Testing of monthly satellite climate data records on temporal and spatial homogeneity

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Reliable and high-quality long term climate data sets are of fundamental importance for the analysis of climate variability and change. To enhance the availability of high-quality long term climate data sets the EUMETSAT Satellite Application Facility on Climate Monitoring (CM SAF) provides satellite-derived geophysical parameter data sets of currently nearly 30 years suitable for climate monitoring. Among others the climate data records SARAH (Surface Solar Radiation data set - Heliosat), CLARA-A1 (CM SAF cLoud, Albedo & Radiation data set, AVHRR-based, Edition 1), MVIRI (data set based on Meteosat Visible and Infrared Imager) and CLAAS (CM SAF Cloud property dAtAset using SEVIRI) are available at http://www.cmsaf.eu/EN/Products/DOI/Doi_node.html.

Parameters based on remote sensing offer global scale and continuous coverage. To analyse climate variability and change the measured satellite data need to be homogeneous over several decades and should not contain artificial heterogeneities masking natural trends. Abruptly appearing mean value instationarities or sudden variance changes can occur for example due to instrument changes with a different sensitivity than the previous ones onboard a follow up satellite.

In this study we examine CM SAF data sets on temporal and spatial homogeneity using state of the art methods like PMT (Penalized Maximal T) test, PMF (Penalized Maximal F) test and SNHT (Standard Normal Homogeneity Test). We focus on testing the homogeneity of gridded monthly mean SIS (Solar Incoming Shortwave) data for the period 1983-2009 over Africa and Europe. Applying the tests to different combinations of the partly independent satellite data sets (e.g. SARAH and CLARA) allows the attribution of the detected break points to inhomogeneities in certain data sets. The results will be used to assess the relevance of the detected linear trends for climate studies.