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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The importance of aerosol mixing state and size-resolved composition on CCN concentration and the variation of the importance with atmospheric aging of aerosols" *by* J. Wang et al.

J. Wang et al.

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Interactive comment on "The importance of aerosol mixing state and size-resolved composition on CCN concentration and the variation of the importance with atmospheric aging of aerosols" by J. Wang et al.

Anonymous Referee 2 Received and published: 3 June 2010

The study presents results form a detailed CCn study where different assumptions of CCN compositions and mixing states for a data set acquired during the MILAGRO

experiment in Mexico City are evaluated and compared. The authors make five assumptions of different complexity and try to reproduce measured CCN number concentrations. They show that the assumption of an external mixture often leads to good results although it may not represent the true composition/mixing state of the aerosol but rather opposing effects cancel. The findings are useful and promise that relatively simple assumptions can be made to predict CCN number concentrations, even in polluted regions with freshly emitted aerosol. The paper is well written and it is appropriate for publication in Atmospheric Chemistry and Physics after consideration of my comments below.

Thank you for your encouraging review.

Specific comments

p. 11752, l. 24-27: Revise this sentence. Either add verb or remove 'that' in l. 24
** Response***
A verb is added.

p. 11755, l. 13 and l. 18: These sentences seem somewhat redundant and could be combined.
** Response***
The sentences are now combined.

p. 11758, l. 12, 13: '5 values every 36 min' and 'all 5 supersaturations every 36 min' seem redundant
** Response***
"all 5 supersaturations every 36 min" is now deleted.

p. 11760 Section3: The multiple addition of 'in MILAGRO' in several sentences in this section seems redundant as all discussion is about this data set.
** Response***
Done. Several "in MILAGRO" are now deleted.

p. 11761, l. 24: 'disappearance' might be misleading here as the particles do not actually disappear but only their concentration decreases.
** Response***
"disappearance" is replaced with "absence"

p. 11763/4: An additional figure might be highly useful that shows graphically the different compositions/mixing states. If you keep the text in the section, I suggest highlighting only the differences between the cases and not repeating all common properties.
** Response***
The differences are highlighted in the subheadings of the cases.

p. 11771 ff (Section 5.2): This section should be split into (at least) two subsections as it is quite hard to follow. Possible subsections could be 'effect of kappa(org)', 'effect of ageing', 'comparison to previously assumed mixing time scales'
** Response***
The section is now split into two subsections: "Impact of mixing state on calculated N_{CCN} and its variation with aerosol aging" and "Comparison to aging time scales from previous studies"

Table 1: For clarity, it would be useful to add another head line to the table that specifies the property that is compared in the respective column. E.g., Differences due

to 'mixing state', 'bulk vs. size-resolved', . . .
** Response***
We thank the review for this suggestion. The descriptions are too long to be included in the table. We have added the description as footnotes of the table.

Figure 1: What is the color-coding in Figure 1c) ?
** Response***
The color-coding is $d\bar{N}/dlog_{10}(Dp/Dp^*)$. This is now added in figure 1c and in the text.

Figure 2: For clarity, add (I-S), (E-S) etc to the legend (and refer to the new figure I suggested above)
** Response***
Done.

Figure 3: Complete the caption by '. . .as a function of local time and assumption on mixing state/composition'
** Response***
Done.

Figure 5: the abbreviation 'fxn' for 'fraction' seems odd.
** Response***
"fxn" is replaced with "fraction"

Technical comments

p. 11756, l. 6: . . .evaluation of its effect (add 'of')

** Response***
Done.

p. 11756, l. 25-27: Either '. . .implication. . .is discussed' or '. . .implications . . .are discussed'
** Response***
"implication" is changed to "implications"

p. 11776, l. 25: 'particle sizes' (not 'particles size')
** Response***
Corrected.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 11751, 2010.