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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol water parameterization: a single parameter framework" *by* S. Metzger et al.

Anonymous Referee #2

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This work presents a simple vi-parameterization to simulate the water uptake of aerosols containing semi-volatile and non-volatile inorganic species. The authors clearly justify how they construct the framework and carefully evaluate their modeled results. This newly developed approach would be valuable for predicting the aerosol water content in global atmospheric aerosol-chemistry and climate modeling. Overall, this paper is well written. However, it is a bit too long, but I think the information presented is essential. My only concern is how to determine and predict the formation of solid in this framework.

For example, in section 2.6 Mixed solution RHD, p33507, line 15

"When the RH is below RHDMIN the aerosol is considered to be dry, while for RH above RHDMAX the aerosol is considered wet with all ionic compounds dissolved. In

between a mixture can exist, with some compounds dissolved while other compounds are precipitated from the solution."

In the text, "When the RH is below RHDMIN, the aerosol is considered to be dry." This statement may not be correct. This is because aqueous droplets may still exist as metastable droplets and do not crystallize below RHDMIN. I do agree that this simple parameterization can reasonably predict the water uptake of aqueous droplets. However, I am not sure if the occurrence of crystallization (or efflorescence) of inorganic mixtures can be accurately predicted by the simple parameterization with this assumption. Given that aerosol water uptake is largely depended on the physical state of the aerosols (e.g. solid vs. aqueous droplets), this may have potential implications when the authors simulate the water uptake of ambient aerosols if the physical state of the aerosol is not accurately predicted. The authors should clarify this point.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 33493, 2015.