

Dear Anonymous Reviewer,

We would like to thank you for taking the time to review our manuscript and for your constructive comments and suggestions. We have addressed each of the points raised both in the text and below. Please note the addition of Appendix A which discusses our choice to use Nearest Neighbour interpolation rather than a higher order interpolation scheme like Bilinear interpolation.

... would benefit from a bulletized summary of the conclusions...

We have bulletized some of the main conclusions, but left some of the discussion to provide more details.

... further summary of priority areas for further research.

We have expanded this section slightly and placed some emphasis on the need for improve cloud masks at night. Moving forward with this research will require better cloud screening that does not need a person to assess each individual image.

In your discussion of the maximum and minimum (and other stats) constructed scenes, you should clarify your expectations from these scenes. For pixels containing surface light sources, the brightness maximum should be the clearest night in the timeseries. For darker pixels adjacent to those sources, the brightness maximum should be the maximum atmospheric scattering (longest atmospheric path). This is consistent with what is seen in the patterns of correlation you found between satellite zenith and DNB and should be discussed at the outset.

We added three new paragraphs to the Section 4 introduction describing what can be expected from the minimum, maximum, and average radiance images. Also, the paragraph that describes Relative Standard Deviation has been extended to describe what can be expected from the RSD images.

Page 11 line 15 end of Section 4. It's puzzling that to say that DNB-IR correlation is beyond the scope of your study when the next section of the paper is about DNB-IR correlation. Since you are discussing the limitations of your study with regard to gas flares, it is a good place to mention the role of spatial resampling error in studying these areas.

We edited this section to remove the point about DNB-IR correlation being beyond the scope of the study.

Appendix A has been added to discuss the impacts of using Nearest Neighbour interpolation vs Bilinear interpolation.

I think it is worth noting that satellite aerosol retrieval algorithms going all the way back to Kaufman 1997 have used the variance in visible brightness as a means of detecting and

screening residual and subpixel cloud. This emphasizes both the opportunity and challenge of using brightness variations as a diagnostic of atmospheric conditions.

Edited the first paragraph of section 3.3 to include the citation that describes this process for the MODIS aerosol algorithms.

“The variance in visible radiance has been used for nearly two decades as a method of screening residual cloud. For example, Martins et al. (2002) expand upon the MODIS cloud mask for use in aerosol applications by masking regions of high spatial variance in visible brightness as cloud. Conversely, using expert analysis, we identified any overpasses containing significant reductions in spatial variance of the terrestrial light sources (e.g. **Error! Reference source not found.**, right), indicating the presence of cloud or aerosol that was not masked by the VCM.”

Abstract-first sentence- this sentence is clumsy and perhaps ungrammatical. ‘Sensitivity’ is ‘information provided by visible spectrum observations’?

Edited to read “Detection and characterization of aerosols is inherently limited at night because the important information provided by visible spectrum observations is not available and infrared bands have limited sensitivity to aerosols.”

Page 17 line 29: I think the finding that the DNB radiance time series show the signal of forward scattering of anthropogenic light sources by land surfaces is significant and should be revisited here.

Thank you for pointing this out. Leaving this out of the conclusions was an oversight and it has been added.

Page 13 Line 24 ‘While this is discussed further in Sect. 5.3, suffice to say...’ Maybe just say “This effect is discussed in Section 5.3”

This has been reworded

Page 15 line 19 “correlation...noisy” I think a better word is ‘weak’ when describing a correlation.

Agreed, corrected

Page 15 line 21 “the same bias” do you mean the same trend?

Yes, “trend” is the appropriate word here. Corrected.

Page 15 line 33 “DNB radiance and four brightness temperature from four” -> “DNB radiance and brightness temperature from four”

Corrected

Again, thank you for taking the time to review our manuscript.