Earth Syst. Sci. Data Discuss.,
https://doi.org/10.5194/essd-2019-210-RC1, 2020

Earth System Science Data Discussions

Interactive comment on "Improving the usability of the MISR L1B2 Georectified Radiance Product (2000–present) in land surface applications" *by* Michel M. Verstraete et al.

Anonymous Referee #1

Received and published: 1 March 2020

Review of Verstraete et al., Improving the usability of the MISR L1B2 Georectified Radiance Product

This paper characterizes and proposes a way to address a significant issue with the 20+ year MISR radiance data record. It is a useful contribution to the literature and is appropriate for ESSD. Some clarification would be helpful, as a great deal of MISR-specific jargon that appears in the text is not explained. My suggestions are mostly for these clarifications, though there are a few more substantive suggestions included in the specific notes. One in particular relates to characterizing the results for more than a single region, and perhaps using a neural net approach to address regions where

the surface is more heterogeneous on 10-100 km spatial scales. A great deal of effort has gone into identifying the issue and developing the algorithm, as presented in this paper, and it will be so much more helpful if the assessment, and possibly also the applicability of the algorithm itself, were more general.

Specific notes:

P2, Line 33-35. You might be more specific here, just for completeness, something like: "In its default Global Mode, for which the instrument acquires data continuously on the day side, all four spectral bands in the nadir camera, and the red spectral bands in the eight off-nadir cameras, are downloaded from the spacecraft at the native resolution of the instrument (275 m). The other 24 channels are averaged on board and downloaded at 1.1 km resolution to reduce the overall data rate." I now see that you get to this in Section 2.1; it might be better to deal with the spatial resolution once, rather than having a vague statement in the introduction and a more specific description one page later.

P3, line 59. You might reference the appropriate ATBD here.

P3, line 80. I know what it is, but you need to define theta_s in Equation 1.

P3, lines 84-87. This statement is also repeated, in this case almost verbatim, from the introduction. Might be better to have it in one place or the other.

P4, Figure 1 caption. You might explain what the "DF" camera is. Might as well also indicate which way is north, given that the caption refers to the "western side" of the image.

P5, after Table 1. You might also explain the criteria for RDQI values of 1 and 2, as these values are considered in section 2.3.

P6, line 115. In which context?

P6, line 118. You might explain what "Path" means in this context.

P8, line 156. You might explain what the MISR-HR product is. I realize a reference is

given, but a sentence or two here would probably be helpful to the reader.

P8, line 161. You might explain what the “AF” and “CA” cameras are.

P8, line 164. Might be: “. . .what the original measurements would likely have been.”

P11, line 236 ff. This seems like an ideal problem to address with a neural net approach, i.e., identifying geophysically similar source pixels in a region upon which to build a correlation function to fill in missing channels in the target pixels. This would avoid the limitations already described in the paper of using the static AGP and illustrated in Figures 6-8. The remaining scatter could be reduced further, as “clear land” alone might offer fairly crude characterization of the surface reflectance spectral-angular dependence in heterogeneous land scenes, especially where multiple ecosystems are present.

P15, line 266. Land areas are apparently of primary interest to the authors (actually, one specific land area, Path 168 Block 110, based on the examples presented), but as you have gone through the trouble of generating an algorithm that seems generic to surface type, why not do the complete problem and at least show the results for other surface types? Further to this point, the examples presented in the paper are all for a single region. If the algorithm is to have more general applicability, it needs to be assessed in a least a few different types of regions, even over land, such as other Blocks where the surface is covered by multiple, distinct ecosystems. (See the note on P11, line 236 above.)

P16, line 289. What are the criteria for a source value to be considered “valid”? I’m a little confused here as to whether a single source pixel is used to fill the missing target values, or whether a statistical summary of multiple source pixels is used. I assumed from the text (e.g., Table 3) it is the latter, but the wording here seems ambiguous. And line 306 seems to indicate a maximum of just four source pixels are used.

P16, line 209. I’d suggest that the filled target channels be given a different RDQI

value, perhaps 4, to indicate that the value has been estimated from other pixels rather than directly measured by MISR.

P25, Figure 18. If I understand correctly, the left plots show the relationship between the predictor and the original target pixel values (before they were removed), and the right panels show the relationship between the original and the replacement target values. It would be easier to interpret these plots if the original were plotted on the same axis in all plots, rather than on the vertical axis for the left plots and the horizontal axis for the right plots. Also, I’m unclear how the replacement is closer to the original than the predictor, upon which the replacement is presumably based. Perhaps I simply do not understand what is plotted here.

Interactive comment on Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2019-210, 2019.