Review of the paper by Ansmann et al.

General comments: I enjoyed reading this paper and think it would make a useful contribution to the literature.

My comments in order of occurrence are:

1) I do think the paper could be made substantially shorter, with a tighter focus on the data itself and what is new (as opposed to review – while I would love to see a long review of wildfires by these authors published in another form, I think including so much background here is distracting and weakens the utility of their new material). In addition, the way wildfire smoke interacts with PSCs or volcanic sulfate is unknown and the speculation here may be right but we really don't know. I think the material on pages 1-8, and Figures 2 and 3, would be part of a great review paper.
2) Line 294. Please specify what dataset(s) was used for this averaging; several were mentioned.
3) Figure 4 is useful, but since a key focus of the paper is the changes at altitudes too low for normal PSC chemistry, I think it would be very valuable to add two more panels showing the same thing for the ozone in the 9-12 km region that is highlighted in the abstract and elsewhere. We really need to see how unusual the reported changes in that height range are, compared to other years. This should be presented either here or elsewhere. Also, can 2021 be added to this plot?
4) Line 364. Near-complete reduction at what vertical level?
5) Line 371. Reference is needed for the statement that Raikoke contributed 10%, or say "(see below)".
6) Can Figure 6 be hatched to show values that are the lowest in the record (if there are any)? Also, how can we relate this figure to statements made elsewhere regarding the 9-12 km layer?
7) It would be great if Figure 7 could delineate the degree to which the high aerosol amounts in the lower portion of the profile are unusual. Would it be possible to show the range of previous years as a shaded region rather than just the single line for the mean?
8) Again re Figure 7, how about showing the range of temperature anomaly in 2020 and 2021 from reanalysis? Single station data can sometimes be unrepresentative.
9) Same issue for the low altitude ozone anomaly in Figure 7 – how unusual is it? A time series like what I suggested in Figure 4 would best answer that question in my view; alternatively, a range of variability in other years could be shown here.
10) Lines 460-463. This is a very important point – can it be expanded and substantiated?
11) The discussion of how much extra ozone loss occurs in the PSC region (lines 479-484) is pretty rough. Factors such as temperature and transport can induce

variability in this region from year to year. This discussion is not very convincing as a result. Can you put this figure in context relative to variability from other factors? If not, I suggest deleting it.

12) Line 505. Please clarify how you identify the PSCs only about 18 km. How can you be sure?
13) Line 521. I see your broad points here but I don't follow how you get the fraction volcanic – yes, the ratio would likely have been about 45 for volcanic but was measured to be 70. But please explain how you get 10%.
14) Figure 10. Same comment as above re. the corresponding Antarctic plot, Fig 4.
15) Line 543. Same problem with variability as made above re the Antarctic; I don't think you can reliably infer the extra ozone loss in this way. For example, cold years also imply very little downwelling, which will also lead to low ozone values, and I think you can't be confident from such a simple way of looking at it.
16) The low altitude anomalies are key in Figure 11. Same comments as above for the Antarctic – we need to better understand how unusual these are.
17) In closing, I want to make one more major comment. There is evidence from OMPS data and presentation on that which I have seen that the aerosols from the Soufriere eruption in 2021 may have contributed to the aerosol load in the Antarctic in that year. It would on the other hand, be surprising if so much of the 2020 Australian fire aerosol lasted into 2021. You may want to make the same kind of comparison that you did for the Arctic in Figure 9 to probe the extinction and what that can tell you. Or you may want to at least discuss the possibility.