Dear Authors,
the manuscript improved a lot after revision. Nevertheless, in my opinion, there are still some more things to improve before publication. Please see the list below.
Sincerely yours,
Your Editor A. Kerkweg

- p.6,l.24 - p.7,l.7: The paragraph is very hard to understand. This is mostly because one never knows, which species is hosted in which media. It would have been better to follow the request of referee #2 to add identifiers like SO_2(g) to the species name. E.g., what is "nucleation of SO_4", if -as you claim- you always mean the particulate sulfate when using SO_4. To be precise, please at the phase to all species names: use "(g)" for gas and "(aq),(l) or (p)" for aqueous, liquid or particulate at your convenience.
- p.13, l.22: temperatures → temperature
- p.14, l.20: remove "macro" in macrophysics
- p.15, l.26 - p.15, l.2: I do not see how reduction in SAD produces less LNO_x
- p.15, l.22: AOA was not introduced
- p.15, l.23: space after "10 hPa" is missing
- p.16, l.5: BDC was not introduced.
- p.18, l.5/6: leave out the sentence about aircraft observations here, it is more confusing than helpful.
- p.18, l.15-17. Here I disagree. The model does not reproduce sulfate aerosol measurements. Only for the height of 4-5 km this might be true.
- p.18, l.25: From Fig. 9 I would not say that BC is overestimated overall.
- p.19,l.4: Is there any concrete proof that it is BC plumes which are underestimated?
- p.19, l.12: "An overall comparison of aerosol .." → "An comparison of overall aerosol .."
- p.20,l.8: "a largest" → "the largest"
- p. 20, l.24/25: removes first "temperatures"
- p. 21: I think there is an issue with the references of the figures. Fig. 13 is only referenced in the introduction (line 5), but not thereafter. Which suggests that figure 13 could be deleted. From the content of your discussion I assume, it should be referenced in line 20ff, and in the paragraph starting line 24. If this is correct, this leaves the issue, that figures should be numbered in the order in which they are referred to. Thus Figs. 13 and 14 should be switched.
- p.22, l.6: delete the second opening bracket.
- p.22, l.12: this is only true for northern hemisphere
- p.22, l.13: second and third column (first is HIPPO data)
- p.23, l.22: up **to** 80%
- p.24, l.9-16: The adjustment of SAD shows almost no effect for most of the cases. You pick the only one, which shows a litte effect. This is not convincing to me.
- p.25, l.10: bracket "Fig. 23, left and middle panel"

- p.25, l.20: bracket “Fig. 23”
- p.26: Why do you write the simulation marker differently (all lower case letters) in the subscripts and not CAM4chem as everywhere als?
- p.26, l.16: What do you mean with “The spread the annual in LNO_x production” ???
- p.27, l.23: Do you really mean model version? It seems to be more a configuration thing.
- p.28, l.19: “a result **of** a coarse resolution”
- Appendix A: The indentation of the reactions is very strange and thus nearly unreadable. Please correct it.
- Table 3. As you use SO4 as abbreviation for sulfate aerosol (similar to OC/BC etc.) it should be also in the abbreviation table.
- Table 3, MOZART : **M**odel for ...
- Fig. 3: From the caption and the annotations it is not clear what is depicted. Why are OH, NO_x and H_2O in %, while Ozone, nitric acid and CO are in ppb? Additionally Ozone difference in Fig. 2 was in %. From the unit I would assume that it is Lighting NO_x production and not Lighting NO_x, but even this is inconsistent with ozone production in %. Please be consistent!
- Fig. 5: Why use millibars instead of hPa here? SI-units should be the standard.
- Fig. 6: The upper right corner of SAD_SOA looks quite artificial.
- Figs. 8 / 21, caption: use either “indicate” or “describe”
- Figs. 9 / 18 / 22: You never use the acronym CAM5-MAM3-chem (even not in the caption of these figures), so please remove MAM3 in the pictures themselves.
- Fig. 10: It is strange to show the same picture in two panels of the same figure twice. I was looking for the difference ....
- Fig. 10: The x-axis annotations are unreadable (less would be good).
- Fig. 10, caption: “over only” → “only over” ?
- Figs. 12 / 15: the numbers are often not readable in the pictures...
- Figs. 12 / 15, caption: “different numbers are correspondent ..” → “different numbers correspond”
- Figs. 12 / 15, caption: The meaning of the numbers is hard to read. Readablility would be greatly enhanced by adding (outlayed as a small table) a third “picture” or panel for each of the regions listing the meaning of the numbers.
- Fig. 13 / 16: at least at current size, the coloured numbers are not easy to read. Please ensure, that the numbers are readable in the final version.
- Figs. 17 / 20: From the caption I understand that “observation - model” is shown. Your discussion implies that the sign is the other way round. Please make unmistakably clear what is shown.
- Fig. 19: Somehow the longitude axis got lost ...
- Fig. 23-25: At print-size, symbols are not distinguishable.
- Fig. 23: Symbol annotation is missing.