**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "A simplified empirical method for determination of aerosol hygroscopicity and composition" *by* C. H. Chan et al.

C. H. Chan et al.

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Thank you very much for the reviews of Referee 1 on our manuscript. We appreciate the valuable comments and helpful suggestions for improving the presentation of the manuscript. Our intial responses to the comments raised by Referee 1 are shown below. We will make corrections to the final manuscript based on our responses if there are not further questions. The final paper will also be edited by the editoral office when accepted to improve the English. For the specific comment 1: In this manuscript, we use a mathematic method to determine aerosol hygroscopicity, and prove that is reasonable. The word "feasibility" is used to indicate not only an experiment, but also

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a mathematic method could determine aerosol hygroscopicity. Therefore, the title is suitable for this manuscript. For the specific comment 2: The extinction here is related to both solid and liquid phase aerosols. In our calculation, we just only exclude the contribution of the gas extinction. So the term "aerosol" is more accuracy in this case. For the specific comment 3: LT is the abbreviation of the term "Local Time". The term "LT" will be corrected. For the specific comment 5: Twomey (1977) indicated that an increase in aerosols due to anthropogenic emissions would enhance the albedo. It is because for the same amount of cloud liquid water, a cloud with more condensation nuclei would be with more but smaller drops. They have a higher albedo than one with fewer, larger drops. This higher albedo would lead to a cooling effect. For the specific comment 7: We just show some cases of experiments for the determination of aerosol hygroscopicity. They haven't other special meaning. For the specific comment 8: The term "dry aerosol extinction" represents that this extinction excluded the contribution of water vapor. For the specific comment 11: The reference of value "q=1.3" is Cheng (2004). This will be corrected. For the specific comment 12: The Method I is useful method for calculation of aerosol hygroscopicity. It is proved in sect. 4.1 because there is a good linear relationship between dry aerosol extinction and PM concentration. Therefore, if the result by Method II contradicted the result by Method I, it would make a big question. However, both results are in good agreement with each other. The RMSE shown in fig. 4 indicates the improvement of Method II. So, it is not a contradiction. For the specific comment 14: the aerosol extinction coefficient was determined by equation 1 and the Rayleigh scattering extinction was removed. It is indicated in sect. 3. Because these figures are discussed in Sect. 4.1, so we only use the term "(without Method I modification)" to shows there is no modification related to hygroscopicity.