The Humidity Composite Product of EUMETSAT’s Climate Monitoring SAF: Towards an Optimal Merging of Satellite Data Sets

Jörg Schulz, Ralf Lindau, Nathalie Selbach
Deutscher Wetterdienst, Offenbach, Germany, e-mail: joerg.schulz@dwd.de
Meteorological Institute, University of Bonn, Germany

The Humidity Composite Product (HCP) of EUMETSAT’s Satellite Application Facility on Climate Monitoring (CM-SAF) will integrate data from several existing and upcoming satellites, e.g., microwave imagers like SSM/I as well as water vapour profiling instruments on the Meteorological Operational polar platform (MetOp) and ATOVS data from NOAA platforms. CM-SAF will provide single sensor estimates as well as some merged estimates, e.g., from SSM/I and AMSU-A. The production of this thematic climate record relies on calibrated and inter-calibrated input data to be provided by the satellite operators.

Two pilot studies on the creation of daily mean fields have been undertaken. The first provided a merged result from total precipitable water (TPW) observations from AMSU-A onboard the NOAA-15 and NOAA-16 satellites and from SSM/I on DMSP-F13, -14, and -15 satellites. The second study considered the merging of ATOVS estimates from NOAA-15 and NOAA-16. In both studies the merging is performed by Kriging, an optimal interpolation technique that provides not only fully covered fields but also a corresponding error map. The obtained errors reflect mostly the actual sampling situation and should not be mixed up with retrieval errors that have to be determined by external comparisons to other data. The technique has been chosen because of its potential to merge data from several completely different sources if they have no bias errors. It also holds the potential to include spatial and temporal resolved information on the retrieval error itself.

Within this poster the Kriging technique is presented and an exemplary application to ATOVS data from April 2004 is shown.

The standard Kriging output comprises of the daily mean fields and the corresponding error maps. The two upper maps show the normalised TPW anomaly (upper left) and the renormalised daily mean (upper right) from ATOVS on April 4, 2004. The values are renormalised by subtracting the monthly mean and dividing by the extra daily standard deviation shown above. The lower left map shows the corresponding normalised error of the TPW anomaly. Due to the normalisation the maximum error is equal to 1, corresponding to the extra daily standard deviation, which would be obtained if all daily values were set to the monthly mean. The renormalised field is shown in the lower right figure.

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