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Release of CM SAF Microwave Upper Tropospheric Humidity (UTH) Data Record – Edition 1

This CM SAF climate data record provides daily estimates of Upper Tropospheric Humidity (UTH) derived from passive microwave sounders. UTH contributes significantly to the atmospheric greenhouse effect by having a strong influence on the outgoing longwave radiation, despite the smaller concentration by mass in comparison to lower troposphere. Long-term observations of UTH can therefore be used to monitor changes in upper tropospheric water vapour loading and subsequently to infer changes in the radiative effect of water vapour in the atmosphere.

The CM SAF UTH v1.0 data set is based on observations from the Advanced Microwave Humidity Sounding Unit B (AMSU-B, onboard NOAA-15, NOAA-16, NOAA-17) and the Microwave Humidity Sounder (MHS, onboard NOAA-18, MetOp-A and MetOp-B), and covers the period 1 January 1999 to 31 December 2015.

The UTH product is a mere transformation of brightness temperature, measured by the 183.31±1.00 GHz channel to a more intuitive humidity unit. The relative humidity Jacobian, which is used to define the UTH, moves vertically depending on the water vapour load in the atmosphere. It is generally assumed that the Jacobian covers a broad atmospheric layer between 500 and 200 hPa. However, in a drier atmosphere the Jacobian will have significant contributions from altitudes below the 500 hPa level and in a wetter atmosphere there can be contributions from altitudes above the 200 hPa level. The UTH retrieval is generally not valid outside ±60° latitudes because of the very low water vapour loading here in the upper troposphere. However, there will be some valid UTH retrievals in these regions, thus a global data record is provided to enable maximum exploitation of the data. Note that observations affected by deep convective or precipitating clouds, together with those sensing the surface due to dry atmosphere or high orography, have been removed from the data set.

The CM SAF UTH product has been evaluated against an equivalent UTH derived from ERA-Interim reanalysis. The validation activity suggests that the data record fulfils the GCOS requirements of 5% measurement accuracy and 0.3% decadal stability within ±60° latitude.

Along with the data and the uncertainty estimates, a comprehensive documentation including product user manual, algorithm descriptions, and validation report is provided. The data record can be ordered via the Web User Interface. The documents and the data record can be accessed from the DOI landing page:
DOI: 10.5676/EUM_SAF_CM/UTH/V001.

CM SAF User Workshop in June 2019 – registration now open

The 5th CM SAF User Workshop will be held on 3-5 June 2019 in Mainz, Germany. It coincides with the 20th anniversary of the CM SAF and will provide opportunities to

- obtain an overview of CM SAF products and their applications in climate monitoring and analysis,
- network with other users,
- discuss the products with their developers and
- raise requirements for consideration during the CM SAF evolution up to 2027.

More information and the registration can be found on the workshop webpage at https://bit.ly/2CliJ2h.

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:

Anttila, K., **Manninen, T.**, **Jääskeläinen, E.**, **Riihelä, A.**, Lahtinen, P.: The Role of Climate and Land Use in the Changes in Surface Albedo Prior to Snow Melt and the Timing of Melt Season of Seasonal Snow in Northern Land Areas of 40°N–80°N during 1982–2015. *Remote Sensing*. 2018; **10**(10):1619, doi: 10.3390/rs10101619.

Karlsson, K.-G., **Devasthale, A.**: Inter-Comparison and Evaluation of the Four Longest Satellite-Derived Cloud Climate Data Records: CLARA-A2, ESA Cloud CCI V3, ISCCP-HGM, and PATMOS-x. *Remote Sensing*. 2018; **10**(10):1567, doi: 10.3390/rs10101567.

Riihelä, A., Kallio, V., Devraj, S., Sharma, A., Lindfors, A.V.: Validation of the SARAH-E Satellite-Based Surface Solar Radiation Estimates over India. *Remote Sensing*. 2018; **10**(3):392, doi: 10.3390/rs10030392.

Seethala, C., **Meirink, J. F.**, Horváth, Á., Bennartz, R., and Roebeling, R.: Evaluating the diurnal cycle of South Atlantic stratocumulus clouds as observed by MSG SEVIRI, *Atmos. Chem. Phys.,* 2018, **18**, 13283-13304, doi: 10.5194/acp-18-13283-2018.

Urraca, R., Huld, T., Lindfors, A. V., **Riihelä, A.**, Martinez-de-Pison, F. J., Sanz-Garcia, A.: Quantifying the amplified bias of PV system simulations due to uncertainties in solar radiation estimates, *Solar Energy*, 2018, **176**, 663–677, doi: 10.1016/j.solener.2018.10.065.

Wang, Y., **Trentmann, J.**, Yuan, W., Wild, M.: Validation of CM SAF CLARA-A2 and SARAH-E Surface Solar Radiation Datasets over China. *Remote Sensing,* 2018, **10**(12):1977, doi: 10.3390/rs10121977.

Young, M. P., Chiu, J. C., Williams, C. J. R., Stein, T. H. M., **Stengel, M.**, Fielding, M. D., Black, E.: Spatio-temporal variability of warm rain events over southern West Africa from geostationary satellite observations for climate monitoring and model evaluation. *Quarterly Journal of the Royal Meteorological Society*, 2018, **144**(716), 2311–2330, doi: 10.1002/qj.3372.

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