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Suitability of a satellite-derived surface solar radiation dataset for a better assessment of the dimming/brightening phenomenon over Europe

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A widespread reduction of surface solar radiation (SSR) from the 1950s to the 1980s has been observed, with a trend reversal since the 1980s. This decrease and increase in SSR has been coined as global dimming and brightening, respectively. However, both global dimming and brightening phenomenon still have major uncertainties in their explanation and quantification. For example, there is a lack of long-term SSR series, especially over ocean and remote land areas, which limit the spatial representativeness of the observed trends. However, derived SSR from satellites offer an alternative to fill this gap, as they increase the availability of spatial data by a better coverage than surface observations. In this work we present the suitability of the derived SSR product from the Satellite Application Facility on Climate Monitoring (CM SAF) over Europe, which provides a dataset with a high spatial resolution (0.03° x 0.03°) covering the 1983-2005 period. Firstly, the temporal homogeneity and consistency in the trends of the CM SAF SSR dataset is compared against the long-term homogeneous SSR series currently available in the Global Energy Balance Archive (GEBA) over Europe. Secondly, reconstructed SSR variations have been estimated by using the relationship found between the CM SAF product and a sunshine duration dataset over Europe, which provide a much higher spatial and temporal resolution than GEBA series.