

Geosci. Instrum. Method. Data Syst. Discuss., referee comment RC2  
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## Comment on gi-2022-6

Anonymous Referee #2

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Referee 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-RC2>, 2022

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This paper described the updates of the MDAL v2 surface albedo product. The evaluation was conducted by comparing the albedo with in-situ measurements and ETAL albedo product. The results indicated that MDAL v2 agrees better with ETAL than MDAL v1. A relatively large discrepancy exists between in-situ measurements and MDAL v1 and v2 albedo which could be due to the spatial representativeness issue given the big difference between ground measurement footprint and albedo product pixel size. I have several issues that need to be addressed.

Major comments:

- Only four in-situ sites were used for the validation. Three of them (Cabauw, Evora, and Izana) are obviously not spatially representative. For example, the Cabauw station is located in a small area of grassland surrounded by large areas of croplands (Figure 5). The authors also mentioned that the V2 improvement can not be said with certainty at these sites. Gobabet desert site is homogenous and both v1 and v2 MDAL albedo agree well with ground measurements. MDAL v1 performs a little better. Therefore, the in-situ data did not provide valuable information for MDAL v2 albedo evaluation.
  
- The MDAL v2 albedo was also evaluated by the intercomparison with the ETAL albedo product. The results show good agreement between MDAL v2 and ETAL. While as the authors said these two products share the same retrieval algorithm and several ancillary input data (e.g. AOD). I'd suggest including independent satellite albedo

products (at least one) for the intercomparison given that the in-situ validation effort of this manuscript is limited.

- I am confused about the aerosol for atmospheric correction. This manuscript claimed that the aerosol is lacking in MDAL v1 and incorporated in MDAL v2. However the MDAL algorithm changes record (<https://landsaf.ipma.pt/en/products/albedo/albedo-copy/>) showed that CAMS climatology aerosol has been integrated since 2020? Climatology monthly aerosol generated from early years (2003-2012) is applied in MDAL v2 albedo. How about the impact of this coarse temporal resolution and old aerosol on the accuracy of albedo retrieval? In particular recent years the aerosol loading varies due to the pandemic COVID-19 (<https://www.sciencedirect.com/science/article/pii/S1352231020308621>). More details of this are needed to be consistent.
- The discussion of this manuscript is limited. There are some interesting results but without further discussion. For example. The MDAL v2 albedo is expected to be higher than v1 based on the updates listed. The albedo from sites Cabauw, Evora, Gobabeb confirmed it (Figure 12), but why the difference between MDAL v1 and v2 albedo is negligible at site Izaña? Figure 8 indicated that the improvement of MDAL v2 vs. ETAL is mainly over the high albedo values ( $> 0.5$ ). I'd suggest adding some discussion of this. Why is the difference between MDAL and ETAL quite different from AL-BB-DH and AL-BB-BH? The mean MBE of MDAL v2 AL-BB-BH and ETAL is less than 0.01 for all the 4 regions while AL-BB-DH showed large values, particularly Eurasia (Figure A4) that reach up to 0.034. The MAE of Eurasia is the highest compared to other regions. I wonder if the large view angles contribute to this (for both the albedo algorithm and aerosol effect)?

Minor comments:

Line 35: the authors referenced several papers that utilize the MDAL albedo product but the references to the albedo product itself are lacking. I'd recommend referencing the MDAL albedo papers (e.g. Geiger et al. 2008; Carrer, 2010, 2018, 2021; Lellouch, 2020) here.

Figure 1: add the date of the SEVIRI image that was acquired.

Line 200: the authors evaluated black and white sky albedo using in-situ measurements directly instead of generating blue sky albedo based on the ratio of diffuse radiation to SWD. The threshold of the ratio varies in order to obtain a sufficient number of data. Does the change of the threshold impact the evaluation?