M. Fromm

GTeam have generally responded well to the latest round of reviews and improved the manuscript.

I will defer to Reviewer 1 for how well GTeam addressed his/her concerns regarding the :arch effect" and the modified wording of the extinction correction. The changes seemed adequate to me.

There is one answer GTeam gave (Answer 10) that I have a concern with. I had made the point that the OMPS-LP extinctions may have a low bias and asked them to consider discussing that. In their Answer 10 (and the textual revision made) GTeam presented two perplexing points. One is that they refer to Taha et a; (2021) and version 2.0 of the OMPS-LP aerosol version. But that is irrelevant for this paper because they use v1.5, which they acknowledge may have extinction underestimates for the densest Raikoke plume elements. Taha et al. (2021) is not cited nor discussed in this manuscript. The second perplexing part of their answer is that the CCC in question is an interesting case because of its composition being a blend of gaseous SO2 and sulfate particles. But this is not peculiar to the CCC; much of the plume was a combination of SO2 and sulfates. Moreover, OMPS-LP scattering is only sensitive to particles. So introducing the SO2 element in their response and the manuscript, in the discussion of extinction bias, has no apparent merit. Hence I would suggest they revise their newly added sentence to remove the reference to SO2, and limit it to a statement about the possible low bias in v1.5 extinctions where the plume is particularly concentrated.

Authors:

We deleted on L374 the sentence "Given that this plume is composed of a mixture of SO2 and aerosol (Fig 12), it is likely that OMPS LP is underestimating its magnitude." And added on L378 the following "The OMPS LP version 1.5 algorithm has a restriction on how much the retrieved aerosol extinction is allowed to grow per iteration at each altitude relative to the first guess, which may cause an underestimation of the retrieved aerosol where the plume is concentrated (README Document for the Suomi-NPP OMPS LP L2 AER675 Daily Product, 2019)." We also added the README reference to the reference list.

Reviewer 1

The authors have done a good job in taking into my previous suggestions. I believe the manuscript is greatly improved and can be published subject to one technical correction and one comment that the authors can choose to take into account if they wish:

Comment:

l.219: "...including a uniform aerosol layer..." I was very confused when I first read this but after reading the next paragraph it made sense and perhaps illuminated the reasons for some of the initial confusion around the arch effect between myself and the authors. The arch effect as described in this paragraph is an effect on the observed radiances, and not the 1D retrieval as I had originally assumed. One way to remove the arch effect is a full 2D retrieval, but a 1D retrieval also removes the arch effect for a horizontally homogenous atmosphere which explains the difference in background conditions. I will leave it up to the authors to decide if any additional explanation should be added here.

Authors: We have moved from L226 statement

"Obviously, the arch effect for a spherically uniform aerosol layer should be fully compensated by the 1D retrieval model. But the further the real system is from the spherical symmetry, the more difficult it will be to take into account the "arch effect""

to L219 - right after the phrase about "a uniform aerosol layer", which makes the logic clearer.

Technical Correction:

l.289: arc -> "arch"

Authors: Fixed.