

Geosci. Instrum. Method. Data Syst. Discuss., author comment AC1
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Reply on RC1

Daniel Juncu et al.

Author comment on "Upgrade of LSA-SAF Meteosat Second Generation daily surface albedo (MDAL) retrieval algorithm incorporating aerosol correction and other improvements" by Daniel Juncu et al., Geosci. Instrum. Method. Data Syst. Discuss., <https://doi.org/10.5194/gi-2022-6-AC1>, 2022

We thank the reviewer for their time and the insightful comments on our manuscript. Below are our replies.

Comment 1

67-68: As with the atmospheric correction, please cite the BRDF inversion algorithm here for easy reference to the reader.

Reply:

We have added a reference to the BRDF model used.

Comment 2

72-73: Advisable to refer here to the later more detailed description on NTBC improvements in section 2.2.

Reply:

We have kept the sections on the current algorithm (2.1) and the updated one (2.2) separated on purpose for the sake of clarity. We do not deem this change necessary, since otherwise we would have to mention all the MDAL v2 changes in this bullet list (with some context), which would bloat the list. We have, however, added an additional reference for the NTBC methodology.

Comment 3

92-96: One potential cause of the 'missing' additional bias due to missing aerosols may be that a large part of the SEVIRI disc is composed of medium-bright deserts like Sahara and the Arabian peninsula; over these targets whose surface albedo is often ~ 0.5 , it has been shown that the presence of aerosols actually does quite little to alter the TOA-observable albedo – the target is neither bright or dark.

Reply:

While the reviewer raises a valid point, this missing additional bias we are talking about appears globally and not only in regions of medium-bright surface albedo. This is what we are referring to in this paragraph.

Comment 4

**134: What about heavy aerosol loading conditions of $AOD_{550} > 1$? SMAC would be*

*expected to exhibit degraded performance in those conditions because of the internal parameterizations which increase its speed, would it not? Do you still process albedo under every possible AOD provided by the reanalysis climatology? And are there plans to move from a climatological AOD to a dynamically updated one?**

Reply:

We are aware of this limitation of SMAC. Using an aerosol climatology somewhat alleviates this issue because the AOD values are less extreme. Furthermore, we attempt to avoid over-estimation of AOD by using the lower tercile (rather than the mean or the median) of 10 years of CAMSRA data. This point was not clear in the original manuscript, we have corrected this.

We have updated Figure 2 for the revised manuscript to show histograms of AOD for each month (new figure attached). In the added plots we can see that AOD values are usually well below 1, with a median value of <0.2 in every month.

There are currently no plans to change to a dynamically updated AOD for MSG/SEVIRI (but possibly for next generation MTG-I/FCI).

Comment 5

135: The cutoff at SZA=80 already seems quite courageous, but what about View Zenith Angle? At the SEVIRI disc edge, the spatial footprint is very large and the atmospheric path lengths of the observed radiances are very long, which complicates the atmospheric correction considerably. Do you really retrieve albedos all the way to the disc edge?

Reply:

Yes, MDAL retrieves albedos close to the disk edge and has done so since the product was first released. We agree with the reviewer's view that this can be problematic, in particular the combination of extreme solar angles with extreme view angles. This means that the small reduction in maximum SZA that we implemented in this update, from 85° to 80°, can help alleviate problems close to the disk edge. The maximum VZA has been kept at 85° in order to maintain high spatial coverage of albedo retrieval (satisfying the needs of LSA SAF Scandinavian users for example) as well as product continuity. Limitations of albedo retrieved at extreme geometries will be explained in the MDAL product documentation accompanying the release.

Comment 6

170: So, ETAL features an aerosol loading component in its atmospheric correction? Is the data source for that the same as for MDAL v2?

Reply:

Yes, the data source is exactly the same. For MDAL the aerosol inputs are just resampled onto the SEVIRI grid. We have added this information to Section 2.2.

Comment 7

237: This may be semantical, but this reviewer considers inter-dataset analyses as "intercomparisons", because even MODIS is still an estimate of the true albedo, rather than a reference in itself.

Reply:

With "validation" we do not mean to imply "against a true reference", as this is difficult to achieve for satellite-based observations of the Earth's surface (other satellites can not be a true reference, ground observations generally do not cover the same ground footprint). We have made a few changes to section headings to take the reviewer's comment into account, however.

Please also note the supplement to this comment:

<https://gi.copernicus.org/preprints/gi-2022-6/gi-2022-6-AC1-supplement.pdf>