

Interactive comment on “Results and recommendations from an intercomparison of six Hygroscopicity-TDMA systems” by A. Massling et al.

A. Massling et al.

anma@dmu.dk

Received and published: 6 May 2010

Reviewer comment: As I understand it, in at least one of the HTDMA instruments (Haemeri et al, 2000) the RH of the aerosol flow is kept 3% lower than the RH of the sheath air. As shown by Biskos et al. (ACP 6, 4633), this can affect the GF measurement especially with small particles. If indeed the aerosol flow RH was lower, then its effects on the results should be discussed. If the aerosol and sheath flows had equal RH, it should be mentioned.

Author comment: This is true, the instrument did have different RH set points for the aerosol and sheath flows, as these measurements were performed before the publi-

C343

cation by Biskos et al. with the system. The difference in these experiments was 8% RH for sheath and aerosol flow (82% and 90%), which will result in a clear broadening during the DRH measurements. Also in the other measurements, the RH seen by a particle inside the DMA will be different, and on average will result in slightly lower growth factors than expected. This effect is still believed to be smaller than the temperature effect that was discussed in the paper, which is also strengthened by the fact that the measured GFs were too high and not too low. In the revised version of the manuscript, this point will be discussed in more detail.

Reviewer comment: Theoretically, there is a size effect to the DRH, which should be noticeable at least with the 30 nm particles, see e.g. Topping et al. (ACP 5, 1205). On the other hand, Biskos et al. didn't observe such an effect with ammonium sulfate nanoparticles (within the uncertainty of their RH measurement of 2.5%). Nevertheless, I believe that this issue should be at least mentioned.

Author comment: This is a very good point. With regard to the literature, a temperature dependency of DRH on particle size was observed by model observations. On the other hand, Haemeri et al. (2000) report a lack of any change in DRH for sub 100 nm particles. Our measurements were carried out for 70 nm particles. As proposed, we will mention these differing results in the final revised version of the paper as a discussion point.

Reviewer comment: System 1 shows the largest positive difference in RH from setpoint (Fig. 3) and a corresponding positive difference in DRH (Fig. 6). However, system 2 shows a large negative difference in RH from setpoint but a positive difference in DRH. This seems strange, and should be discussed.

Author comment: We do completely agree on this comment. We will have a further look into this single case of measurements for system 2. This issue will be discussed in more detail in the revised version of the manuscript.