

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.

Anonymous Referee #1

Received and published: 25 February 2010

Referee Comment: amtd-2009-81

Title: Instrumentational operation and analytical methodology for the reconciliation of aerosol water uptake under sub- and supersaturated conditions

Author(s): N Good et al.

General scientific comment:

The manuscript presents the calibration procedure of H-TDMA and CCN instruments in a very detailed way. Even if this kind of calibration has been carried out by others before (personal communication), it is very useful to find it in a scientific article as a

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kind of instruction manual. Limitations of this kind of calibration are listed, too.

The manuscript gives in the end a view into a field study evaluating the operation of the instruments including the proposed calibration procedures.

The manuscript is worth for publication in AMT, but I would like to address a number of minor comments on the manuscript before publication.

General comment on the manuscript style:

In general, the manuscript is well structured. A few comments on the restructuring are found below. In any case, the reviewer thinks that the language looks sometimes a bit “irritating”, meaning the introduction to a relative clause with “that” is missing or sentences are starting with “To”. As the authors are native speakers, the reviewer will only mention this issue in general and motivate the editor to take special care concerning this comment.

Detailed scientific comments and comments on the manuscript style:

Introduction

Page 360, line 13, 14, 18: Avoid the repetition: “require”

Page 360, line 20: Write: “particle populations”

Page 361, line 7: Write: “of the columns’ walls”

Page 361, line 19: Write: “with the aim”

Page 361, line 24: Write: “long-term”

Page 361, last two sentences: I do not understand your statement. Can you reformulate this paragraph and clearly state what you mean!

Experimental configuration

Page 364, line 14: Write: “this may limit the certainty”

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Page 364, line 18: Write: "is calculated"

Page 364, second paragraph: You should add here, that the problem of multiply charged particles leads to a measurement of HGF of larger particles, which - even if the same chemical composition is present- may have different HGFs because of the Kelvin term. Describe here, where the problem is to be found!

Page 365, line 3: Write: "multiply charged particles"

Page 365, line 6: Write: "by a DMA as a"

Page 365, line 5, 10, 12: Avoid the repetition: "ensure"

Page 367, line 14: Write: "distributions are measured"

Page 367, last sentence of this section: I find the temperature descriptions here confusing. If you state that one temperature is higher than another, you have to denote what T, T1, and T3 is. What is then T2. Describe the locations of the different points, say how they are connected (like $T1 > T2 > T3$ or so) and give an example during operation.

Instrument calibration

Page 368, line 4: Avoid repetition: "ensure"

Page 368, line 10: Use better English: "with over sampling around the peak"

Page 368, line 19: Write: "one of the limitations of these calibrations"

Page 369, line 6: Write: "and also to define"

Page 370, line 8: Write: "the critical supersaturation Sc "

Page 370, line 9: $D0$ is not a function of Sc as I understand

Page 370, line 14: Write: "for Fa values around"

Page 370, line 17: Write: "there may be"

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Page 370, line 18: Write: "from their calibrations"

Page 371, line 18: Write: "ammonium sulphate calibrations"

Page 372, line 7: Write: "reaches its equilibrium size"

Data analysis

Page 372, line 21: Write: "of the HTDMA data analysis"

Page 372, line 24: Write: "can be corrected for"

Page 375, line 6: Write: "of singly charged particles"

Page 375, line 13: Write: "used to calculate"

Page 375, line 20: Say of which sample!

Page 376, line 6: Say of which sample!

Page 375, line 12 – Page 376, line 6: In my view, this section does not state two methods to calculate Sc , it rather more states one method to determine Sc ($D0$) and one method to determine $D50$ (S). It is somehow written in a confusing way and I would very much like the authors to clear what can be derived by the data analysis.

Page 376, line 18: Write: "required for"

Page 376, line 18: Write: "of sizes typically sampled"

Page 377, line 14: Write: "analysis approach must be"

Page 377, line 16 - 27: I feel this paragraph must be placed earlier in the manuscript as you used this information on how particles are detected as droplets during all the calibrations.

Example of operation in the field

Page 378, line 8: Write: "aerosol is formed"

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Page 378, line 8: Write: “a ship-borne platform”
Page 378, line 12: Write: “as well as during some periods”
Page 378, line 17: Use the acronym instead of “per cubic centimetre”
Page 378, line 18: Write: “is similar and the resulting”
Page 378, line 20: Use the acronym instead of “per cubic centimetre”
Page 378, line 22: Write: “are particles observed during”
Page 378, line 25: Write: “The size-resolved CCN activation”
Page 379, line 25: Start this paragraph one sentence earlier.
Page 380, line 3: Write: “to calculate”
Page 380, line 3: Write: “two methods outlined”
Page 380, line 4: Write: “to derive”
Page 380, line 10: Write: “operational range”
Page 380, line 11: Write: “is substantially below”
Page 380, line 13: Write: “the CCNc calibrations are valid the operational conditions”
Page 380, line 16: Write: “295.3K)”
Page 380, line 25 – page 381, line 17: You list several good explanations for the discrepancies found in the data. In addition, use the wording non ideal solution, which you describe, but do not use by now.
Page 381, line 9: Write: “may not be accurately”
Discussions and conclusions
Page 381, line 25: Write: “to obtain measurements of size-resolved”

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Page 381, line 19 - 23, page 381 - 382, line 24 - 3: These two paragraphs contain lots of repetitions in terms of information given in the text. Summarize!

Page 382, line 21: Write: “two test aerosols were”

Tables

Table1: List the surface tension parameters you have used for your calculations.

Figures

Figure 1: Use a better colour/symbol code for the upper figure!

Figure 3: Use a quadratic plot and show the 1:1 line!

Figure 4, figure caption: State the name of the field study, where the calibration is carried out!

Figure 5f: Use a quadratic plot and show the 1:1 line!

Figure 5, figure caption: State the name of the field study, where the calibration is carried out!

Figure 6: Use a quadratic plot and show the 1:1 line!

Figure 6, figure caption: State the name of the field study, where the calibration is carried out!

Figure 7, figure caption: State which sample is investigated and which S was used!

Figure 8, figure caption: State which sample is investigated!

Figure 9, figure caption: State which sample is investigated and which S was used!

Figure 10, figure caption: Write: “illustrate the difference”

Figure 12: Would it not be more convenient to plot $dN/d\log D_p$ in the coloured graph?

Figure 13, figure caption: State which sample was investigated and put the caption into

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one sentence!

Figure 15, figure caption: Write: "Time series of D50 at...." Write: "the theoretical D50"
State which sample/field study is investigated!

Figure 16, figure caption: State which sample/field study is investigated! You probably
might use the same order of colours from bottom to top as in Figure 15.

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