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Discussions

Interactive comment on "Replacing Missing Values in the Standard MISR Radiometric Camera-by-Camera Cloud Mask (RCCM) Data Product" *by* Michel M. Verstraete et al.

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Dear Anonymous Reviewer #1,

Thanks a lot for your constructive comments. We have addressed those as indicated in the following sections, and a new version of the manuscript is attached below. Best regards, Michel Verstraete, on behalf of all co-authors.

A. Minor comments

1) The writing on page 8 reflected our state of mind as we inspected the data, unveiled these correlations and hypothesized the proposed solution. It is true that the latter does

turn out to be very useful–in retrospect.

On the other hand, correcting the Local Mode data was not our primary motivation, only a side issue. Having access to a RCCM product as complete as possible is actually necessary to fill out the missing values in the L1B2 radiance product itself, a more complex topic that will be the subject of a follow-up paper.

To address both of those points, we have implemented the following changes:

* p. 8, l. 11: Replaced "might prove useful" by "may be useful".

* p. 8, l. 18-19: Replaced "In turn, a more spatially complete RCCM product may be useful to users of those data or derived products." by "In turn, a more spatially complete RCCM product will be useful to users of those data or derived products. In particular, updating this RCCM product is required for our next goal (to be addressed in a follow-up paper), which is to improve the spatial coverage of the L1B2 radiance product itself."

2) This second point is well taken. We have updated the software to allow the artificial insertion of missing values in the RCCM data and to document the performance of the replacement algorithm with the help of a confusion matrix. These materials, which make up an entirely new section (5) of the paper, occupy 4 additional pages and include 3 new Figures as well as 5 new Tables. The concluding section of the paper has also been modified accordingly. Note that the software has been updated to implement those evaluations, and that a new version will be uploaded on the open source GitHub web site, once this paper appears in final form, to ensure that the code and the publication are in sync.

B. Editorial remarks (on the marked up manuscript)

* p. 1, l. 5: Replaced "on the basis of 36 data channels gathered by each of its nine cameras" by "on the basis of 36 data channels collectively gathered by its nine cameras".

* p. 1, l. 9-10: Indicating a percentage (e.g., 0.1%), or even a range of percentages (e.g., 0.1 to 80%), of missing RCCM values in a short abstract is prone to misunderstanding because these values are so variable in space and time. Even an abbreviated outline of those statistics would unreasonably lengthen this paragraph, as most missing values appear over land (see below). We have opted to keep the original wording.

* p. 1, l. 12: Replaced "describe how to replace most missing values" by "describe how to replace over 99% of the missing values".

* p. 1, l. 13: Replaced "to process MISR RCCM data products" by "to replace missing RCCM values".

* p. 2, l. 5: Replaced the semi-colon by a comma.

* p. 2, l. 7: The expression "ground segment" designates the infrastructure that receives and processes the data from the satellite. This is the proper technical term.

* p. 2, l. 8-10: Replaced "Hence, the four spectral bands of the nadir pointing camera, and the red spectral band in the eight off-nadir cameras, are available at the native spatial resolution of 275 m, while all other data channels are only available at the reduced spatial resolution, in the default Global Mode of operation." by "Hence, in the default Global Mode of operation, the four spectral bands of the nadir pointing camera and the red spectral band in the eight off-nadir cameras are available at the native spatial resolution of 275 m, while all other data channels are only available at the reduced spatial resolution."

* p. 2, l. 10: Replaced "MISR can occasionally be operated in Local Mode" by "MISR is occasionally operated in Local Mode".

* p. 3, l. 4: Replaced "and has already completed over 100,000 Orbits" by "and completed its 100,000th Orbit on 6 October 2018".

* p. 3, l. 5: Replaced "range" by "span".

C3

* p. 3, l. 6: Replaced "in" by "into".

* p. 3, l. 10: Replaced "Equatorial" by "equatorial".

* p. 3, l. 12: Deleted comma.

* p. 3, l. 22: Replaced "assigns" by "contains" and replace "to" by "for".

* p. 3, l. 29: Replaced "near-infrared BRF" by "near-infrared band BRF".

* p. 4, l. 6: Moved the opening parentheses in front of the dates rather than the names.

* p. 4, l. 27: The expression "The data files containing RCCM data" refers to the standard data files distributed by ASDC. These include data for a complete Orbit, i.e., from the northern to the southern terminator, which contain about 142 Blocks with effectively usable data, as explained on p. 3, l. 10. Their geographical coverage is wider than the swath width of the instrument, and this feature is independent from the notion of Blocks. The subsequent sentence only mentions "in any particular Block of data" because the updating software process works on individual Blocks, as is evident from all examples shown. No action taken.

* p. 4, l. 29: Replaced "these are referred as the swath edge pixels" by "these are referred to as swath edge pixels".

* p. 5, l. 4: Replaced "The software processor that interprets" by "The software that processes".

* p. 5, l. 6: Inserted a sentence to introduce the new Figure 2, showing the topography of Southern Africa and the location of the MISR Blocks used in subsequent Figures.

* p. 5, l. 7: Replaced the comma by a full stop.

* p. 5, l. 13: The question "What about ocean?" appears to have been written upon first reading, as this point is addressed in the very next paragraph. No action taken.

* p. 5, l. 14: Replaced "since" by "because".

C4

* p. 5, l. 15: Replaced "because" by "as".

* p. 5, l. 16: Deleted "each".

* p. 5, l. 19: Added a space between "275" and "m" and replaced "red-band" by "red band".

* p. 5, l. 20: Added a comma after "otherwise".

* p. 5, l. 21-22: Replaced "These various cases are exhibited in the following three figures for the southeastern coast of South Africa and the Indian Ocean." by "These various cases are exhibited in Figures 3 to 6 below. Figure 2 shows the geographical locations of those Blocks along the southeastern coast of South Africa and the Indian Ocean."

* p. 5, legend of Figure 2: Deleted the sentence "These maps have been enlarged (4x in each direction) by duplication for viewing convenience and to facilitate comparisons with other maps."

* p. 6, top of the page: Added a new Figure 2, extracted from Google Earth, with the following legend: "Google Earth Pro (Version 7.3.2.5776, 64-bit, March 5, 2019, 12:32:21 AM UTC) map of Southern Africa showing the geographical location of the three MISR Blocks mentioned in the text and in the figures of sections 2 to 4. NW corner: -17.154 (S) and 20.363 (E), SE corner: -24.675 (S) and 31.104 (E); eye altitude: 1823 km; data from SIO, NOAA, U.S. Navy, NGA, GEBCO and imagery from Landsat / Copernicus. Copyright 2018 AfriGIS (Pty) Ltd. URL: http://www.earth.google.com [accessed September 9, 2019]."

* p. 6, legend of old Figure 4: Replaced "See" by "see".

* p. 6, l. 15: Replaced "could work over" by "worked over".

* p. 7, l. 1: Replaced "tests were" by "test was".

* p. 7, l. 3: Replaced the colon by a full stop.

* p. 8, l. 1: Replaced "occur" by "occurred" and replaced "corresponds" by "corresponded".

* p. 8, old Figure 7: Adding the total number of values acquired would require significant modifications to the codes, as the plotting routine does not currently keep track of that total. Instead, the total number of theoretically observable values during that period is now mentioned in the text itself.

* p. 8, legend of old Figure 7: Replaced "See" by "see".

* p. 8, l. 16: Replace "that" by "the" twice.

* p. 8, l. 17: Replace "type 3 and 4 above" by "type 3 and 4 mentioned at the start of this section" and relabel the three points in the paragraph immediately above as (i) to (iii) to prevent any possible confusion.

* p. 9, l. 4: Add a full stop.

* p. 9, l. 9 and 10: The notations and references to binary and byte (8-bit unsigned integer) values have been systematically updated throughout the manuscript, as described in section C below.

* p. 9, l. 10: Replace "independently from the reason for this latter quality indicator:" by "independently of the origin of this data quality indicator value." This version differs from that proposed by the reviewer because the key point is the reason (cause) for the RDQI, rather than its value.

* p. 10, l. 22: The "type 3 and 4" should be clear, after the changes made on p. 8, l. 17.

* p. 13, legend of old Figure 8: Replace "The remarks and the linear dimensions" by "The enlargement and linear dimensions".

* p. 13, l. 3: Deleted "It can be seen that".

* p. 13, legend of Figure 9: Replace "The remarks and the linear dimensions" by "The enlargement and linear dimensions".

* p. 13, l. 11: Replaced (old) "Figure 4" by (old) "Figure 5", which is now Figure 6.

* p. 14, l. 4: Deleted the comma.

* p. 14, legend of Figure 10: Replaced (old) "Figure 4" by (old) "Figure 5", which is now Figure 6.

* p. 14, l. 6: Deleted "successfully".

* p. 14, l. 7: Replaced "success" by "replacement".

* p. 14, l. 8: Added a new section on the evaluation of the replacement process.

* p. 15, legend of Table 1: Deleted "elsewhere".

* p. 15, line 1 of Table 1: Replaced "Success" by "Replacement".

* p. 15, l. 6, 11, 14: See section C below.

* p. 15, l. 15: Replaced "processes" by "causal factors".

* p. 16, l. 1: Replaced "processes" by "causal factors".

* p. 16, l. 1: Kept the original text, which is more appropriate than the suggested replacement.

* p. 16, l. 3: Deleted the comma.

* p. 16, l. 16: Deleted "and MISR-HR products" since those have not been introduced in this paper.

C. Changes in the notations and labels

To avoid any confusion, all references to the RDQI are now typeset as 2-digit binary numbers while all references to RCCM values are typeset as integers (without the 'B')

that designated 8-bit unsigned integers.

* p. 4, l. 9: Replaced "The RCCM values carry the following meanings" by "The RCCM values, which are unsigned 8-bit (or single byte) integers, carry the following meanings".

* p. 4, l. 10-15: Deleted 'B'

* p. 4, l. 16: Deleted this line.

* p. 5, l. 5: Replaced "0B" by "00".

* p. 5, l. 12: Replaced "1B" by "01".

* p. 5, legend of (old) Figure 2: Removed the "B" in the description of the color coding scheme.

* p. 6, l. 12: Replaced "1B" by "01".

* p. 7, l. 2: Replaced "1B" by "01".

* p. 7, l. 4: Replaced "1B" by "01".

* p. 7, legend of (old) Figure 6: Replaced the integer values of the RDQI by their binary representations, for consistency.

* p. 7, l. 14: Replaced "1B" by "01".

* p. 8, l. 6: Replaced "1B" by "01".

* p. 9, l. 10, 19, 21 and 23: Deleted "B".

* p. 9, l. 29-30: Replaced [1B, 4B] by [1, 4].

* p. 11, l. 6 to 21: Deleted all "B" characters.

* p. 12, l. 18 to 25: Deleted "B".

* p. 15, l. 6: Replaced "0B" by "00".

* p. 15, l. 11: Replaced "1B" by "01".

* p. 15, l. 14: Replaced "1B" by "01".

Please also note the supplement to this comment:
https://www.earth-syst-sci-data-discuss.net/essd-2019-77/essd-2019-77-AC2-supplement.pdf

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