

Interactive comment on “On mineral dust aerosol hygroscopicity” by Lanxiadi Chen et al.

Anonymous Referee #2

Received and published: 22 June 2020

General comments:

The authors present the experimental water adsorption data for 21 mineral dust samples, including 7 authentic mineral dust samples and 14 atmospherically relevant compounds. The motivation of the work is to improve our knowledge of hygroscopicity of mineral dust aerosol and reduce uncertainty of its hygroscopic parameters. The manuscript is well written and I recommend this manuscript to be published in ACP.

Specific comments:

1. Figures S1-S7 display very wide size distribution (often bimodal) of mineral dust particles. So the only average particle diameter presented in table 1 is not enough to characterize particles size in dust samples. Some parameter describing the distribution width (variance, uncertainty, quantiles, etc) should be added.

C1

2. The measurement errors information should be presented in section 2.3 (accuracy of RH and mass measurements, temperature stability).

3 The mass stability criterion reporting in line 169 is doubtful. It is well known that achieving adsorption equilibrium may require several hours, especially at high RH. The figure 2 shows that in some measuring steps (blue line) the stability apparently has not yet been achieved. Reduction of measurement time may result in underestimation of water uptake.

4. In line 499 “Figure 4b” seems to be replaced “Figure 11b”. As reported in comment 1 the average diameter is not an informative parameter for the considered dust samples; therefore, the absence of size dependence of surface coverages is not justified.

5. A more detailed explanation of the discrepancy between the results of this work and previous studies is desirable. Especially this concerns the hygroscopicity parameterizations. The values of AFHH differ by more than 10 times for CaCO₃ and 6 times for SiO₂ although the error of each coefficient is very small (table 6).

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-442>, 2020.

C2