 100 nm, 145 nm) particles was obtained at 90% RH. A dominant mode of more hygroscopic (MH) particles together with a small mode of less hygroscopic (LH) particles were observed, suggesting our aerosol population was external mixing. The HGF of less hygroscopic (LH) mode particles increased, while their number fractions decreased during the daytime indicating these LH mode particles in the early morning or late afternoon could be possibly from local automobile exhaust during the rush hours. By using the chemical composition obtained from an Aerodyne Quadruple Aerosol Chemical Speciation Monitor (ACSM), the hygroscopicity of ambient aerosols can also be derived. From the closure analysis between the HTDMA-measured HGF and the ACSM-derived hygroscopicity, hygroscopic growth factor of organic compounds (HGF<sub>org</sub>) was estimated to be 1.26 for 145 nm particles and a simple linear relationship between HGF<sub>org</sub> and the oxidation level inferred from the O:C ratio of the organic material was suggested. Compared with the results from other environments, HGF<sub>org</sub> obtained from our measurements appeared to be less sensitive to the variation of its oxidation level, which is similar to the observations in the urban atmosphere of other megacities in China.