

Interactive comment on “Instrumentational operation and analytical methodology for the reconciliation of aerosol water uptake under sub- and supersaturated conditions” by N. Good et al.

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We thank Dr Petzold for his supportive criticisms and the opportunity to address the requested specific comments.

1. The operation of a DMA is briefly described in Section 3.1 with particular emphasis on the correction for multiply charged particles which is described with more detail in Section 5. The authors describe in Section 4.1 that they have calibrated the DMA over the entire size range from 4 nm to 600 nm by a combination of nebulising latex spheres and using an electrospray generator. However, in Figure 3 only results from the latex

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spheres calibration are shown. Please add data points from the electrospray generator. Additionally, units should be added to the titles of x- and y-axes. Furthermore, since the diameter measured by the DMA for each latex standard was obtained by a fitting procedure it appears appropriate adding error bars to Figure 3.

The calibration was shown as originally presented because, as stated in the text, the electrospray calibration was not performed in-situ. Since the data were not acquired at the same time as the PSLs we felt it was appropriate to only show the data used to determine the DMA calibration for the experimental period. In hindsight we believe it would be useful to show both the CCNc's and the HTDMA DMA calibrations. The 1:1 lines suggested by reviewer 1 (which are indeed a valid addition) do not serve their purpose on the scale of the plots. Thus, we have added a table in place of this figure showing the calibration values, hence the reader can easily see the result of the calibration.

2. In the section on the calibration of the CCN counter, also the calibration of the OPC is described. For the sake of clarity the position of the OPC and its role in the CCN counter operation should be described briefly. Otherwise the reader has no clear idea what the OPC is used for and to what extent errors in the OPC calibration propagate into the overall error of the measurements.

A brief description of the OPC's operation is added to the section "CCNc - principle of operation".

3. The authors describe in detail the calibration of the different parts of the instrument package. What is missing is the assessment of the uncertainties associated with each calibration step and the overall uncertainty in relevant properties resulting from the combination of the different steps. It is recommended to point out the improvement in uncertainties for the different aerosol properties which is achieved with this new calibration procedure. Such a section would help to assess the gained progress in hygroscopic growth factors, critical supersaturations for CCN activation, and CCN

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activated fractions of the investigated aerosol.

A full analysis of errors and uncertainties the HTDMA and CCN along with their propagation through to final data products is presented in Irwin et. al. 2010, to which we refer the reader for a detailed discussion beyond the scope of this paper. We do agree that the improvement in the measurements as a result of the techniques presented in this paper can be more clearly presented. In section 4.1 the sizing improvements from the DMA calibrations are given which applies to both the monodisperse CCN and HTDMA calibrations is more clearly stated in the text and can be seen in the new table 1. In section 4.2 we state the improvement in the growth factor measurement achieved as a result of calibrations. In section 4.3 we more clearly describe the improvement in the CCNc's supersaturation calibration illustrated in Figure 6. In section 5.2.3 we point the reader to Irwin et al. 2010 for information upon how the errors associated with the analysis are propagated.

References:

M. Irwin, J.D. Allan, and G. McFiggans, Evaluation of errors in derived data products from water uptake measurements of atmospheric particulates, submitted to Atmos. Meas. Tech. Discuss.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 359, 2010.