



EGUsphere, referee comment RC2  
<https://doi.org/10.5194/egusphere-2022-438-RC2>, 2022  
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## **Comment on egusphere-2022-438**

Anonymous Referee #2

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Referee comment on "Incorporation of aerosol into the COSPv2 satellite lidar simulator for climate model evaluation" by Marine Bonazzola et al., EGU sphere,  
<https://doi.org/10.5194/egusphere-2022-438-RC2>, 2022

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Bonazzola et al extend the well-known COSP satellite cloud simulator with a package designed to retrieve vertically-resolved aerosol information. This is a natural and valuable addition to COSP, and is likely to find wide uptake.

The study also indicates that accounting for clouds when calculating backscatter ratios isn't necessary to achieve a good comparison over longer time periods. This is a valuable result in itself, as it suggests even models with poor cloud representation can benefit from using COSP aerosol evaluation.

I have identified no scientific concerns.

### **Major comments**

I can't find the aerosol-related additions to COSP on git nor on zenodo. Could the authors be more specific about which routines have changed, perhaps even going as far as providing a diff file?

The word 'aerosol' is effectively already plural, as it refers to the population of particles and not a single particle. Thus 'aerosols' is unnecessary. I suggest correcting throughout the manuscript, but at the same time acknowledge that 'aerosols' is becoming widespread.

Readability in many places could be significantly improved with some editing. Many sentences are quite awkward to read and follow.

## Minor comments

Abstract, line 4: The clause 'and because it has an impact on aerosol-cloud interactions' seems to be out of place. The sentence in its entirety is hard to follow.

Abstract, sentence starting on line 12: 'It applies...', please clarify what 'it' is.

Abstract, line 15: 'discrepancy in the Southern Hemisphere'. Is it possible to be more specific? The Southern Hemisphere is half the globe. Perhaps Southern Ocean is what is being referred to?

Page 2, line 5: not all greenhouse gases are long-lived, e.g. ozone. Suggest adding 'long-lived' before greenhouse gases

Several of the Figures comparing SR0, SR1 etc: It might be easier for the reader to interpret the plots if they were presented as difference plots, e.g. difference to SR0. As presented, the reader finds themselves looking for subtle changes in color in order to derive value from a figure. Additionally the chosen color palette would present difficulties for anyone with color blindness.