Atmos. Meas. Tech. Discuss., 6, C2655–C2657, 2013
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Atmospheric Measurement Techniques Discussions

Interactive comment on "A method for sizing submicrometer particles in air collected on formvar films and imaged by scanning electron microscope" *by* E. Hamacher-Barth et al.

Anonymous Referee #2

Received and published: 19 September 2013

The manuscript "A method for sizing submicrometer particles in air collected on formvar films and imaged by scanning electron microscope" by Hamacher-Barth et al. presents a quantitative offline characterization of size and morphology of ambient aerosol particles using scanning electron microscopy. Standard aerosol particles have been used to evaluate the reliability of the method. Further, two aerosol samples from an Artic ship campaign were systematically analyzed and SEM-results are compared against online techniques. The study is well written and easy to follow. It deals with the microscopic investigation of aerosol microstructure (e.g. morphology, mixing state, surface properties), which is an important topic with regard to aerosol properties and their im-

pacts on atmospheric cycling. In general, I think the study is appropriate for AMT and should be published after some minor revisions as listed below.

- p. 5402 / l. 22 to p. 5403 / l. 6: This is a well written and short introduction. Please add some references for the crucial statements (e.g. CCN, optical properties, multiphase processes).

- p. 5405 / l. 3-5: Do you expect a loss of volatile compounds from the aerosols particles in the SEM? Do you think that harsh high-vacuum conditions in the SEM could change particle composition and morphology? Could this potential artifact be taken into account in the analysis? Please add a statement.

p. 5408 / l. 21: The focus of the ASCOS campaign was the link between marine microbiological life and aerosol properties. Did the SEM analysis provide any evidence for a microbiological aerosol source?

p. 5409 / l. 3-26: Did you dry the air stream before sampling? If yes, how? What was the ambient RH and what was the RH behind the dryer? I am trying to image what the water content of the sampled aerosol particle may have been when they were deposited on the substrate. Given that the aerosol particles in the marine environment had certain water content, how may this have changed their morphological appearance after residual water has evaporated from particle on the sampling substrate? Please state.

In general, I wonder what the influence of sampling on the particle morphology, mixing state etc. may have been. The standard PSL cell can be treated as spheres and the diameter can be easily retrieved. But how do ambient particles behave during sampling? What is their diameter to height ratio on the substrate? How is the polarity of the substrate influencing their shape (compare Freedman et al., 2010)? Please discuss more explicitly how these uncertainties are taken into account.

p. 5415 / l. 1-10: The figure numbers are mixed up here (Fig. 8, Fig. 13, Fig. 14, . . .).

p. 5416 / l. 1-28: Three morphologically different aerosol particle types are characterized here. Do you have any EDX-data to check if morphological differences correspond with chemical differences?

p. 5416 / 1-4: You state that the observed particles were not “necessarily spherical but can show a very irregular shape and surface”. If I understand correctly, you use the appearance of the particles on the sampling surface to infer their morphology in airborne state. Again, how does sampling change their morphology and surface? The gel particles (GP) appeared as a “film-like structure” – how is the equivalent spherical diameter retrieved in such cases? How can the volume of the particles be calculated without information about the height of the impacted particle?

p. 5419 / l. 7: How exactly does information about elongation and circularity “improve the understanding” of the aerosol population?

References:

Freedman, M. A., Baustian, K. J., Wise, M. E. and Tolbert, M. A.: Characterizing the Morphology of Organic Aerosols at Ambient Temperature and Pressure, Anal. Chem., 82, 7965-7972, 10.1021/ac101437w, 2010.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 5401, 2013.