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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Influence of particle size on the ice nucleating ability of mineral dusts" *by* A. Welti et al.

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General comment

We appreciate the suggested corrections to the paper and thank the referee for the critical questions. We reply to the individual comments below.

Specific comments

1. -
2. We will discuss this in more depth.

3. We will rewrite the introduction accordingly.

4. The samples were used untreated and the aerosol were generated via dry dispersion. The used mineral dusts have small hygroscopicity parameters in the range of κ = 0.02 to 0.001 (Herich et al., 2009).

5. Taking into account the multiple-charged particles induces only minor changes. The average diameter of the "'100 nm"' particles changes about 6-11% and the 200 nm particles about 14-23% depending on the dust species. We now consider this for the data analysis as suggested by the reviewer.

6. There is a buoyant updraft due to the temperature difference between the walls. The total flow profile within the chamber is therefore slightly shifted towards the cold wall. The flow profile is taken into account for the determination of the temperature and saturation conditions of the sample flow. The sample flow can be considered laminar. We added that.

7. Only the qualitative fact that the nucleation efficiency is size dependent is addressed here. The phrase has been rewritten.

8. It's the absolute difference. We will reformulate the statement to make it clearer.

9. This is not obvious to us. We expect that dust particles from the same source and in the same size range would have the same surface properties. We expect the shape of particles to be roundish but (as can be seen from the SEM images) of irregular shape. The shape is independent of the particle size within the used size range. For the surface normalization a spherical shape of the particles is assumed. This is a necessary simplification.
We agree that the theoretical interpretation was exaggerated and change it in the revised manuscript.

ACPD
9, C1638–C1640, 2009

10. Contact angles were calculated according to Chen et al. (2008). To discuss the whole procedure is too lengthly; thus we refer to Chen et al. (2008). Comparing contact angles is one attempt to explain the results.

11. We performed an error analysis to make the results more quantitative.

Technical corrections

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References

Herich, H., Tritscher, T., Wiacek, A., Gysel, M., Weingartner, E., Lohmann, U., Baltensperger, U., and Cziczo, D.: Water uptake of clay and desert dust aerosol particles at sub- and supersaturated water vapor conditions , Phys. Chem. Chem. Phys., doi:10.1039/B901585J, 2009.

Chen, J., Hazra, A., and Levin, Z.: Parametrizing ice nucleation rates for cloud modeling using contact angle and activation energy derived from laboratory data, Atmos. Chem. Phys. Discuss., 8, 14 419–14 465, 2008.

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9, C1638–C1640, 2009