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The Fundamental Climate Data Record of SSM/I Brightness Temperatures from CM SAF

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The satellite based HOAPS (Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data; http://www.hoaps.org/) climatology provides climate data records of precipitation, evaporation and the resulting freshwater flux over the global ice-free ocean between 1987 and 2008. The latest version of HOAPS has been released by CM SAF and is available from the CM SAFs web user interface (http://wui.cmsaf.eu/).

The HOAPS climate data records are primarily based on passive microwave measurements from the SSM/I (Special Sensor Microwave/Imager) sensor family. In order to derive reliable long term trend estimates of the global water cycle parameters it is strictly necessary to carefully correct for all known problems and deficiencies of the SSM/I radiometers as well as to inter-calibrate and homogenise the different instruments. Moreover, all applied corrections need to be clearly documented to provide a complete calibration traceability for a Fundamental Climate Data Record (FCDR). Following these recommendations, CM SAF has released the first version of the FCDR of SSM/I brightness temperatures, available from the web user interface (DOI:10.5676/EUM_SAF_CM/FCDR_SSMI/V001, http://dx.doi.org/10.5676/EUM_SAF_CM/FCDR_SSMI/V001).

Three different FCDRs of SSM/I brightness temperatures are currently available, released by CM SAF, Colorado State University, and Remote Sensing Systems. All groups developed different approaches to homogenize the SSM/I sensor family. This presentation will focus on the main calibration issues identified for the SSM/I instruments and compare the different intercalibration procedures implemented to homogenise the time series of all 6 different SSM/I instruments.

A validation of the brightness temperatures is a challenging task as there are no ground-truth reference measurements available for the microwave band. Hence, the homogeneity of the FCDR is evaluated by an analysis of the relative biases between the different instruments before and after the intercalibration offsets are applied. Finally, all three FCDRs are compared to identify strengths and weaknesses of the intercalibration approaches. This is a first step toward a consensus SSM/I Fundamental Climate Data Record. Significant differences between the diverse inter-calibration approaches must be identified and, if possible, traced back to the physical reason.