Response#2 reviewer#2

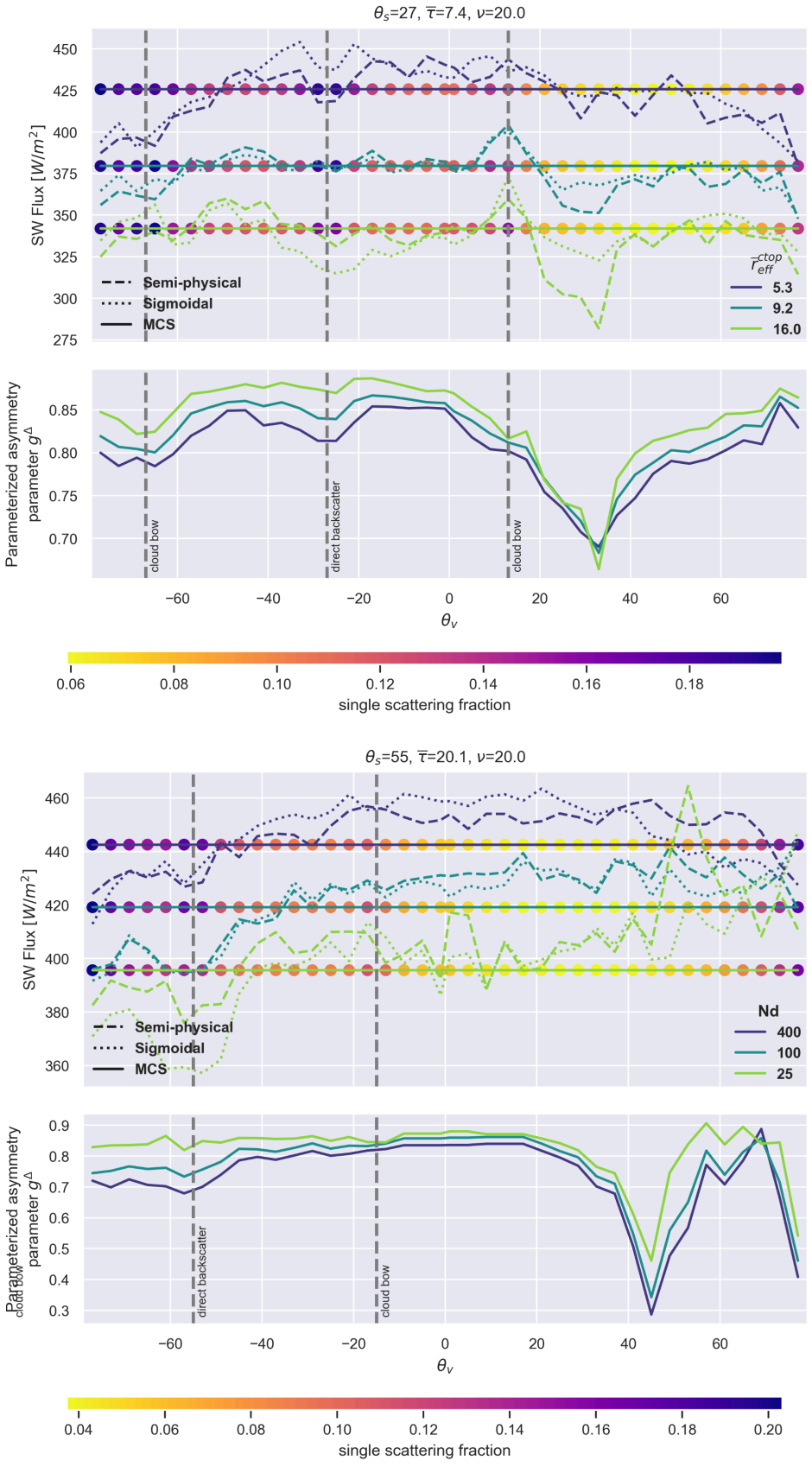
I thank the authors for addressing many of the points I raised in the original review. Several things have not been suitably addressed or addressed at all. Some of this is for reasons I understand of computation complexity or the principal intent of the presented work which I accept but this needs to be made clear. Others are addressed not as expected but can be simply mitigated. I therefore suggest slight addition text and altered presentation of some figure which I think are minor changes relating to presentation and clarity and I hope simple to achieve. I think this needs to be made for the paper to be suitable for publicationfor the reasons given in my original review and summarized below.

1. In my original review under major points, I expressed confusion regarding the asymmetry parameter varying with view angle. You have added a classical definition of the asymmetry parameter in the text but this does not address the problem that the asymmetry parameter as the intensity weighted averagecosine of the scattering angle would not vary with viewing angle unless you were redefining the frame of reference for each angle. Thus it remains very confusing but would be solved I think if you **explicitly state that the parameterised asymmetry parameter varies with viewing angle to mitigate the limitations of the model / the mismatch between the model assumption and the MODIS retrieval assumption** (I assume unless you *are* changing frame of reference with viewing angle). Before you list the things it account (in line 86. Although you stating it accounts for the cloud bow and glory featuresimplies these are not part of the model so is this really the case?
2. Section 2.1 At the start of this section given your reply to my concerns that your simulations are not observationally based and of unverified realism that you 'seek semi-idealized conditions to infer sensitivity' add a statement to this effect: **The following is used to provide a simplied framework for testing. The resulting implied relationship between optical depth and effective radius is shown to be generally representative of realily** (**ref to the supplement).** I'm afraid I can't find the supplement pdf in the documents anymore but I would still caution for future consideration if this work is taken forward that small scale variation vs mean variation are not the same and the results don't speak to your assumption on the scale you apply it or the assumption regarding optical depth depending only number density and geometrical thickness or the use of a fixed number density.
3. Figure 6 and 7, reply to my note that the sza =1 is a limited case states that 55 degrees as well as 27 degrees is shown. This is not the case for figures 6 and 7, but upper panel is added in figure 8. **As a minimum the dashed lines whose labels were in the lower panels need to be label in figure 8. By preference upper and lower panels for these angles would be better and should replace figure 7. Figure 6 should also show one of these angles not 1 degree SZA.**
4. Figure 10, shows the 'summary statistics' for the 2000 cases (25 optical depth pdfs x 20 view angle x 4 solar zenith), you state that each case is stated equally without consideration for frequency of occurrence. I don't think they summarize anything useful in this case when the very different frequency ofoccurrence of the different SZA . **As a minimum a separate box whisker plot for each SZA**

should be shown in figure 10. Figure 11 should show the effect of domain size for a single representative SZA of 55.

We want to thank the reviewer for the review.

1. ***Thank you for the comment. We introduce the parameterized asymmetry parameter used in the semi-physical model starting in L.94. We explain that to reduce residuals found between MODIS observations and simulations, g is optimized per viewing and solar angle (∆). And that with this optimization, the parameterized g∆ also becomes viewing angle dependend. We describe that the residuals found and reduced by the optimization of g are caused by various 3D effects, as well as single-scattering features related to the underlying phase function, such as the broadening and shift of the cloud glory and the cloud bow.***
   We adapted the phrase in L.94 a bit to make it clearer that by optimizing g per angular bin, the found **mismatch (residuals) between the modeled and the MODIS observed radiances is reduced. Furthermore, we cited the paper of Tornow et al. 2020, where the exact procedure is explained in detail.**
2. ***Thank you for your remark. We added a sentence in L. 142 to make it clearer that we are using a simplified framework.***
3. ***Thank you. We retain SZA = 1° in Figs. 6 and 7 because this geometry most clearly illustrates the cloud bow and glory features. Fig. 8 shows other geometries. For Fig. 8 we added the description to the dashed lines. The lower panel we excluded in Fig. 8 to not overload the manuscript with figures. Below this document we added the two geometries of Fig.8 including the lower panel. If the reviewer thinks that including the lower panels would improve the paper, we propose to add them to the appendix.***
4. ***Thank you for this comment. We adapted the figures and text according to your suggestions.***


θ_s=27, $\overline{\tau}$=7.4, ν=20.0
SW Flux [W/m^2]
Semi-physical
Sigmoidal
MCS
$\overline{r}_{eff}^{ctop}$
5.3
9.2
16.0
Parameterized asymmetry parameter g^{Δ}
cloud bow
direct backscatter
cloud bow
θ_v
single scattering fraction
θ_s=55, $\overline{\tau}$=20.1, ν=20.0
SW Flux [W/m^2]
Semi-physical
Sigmoidal
MCS
Nd
400
100
25
Parameterized asymmetry parameter g^{Δ}
cloud bow
direct backscatter
cloud bow
θ_v
single scattering fraction