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Generation of global surface albedo data set from archived geostationary satellite observations

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Monitoring and understanding climate changes of the Earth require the generation of long-term and consistent global data set from observation. In this context, geostationary satellite observations could play a significant role thanks to the long duration of the missions and the corresponding archives, often covering more than two decades. In particular, their frequent cycle of acquisition can be used to document the anisotropy of the surface and thereby surface albedo. Hence, EUMETSAT has developed the so-called Geostationary Surface Albedo (GSA) algorithm based on an algorithm proposed by Pinty et al. This algorithm is capable of processing observations of any geostationary satellites to derive the surface albedo, accounting for the effects of the surface anisotropy and the aerosols. This algorithm has been implemented in the Operational reprocessing facility of EUMETSAT in order to generate reliable albedo dataset starting from the 1982, through the analysis of data acquired by the six different Meteosat first generation platforms for the satellites located at the 0 degree longitude. Observations acquired by the EUMETSAT satellites located over the Indian Ocean since 1998 have also been processed. The GSA algorithm has also been implemented at the Japanese Meteorological Agency (JMA) for the processing of the GMS-5 archive. EUMETSAT has the responsibility to integrate all these level-2 products into a unique level-3 broadband surface albedo product. The evaluation of this global surface albedo product relies on the comparison of pairs of contemporaneous products generated from two adjacent satellites sharing a common observation area and with the equivalent MODIS product. This latter comparison has revealed that both products agree within 10% relative difference.

This study is performed under the framework of the Co-Ordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM) project, a WMO initiative to establish a network of facilities ensuring continuous and sustained provision of high-quality satellite products related to the Essential Climate Variables (ECV), on a global scale, responding to the requirements of the Global Climate Observing system (GCOS). It demonstrates the contribution of operational weather satellites into the generation of consistent time series of surface albedo.