

Responses to reviews

Reviewer #1, Response to comment #2: This discussion should be added at an appropriate place in the manuscript (e.g. in the conclusion or in the discussion of model results and/or around l. 104).

Reviewer #1, Response to comment #3: I think the discussion of these additional effects and processes should not be in Section 2 that describes the model as used in the present study. Instead, I suggest moving it to the conclusion section and discussing it in the context of 'further model improvements'.

Reviewer #2, Response to comment #4: The difference between PM_{2.5} and PM₁ mass could be added briefly at the beginning of Section 3.3.

Reviewer #2, Response to comment #6: The definition of the differences between the model cases might be also useful for readers of the paper. Therefore, it should be added briefly to the manuscript.

Reviewer #2, Response to comment #7: I'm aware that the figure is not included in the revised manuscript and I agree that it is not really necessary to add it. However, I think it is curious that for the largest particle sizes (> ~800 nm) particles with $0.2 < \text{FBC} < 0.65$ show a higher activated BC fraction than those with smaller FBC values. Is there any explanation for that?

Reviewer #2, Response to comment #11: I think that the information of the negligible mass fraction of H₂SO₄ to total sulfate mass in the particle size range of 1-40 nm is an important one as it shows the overwhelming effect of condensation and should be added to the manuscript.

Reviewer #2, Response to comment #13: The reviewer asked for some quantification of this effect and improving Figure 10 by adding some numbers instead of only using '+' or '-' signs, respectively. I think the conclusions and the figures were much stronger if you could indeed add such numbers (even if they are uncertain and might be specific to the cases simulated here).

Reviewer #3, Response to comment #1: The reviewer's inquiry about a definite conclusion or recommendation is useful. Some discussion/suggestion should be added in the manuscript (e.g. conclusion section).

Technical/minor comments

l. 29: remove 'an' between 'using' and 'additional'

l. 64: replace 'under' by 'to'

l. 81: The model study by Volkamer et al., 2006 was not a 3-D study but a box model study.

l. 142: remove 'an' between 'using' and 'additional'

l. 144: specify 'uncertainty for WHAT?'

l. 342: do you means 'fraction of total aerosol mass' instead of 'ratio to preexisting aerosols'?
'Preexisting aerosols' would exclude other secondary aerosols such as sulfate.

l. 398: replace 'by' by 'due to'