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Interactive comment on "LACIS-measurements and parameterization of sea-salt particle hygroscopic growth and activation" *by* D. Niedermeier et al.

G. Biskos

biskos@deas.harvard.edu

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This paper presents important laboratory measurements on the hygroscopic growth and activation diameters of sea-salt particles using state-of-the-art instrumentation. I have only one comment with respect to the shape factor correction of the pure NaCl cube particles.

As the authors correctly point out, NaCl particles have a cube shape and thus a shape correction has to be applied for comparison of mobility-based measurements with predictions that typically assume a dry volume-equivalent diameter. Traditionally, people have used a constant shape factor of 1.08 for the cube NaCl particles, but observed

differences between predicted and measured hygroscopic growth factors (e.g., Hämeri *et al*. 2001, Gysel *et al*. 2002). In recent HTDMA experiments we have found that a size-dependent shape factor can account for these differences for particle sizes as small as 8 nm (Biskos *et al*. 2006a). Although greater deviations are predicted for sub-100 nm particles, the size-dependent shape factor of 150- and 200-nm NaCl particles (that the authors investigate) can still be significantly higher than 1.08 (cf. inset of Fig.1b in Biskos *et al*., 2006a).

Following on the comment of Reviewer 2 for the shape factor of $(NH_4)_2SO_4$ particles, the consensus from the literature that they are spherical may not be fully true. In fact, recent experimental evidence suggests that ammonium sulfate particles are slightly non-spherical, having an associated shape factor that ranges from 1.07 to 1.03 as particle size decreases from 500 to 160 nm (Zelenyuk *et al*., 2006). For nanoparticles, we have measured an apparent shape factor of the order of 1.02 as estimated by the restructuring of dry ammonium sulfate particles at RH values from 20-60% during the course of HTDMA measurements (Biskos *et al*. 2006b; cf. Figure 6 and associated discussion therein).

References

G. Biskos, L.M. Russell, P.R. Buseck, and S.T. Martin (2006a), *Nanosize effect on the hygroscopic growth factor of aerosol particles*, Geophysical Research Letters, 33, L07801.

G. Biskos, D. Paulsen, L.M. Russell, P.R. Buseck, and S.T. Martin (2006b), *Prompt deliquescence and efflorescence of atmospheric nanoparticles*, Atmospheric Chemistry and Physics, 6, 4633-4642.

Hämeri, K., A. Laaksonen, M. Väkevä, and T. Suni (2001), *Hygroscopic growth of ultrafine sodium chloride particles*, Journal of Geophysical Research, 106, 20,749-20,757.

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Gysel, M., E. Weingartner, and U. Baltensperger (2002), *Hygroscopicity of aerosol particles at low temperatures. 2. Theoretical and experimental hygroscopic properties of laboratory generated aerosols*, Environmental Science and Technology, 36, 63-68.

Zelenyuk, A., Cai, Y., and Imre, D. (2006), *From agglomerates of spheres to irregularly shaped particles: Determination of dynamic shape factors from measurements of mobility and vacuum aerodynamic diameters*, Aerosol Science and Technology, 40, 197-217.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 11511, 2007.