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Comment on gi-2022-6

Anonymous Referee #1

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-RC1, 2022

Review of " Upgrade of LSA-SAF Meteosat Second Generation daily surface albedo (MDAL) retrieval algorithm incorporating aerosol correction and other improvements" by Juncu et al.

Surface albedo is an important ECV to monitor and track; continuous development of the retrieval methods is a prerequisite for better accuracy and thus wider adoption by the potential user community. Here the authors present an upgrade into one of the near-real time data records from the LSA SAF, composed from SEVIRI observations over the full observable disc. The main component of this upgrade is the inclusion of aerosol loading into the atmospheric correction. Overall, the manuscript is cleanly written and generally easy to follow. The quality of the albedo retrieval upgrade is verified with standard methods (intercomparison with other satellite data & direct validation against in situ observations whilst acknowledging the spatial representativeness issue). The number of in situ sites is relatively limited, but on the other hand it is true that number of available high-quality albedo measurement sites within the SEVIRI disc is quite limited in itself. The results appeared logical and in line with expectations given the nature of the algorithm upgrade.

This reviewer noted some issues in the text where further elaborations and clarifications are required, but none of them are indicative of major issues in the study methods or its results. Once these comments are adequately addressed, this reviewer sees no major obstacles preventing the publication of this manuscript in GI.

Comments (lines):

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

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

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.

134: What about heavy aerosol loading conditions of AOD550 > 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?

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?

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

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.