CM SAF Newsletter 51
April 2024

Release of the first edition of the CM SAF Global Interpolated RAinFall Estimation data record (GIRAFE v1)

The GIRAFE v1 climate data record (CDR) provides precipitation estimates derived from a combination of passive microwave (PMW) observations onboard polar orbiting satellites and infrared (IR) observations onboard geostationary satellites. GIRAFE v1 covers the time period 2002/01/01 until 2022/12/31. The PMW-based precipitation rate input to GIRAFE v1 stems from various microwave imager and sounder instruments and respective retrieval algorithms and is homogenized using quantile mapping. The IR input to GIRAFE comes from the five geostationary positions forming the Geo-Ring, providing observations along all geographical longitudes. The spatially and temporally highly resolved IR input is trained to detect the occurrence of precipitation using the PMW-based instantaneous precipitation rate estimates. Conditional precipitation rates are computed based on PMW observations only. At latitudes higher than 55°N/S where Geo-Ring IR pixels are extremely distorted, GIRAFE v1 relies only on the PMW input. GIRAFE v1 is a gridded product which is available globally at a spatial resolution of 1° x 1°and at a temporal resolution of 24 hours as accumulated precipitation computed from the (IR-based) fraction of precipitation and the conditional precipitation rate. Additionally, 1° x 1° monthly mean values of the daily accumulated precipitation are provided. The daily accumulated precipitation features a dedicated sampling uncertainty at the same 1° x 1° x 24 h resolution which is based on the analysis of decorrelation scales in space and time in the IR-based precipitation fields.
The data record can be ordered via the Web User Interface. More information on the data record and accompanying documentation is available from the DOI page: 10.5676/EUM_SAF_CM/GIRAFE/V001.

Release of CM SAF Passive Microwave Upper Tropospheric Humidity (UTH) Data Record - Edition 2

The second edition of the CM SAF Upper Tropospheric Humidity (UTH) is a satellite-based climate data record. It is a near-global 1°x1° latitude-longitude dataset that is produced with both hourly and daily time steps. The dataset is based on data from twelve passive microwave (MW) sounders operating at 183 GHz in polar orbit that are combined into a single time series covering the period 6 July 1994 to 31 December 2018. The UTH provided typically represents a broad atmospheric layer between 500 and 200 hPa. However, the exact height of this layer depends on the atmospheric conditions at the time of the observation. An optional fixed layer approximation adjustment is supplied that users can apply to provide an estimated mean relative humidity (RH) between ±60° latitude for a fixed layer between 500 and 200 hPa (mean_RH). However, users are advised to take care using this correction, especially outside of the tropics where the mean_RH is of lower quality. Users are also advised to take care using UTH observations above ±60° latitude as the retrieval is sometimes less reliable at high latitudes. Further information describing the dataset in detail can be found in the available product documentation. This documentation includes the 1) Algorithm Theoretical Basis Document (ATBD), which describes the product algorithms and its generation, 2) Validation Report (VAL), which assess the performance of the dataset and 3) Product User Manual, which summarises the ATBD and VAL and provides additional guidance on how to interpret and use the data.

The data record can be ordered via the Web User Interface. More information on the data record and accompanying documentation is available from the DOI page: 10.5676/EUM_SAF_CM/UTH/V002

Changes in CLARA-A3 ICDR: Addition of AVHRR data from Metop-C and updated calibration coefficients

As announced earlier (see service message 157 or our Newsletter 50), observations from the Metop-C satellite can now been included in the processing of the AVHRR based CLARA-A3 Interim Climate Data Record (ICDR). So far, the data had not been used in the processing because of uncertainties in the previously applied calibration method. However, new calibration data from 2023 allow including Metop-C, which can thus compensate the exclusion of NOAA-15 (since 10 November 2023) to a certain extent.

From 1 January 2024 onwards, data from NOAA-18, NOAA-19, Metop-B and Metop-C have been used in the AVHRR-based CLARA-A3 ICDR data record. The new calibration coefficients are used for all satellites in question.
The calibration, provided by the PATMOS-x team, is based on comparisons with MODIS and invariant targets on Earth (e.g. Libyan d5esert, Greenland ice sheet, etc.). For the satellites used besides Metop-C, the calibration changes will be small-to-moderate but could lead to visible but small jumps in product quality after the introduction.

There are no changes to the algorithms at that time. Users can find information on the used satellite combination in the global attributes of the netCDF-files (attribute "CMSAF_platform_and_orbits").

Publications by CM SAF team

The following list gives an overview of some recently published papers by the CM SAF team covering CM SAF products and developments. Authors from the current CM SAF team are marked in bold:

Benas, N., Solodovnik, I., Stengel, M., Hüser, I., Karlsson, K.-G., Håkansson, N., **Johansson, E., Eliasson, S., Schröder, M., Hollmann, R., Meirink, J. F.** (2023): CLAAS-3: the third edition of the CM SAF cloud data record based on SEVIRI observations, *Earth Syst. Sci. Data*, **15**, 5153–5170,DOI: 10.5194/essd-15-5153-2023.

Devasthale, A., Karlsson, K.-G., Andersson, S., Engström, E. (2023): Difference between WMO Climate Normal and Climatology: Insights from a Satellite-Based Global Cloud and Radiation Climate Data Record. *Remote Sens*., **15**, 5598. DOI: 10.3390/rs15235598

Riihelä, A., Jääskeläinen, E., and Kallio-Myers, V. (2024): Four decades of global surface albedo estimates in the third edition of the CM SAF cLoud, Albedo and surface Radiation (CLARA) climate data record, *Earth Syst. Sci. Data*, **16**, 1007–1028, DOI: 10.5194/essd-16-1007-2024.

Stubenrauch, C. J., Kinne, S., Mandorli, G., Rossow, W. B., Winker, D. M., Ackerman, S. A., Chepfer, H., Di Girolamo, L., Garnier, A., Heidinger, A., **Karlsson, K.-G.,** Meyer, K., Minnis, P., Platnick, S., **Stengel, M.**, Sun-Mack, S., Veglio, P., Walther, A., Cai, X., Young, A. H., Zhao, G. (2024): Lessons Learned from the Updated GEWEX Cloud Assessment Database. *Surveys in Geophysics*, DOI: 10.1007/s10712-024-09824-0

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