



A surface radiation climatology across two Meteosat satellite generations

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Long term observations of the surface radiation budget are essential for climate monitoring, for climate model evaluation and for applications such as in the solar energy or agriculture sector. The Satellite Application Facility on Climate Monitoring (CM SAF) released a Climate Data Record (CDR) of global and direct surface irradiance as well as effective cloud albedo derived from observations of the Meteosat First Generation satellites (MFG, 1983-2005).

We will present an extension of this CDR using measurements from the Meteosat Second Generation satellites (MSG, 2004-present). The differences in the spectral properties of the radiometers aboard the MFG and MSG satellites requires a modification of the original MagicSol algorithm. In order to guarantee a climatologically homogeneous continuation of MFG-based CDR, the two narrowband visible channels of the MSG satellites are combined to simulate the MFG broadband visible channel.

The combination of the MFG and MSG based datasets is tested for homogeneity and no significant breaks are detected during the overlap period of 2004-2005. Validation of the extended global radiation dataset against ground based observations from the Baseline Surface Radiation Network yields a mean monthly absolute bias of 8.15 Wm^{-2} . This complies to the target accuracy threshold of 15 Wm^{-2} (including a measurement uncertainty of the surface observations of 5 Wm^{-2}) required for satellite-derived CDR's of global radiation by the Global Climate Observing System.

Climatological analysis of the extended surface radiation dataset shows an overall positive trend of the global radiation for the Meteosat disc (with variable extents and significances for different regions) which can be attributed to a negative trend in the effective cloud albedo, i.e., a decrease in cloudiness. Trends due to changes in the clear sky radiation are small and only induced by trends in the water vapour fields. Trends caused by changes in the direct effects of atmospheric aerosol are not represented because an aerosol climatology is used.