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Interactive comment on "A study of aerosol liquid water content based on hygroscopicity measurements at high relative humidity in the North China Plain" by Y. X. Bian et al.

Anonymous Referee #2

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General comments:

Aerosol liquid water content (ALWC) is one of the key quantities, which are closely related to aerosol optical properties and climate effect and to chemical reactions that take place in aerosol particles. Although ALWC can be calculated using some thermodynamic equilibrium models, all models are highly simplified and have some limitations. A few methods have been reported to calculate ALWC from measurements. However, most of the previous methods are limited to RH lower than 90%. This paper proposed a method of calculating ALWC under RH 20-99% conditions. Size-resolved hygroscopic growth factors are obtained based on High Humidity Tandem Differential Mobility An-

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alyzer (HH-TDMA) measurements and using the kappa-Köhler theory. ALWC values for the HaChi campaign are then calculated from the hygroscopic growth factors and particle number size distribution (PNSD). The ALWC values are compared with those from the ISOPROPIA II model. Impacts of RH and PNSD on the calculated ALWC values are studied.

I think this paper addresses relevant scientific questions within the scope of ACP. The methods used in this paper are novel. The results presented are definitely of interest and valuable. This paper is well structured and concise. The authors give proper credit to related work. I only have a few minor points and recommend publication of this paper in ACP after minor revisions.

Specific comments:

1. P4093, L4-5, "the RH measured"?

2. P4097, L20-22, why T used to calculate kappa is set to 293K? Was this the average T? Aerosol water is not pure water. Do we expect a surface tension coefficient much different from 0.0728 N m^-1?

3. P4098, L10-11, the size-resolved growth factor is not explicit in Eq. (2). I think more explanations on the resolving process are needed.

4. Section 4.3.1 and Fig. 5, a fitted fuction connecting the relative ALWC and RH would be interesting and valuable.

5. P4103, L2-3, the R^2 value of the Aitken mode under RH>90% is 0.35, which is much larger than 0.2.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 4089, 2014.