

Replies to Comments by Executive Editor

I have been assigned to look after the final stages of revision of this paper prior to acceptance for publication in ACP. As you will see from the information accompanying this message, the handling editor has recommended acceptance of the paper as a Research Article, not as a Letter, subject to further technical correction. The editor gives justification for not accepting the paper as a Letter. I know that they have discussed this with other experienced Editors and I see their justification as reasonable. I am sure that your paper will attract plenty of attention, particularly given its title, when it appears as a Research Article.

Therefore, I confirm acceptance of your paper as a Research Article, subject to you making the technical correction specified by the original handling editor and to you reformatting the paper to meet the requirements of a Research Article, rather than those for a Letter. Since the combination of these changes is a bit more than a standard technical correction I have specified this as publish subject to minor review (review by editor) -- but my review will simply be to ensure that the paper has been reformatted correctly.

Reply: We thank the Executive Editor for accepting our manuscript as a research article subject to minor review/technical corrections. We have reformatted our manuscript. The technical corrections suggested by the handling Editor are now incorporated in the revised manuscript in green colour at line numbers indicated in the replies.

Replies to the Handling Editor

Public justification (visible to the public if the article is accepted and published):

There is one outstanding technical point pertaining to a query of reviewer #2. Their original question #2 enquired "Is the dust impact on HKH snow impurity considered in the model simulations as well? How about organic carbon (e.g., Brown et al., 2022)? Please clarify.", to which the authors initially responded the following: "We have considered impurities other than dust in our experimental set-up. In our model simulations, we have incorporated changes in BC, OC, and sulfate aerosol emissions. Thus, we have considered changes in organic carbon in our model (see section S1.2). In the model, we have also considered the impact of dust as well."

I think there was perhaps a misunderstanding here because this, to me (and presumably the second reviewer), in the context of the question would imply an answer in the affirmative, i.e. that the effect of dust and BrC on snow was considered. But as pointed out by the reviewer, this was using a model that couldn't consider this. The response to the second review is to state that they aren't considered, but no modifications of the text are offered, so the misunderstanding could still stand.

Reply: We have mentioned that “The model also accounts for changes in snow albedo due to airborne BC deposited in the top layer of snow, while the effect of other in-snow aerosol particles (e.g. dust, OC) is not simulated in the model.” at L118-120

The text pointed to in the second rebuttal is somewhat ambiguous on this point because it refers to a "reduction of anthropogenic sulfate, OC, and BC burden" without specifying that this is a purely atmospheric effect, noting that 'burden' can refer to multiple reservoirs in earth system science. But besides this, the paragraph is confusing because it goes on to say, "combined with lower atmospheric loadings of PM2.5 and PM10", in spite of the fact that sulphate, OC, and BC are a subset of PM2.5 and PM10. For the sake of reducing ambiguity, I must ask that the authors modify the text to explicitly state that only BC was the only aerosol component represented in the snow model.

Reply: the above sentence is modified as “This decreased heating of the snowpack and tropospheric column is the combined effect of the reductions of BC in snow, as well as changes in atmospheric concentrations of sulfate, OC and BC.” L247-249.