Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2017-1100-RC1, 2018


Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Characterization of aerosol hygroscopicity, mixing state, and CCN activity at a suburban site in the central North China Plain" *by* Yuying Wang et al.

**Anonymous Referee #2**

Received and published: 22 January 2018

This study reported field measurements results of the chemical speciation, hygroscopicity and CCN properties of ambient particles at a suburban site in the central North China Plain (NCP). The probability density function of the hygroscopicity parameter kappa-PDF was then derived from measurement data and showed only a singular hygrophilic mode which was very different from profiles observed in other regions of the NCP (that were normally bi- or tri-modal). Among the possible factors affecting aerosol hygroscopicity (the mixing state, chemical composition and particle size), particle size was identified as the key factor influencing the particle CCN activation.

This study explored the aerosol microphysical properties in a region that was not pre-



Printer-friendly version

Discussion paper

viously studied and the results can be useful when compared with existing data to understand aerosol aging and its impact on particle microphysics and the climate. The topic is relevant to the scope of the journal of Atmospheric Chemistry and Physics and should be considered for publication.

(1) The tile may be changed to “Characterization of aerosol hygroscopicity, mixing state, and CCN activity at a suburban site in the central North China Plain” to reflect the unique location of this study.

(2) Section 4.1, Lines 317-321: While it’s been shown that aging of BC will enhance its hygroscopicity and CCN activation, the actual determination of the GF of aged BC could be challenging (see, for example, Torsten et al., Environ. Res. Lett., 2011) as the DMA mobility size change may be marginal. A few chambers studies on soot SOA from anthropogenic VOCs may provide some insights here (Guo et al., ES&T, 2016 and Qiu et al., ES&T, 2012). In general, the knowledge on particle morphology is useful, and in principle, ACSM and DMA data can be combine to retrieve morphology information.

(3) Section 4.1, Lines 347-351: As pointed out by recent studies, amines may contribute significantly to the NPF events (e.g., Zhang et al., Chem Rev., 2015). Several studies have shown that amine compounds in aerosol phase can be hygroscopic, sometimes even at event low RH (e.g., Gomez-Hernandez et al., ES&T, 2016; Chu et al., PCCP, 2015; Qiu and Zhang, ES&T, 2013). Since the reported field measurements took place in a local with heavy industrial activities, it is possible that amine may contribute significantly to the hygroscopicity of the 40-nm particles

(4) Section 4.3: It would make more sense to merge Figures 6&7 as the discussions on the two figures are closely related.

(5) Section 4.4: It seems odd that kappa was not derived from CCN data as described by Petters and Kreidenweis (2007). A side-by-side comparison of kappa values derived from HTDMA, chemical speciation and CCN may be more straightforward. Also, CCN-derived kappa values can also provide basis for comparison with other studies that

may only had CCN results.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-1100, 2018.