



## **Comprehensive intercomparison of a satellite-derived total water vapour column climatology from CM-SAF with various re-analyses and in-situ data**

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The production of climate data records (CDRs) for variability and trend monitoring is one of the major objectives within the Continuous Development and Operations Phase (CDOP) of the Satellite Application Facility on Climate Monitoring (CM-SAF). In this study, the first such CDR from CM-SAF, a total water vapour column climatology, is presented and compared to various data sources to increase confidence in consistency and accurateness of such a climatology.

Based on intercalibrated brightness temperatures from the SSM/I sensors on board the DMSP satellite platforms, a climatology of total water vapour column content over global ice-free oceans has been compiled within the Hamburg Ocean-Atmosphere Fluxes and Parameters from Satellite (HOAPS) framework. The climatology covers the period 1987 - 2006. A recently developed geostatistical interpolation technique using the Kriging approach has been applied to the swath-based total column water vapour retrievals from the HOAPS data set. The resulting climatology consists of daily and monthly mean fields of the column water vapour itself and an uncertainty estimate from the Kriging technique.

The climatology has been compared to different types of meteorological analyses from the ECMWF (ERA40, ERA INTERIM and operational analyses) and other centers (JRA, NCEP). This comparison shows an overall good agreement of the climatology and the analyses, with maximum daily biases of  $\pm 3 \text{ kg/m}^2$ . Regarding the biases to the ECMWF data sets, one finds that ERA INTERIM performs significantly better

than ERA40 and the operational analyses over time. Only from 2003 on, the operational analysis reaches comparably low biases as ERA INTERIM.

In order to show the robustness of the SSM/I-based climatology it has also been compared to other independent data sets (as SSM/I channels are assimilated in all ECMWF analyses used): (a) a second CM-SAF total water vapour climatology based on ATOVS from the NOAA polar orbiting satellites for one selected year and (b) time series of instantaneous column water vapour values as obtained from the integration of radiosonde profiles. The latter mentioned data sources agree reasonably well with the climatology. Existing distinctions may be traced back e.g. to the different spectral channels of the SSM/I and AMSU instruments used.