

# CM-SAF water vapour and temperature products from ATOVS

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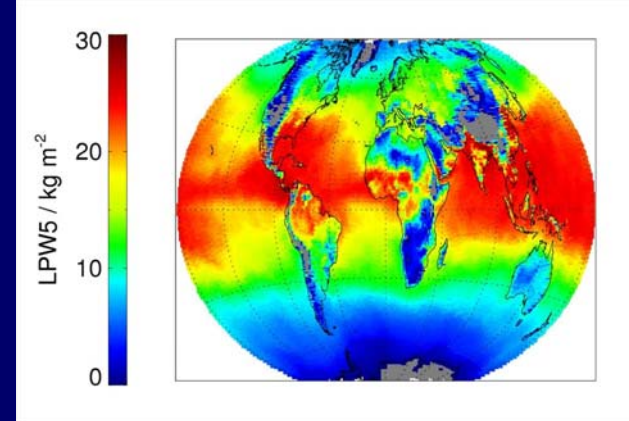
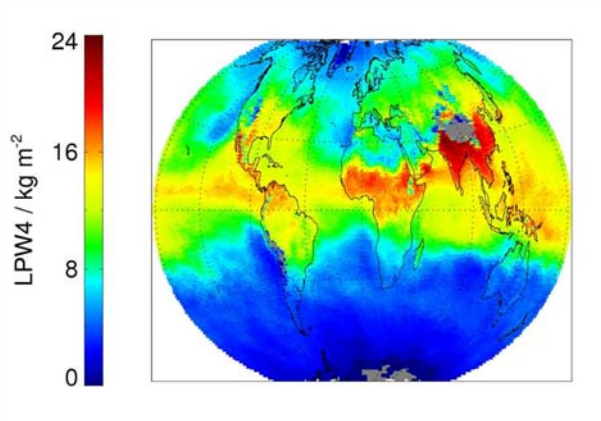
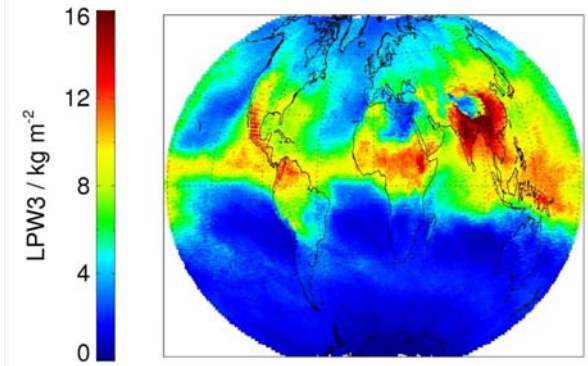
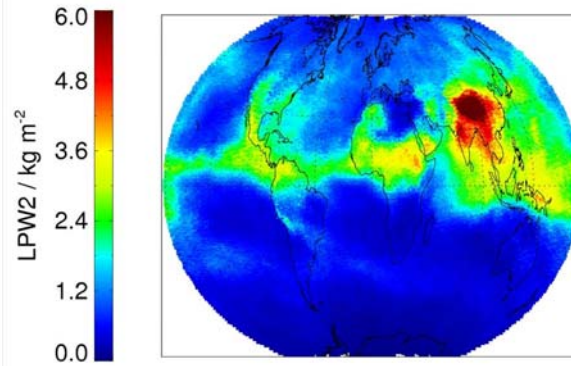
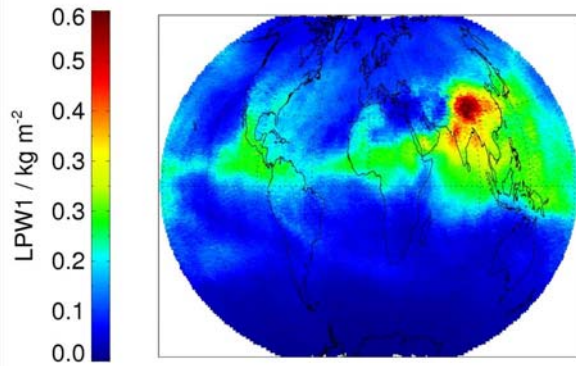
- **CM-SAF overview**
- **CM-SAF water vapour and temperature products**
- **ATOVS processing scheme at CM-SAF**
- **Validation process and validation results**
- **Reprocessing**
- **Conclusion**

- The aim of the Satellite Application Facility on Climate Monitoring is to generate, archive and distribute widely recognised high-quality satellite-derived products and services relevant for climate monitoring in operational mode.
- Cloud, radiation, water vapour and temperature products derived from different instruments are available.
- Poster 6.11 by Nathalie Selbach summarizes all our available products.

- CM-SAF data products can be distinguished in operational monitoring products and retrospectively produced data sets.
- Operational monitoring products are disseminated with high timeliness (max 8 weeks after the observation) to support operational climate monitoring applications of the national meteorological and hydrological services.
- Because of the timeliness requirement it is not possible to monitor interannual variability and trends. Bias error due to orbit shift and decay, as well as intersatellite biases are not corrected for the operational products.
- For the retrospective produced data sets errors due orbit changes and intersatellite biases are minimised.

- CM-SAF water vapour and temperature products are derived from the ATOVS instruments.
- Time period: 2004-2009.
- In total 28 products are available as global daily and monthly means in a Behrmann cylindrical equal area projection.
  - Vertically integrated water vapour of the atmospheric column from the surface to 100 hPa.
  - Layered vertically integrated water vapour, layered mean temperature, and layered relative humidity on 5 layers (300 to 200 hPa, 500 to 300 hPa, 700 to 500 hPa, 850 to 700 hPa, and surface to 850 hPa).
  - Temperature and water vapour mixing ratio at 6 pressure levels (200 hPa, 300 hPa, 500 hPa, 700 hPa, 850 hPa, and 1000 hPa).

# Examples of CM-SAF water vapour and temperature products

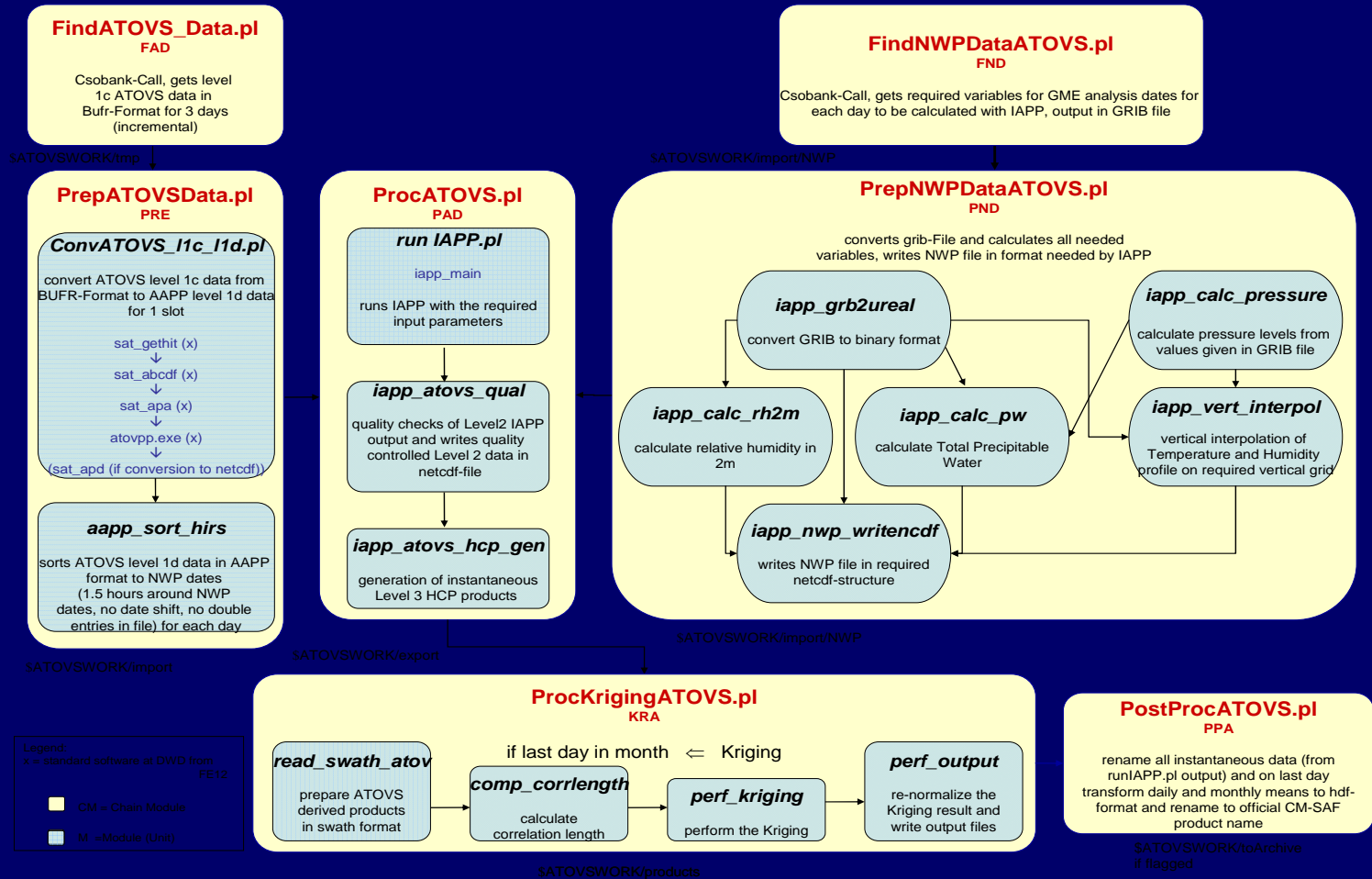


Layered vertically integrated water vapour for the 5 layers.  
Monthly means for July 2005.

# The ATOVS processing scheme at CM-SAF

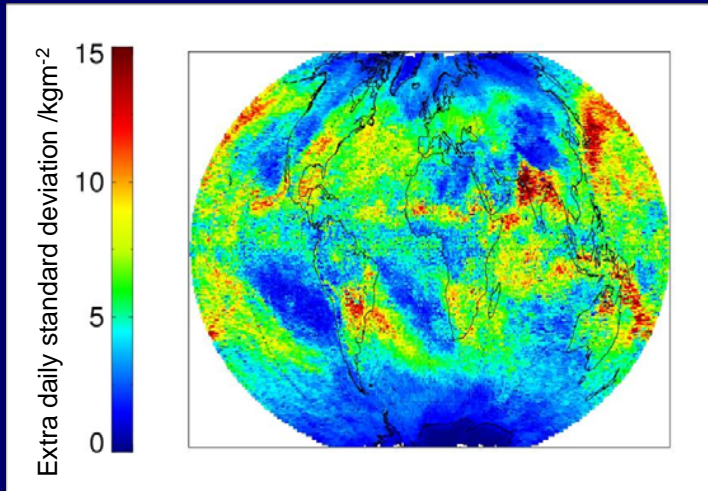
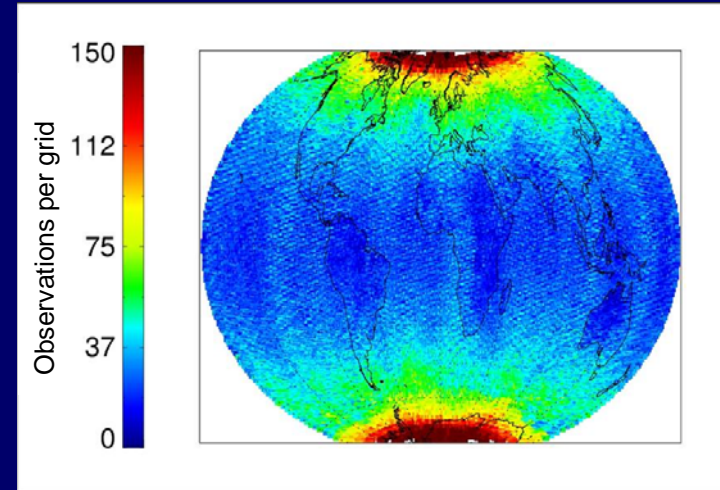
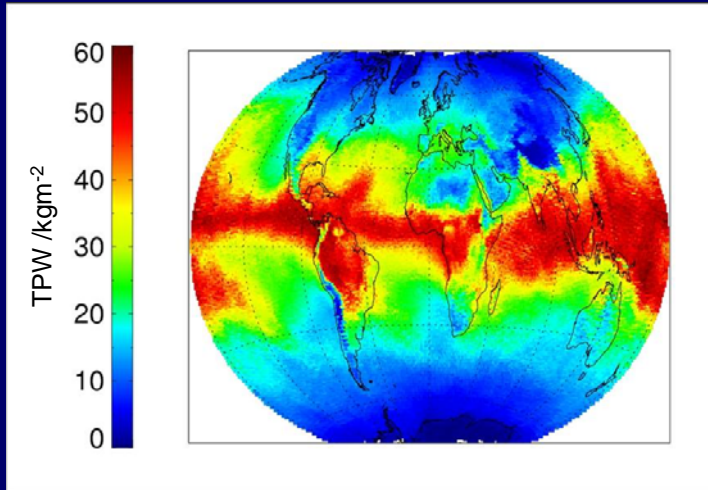
- CM-SAF operationally uses the International ATOVS Processing Package (IAPP) to carry out the inversion from ATOVS radiances to humidity and temperature profiles.
- The ATOVS level I1d data generated by the ATOVS and AVHRR Processing Package (AAPP) are used as input for the IAPP.
- Output of the Deutscher Wetterdienst Global-Modell (GME) are used as first guess input to the retrieval.
- A Kriging routine is used to determine daily and monthly means on a global grid from the swath based retrievals, as well as uncertainties estimates.

# The ATOVS processing scheme at CM-SAF





# Examples of CM-SAF water vapour and temperature products



October 2004.

Vertically integrated water vapour.

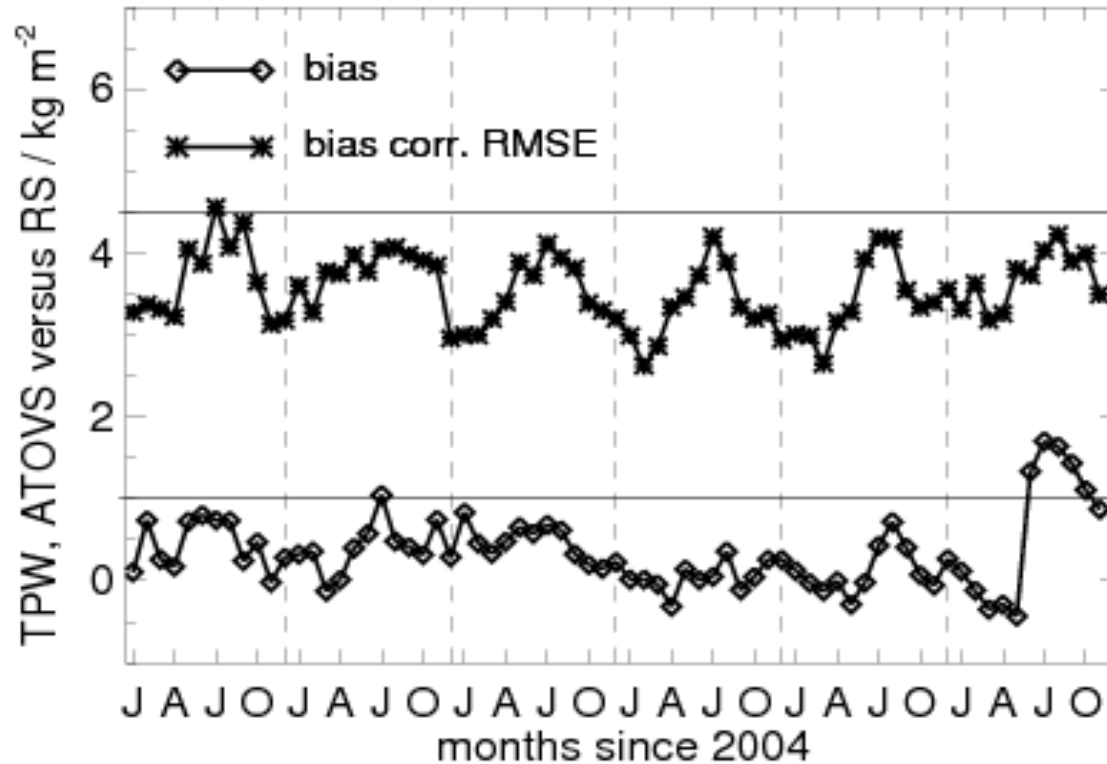
Number of observations per grid points.

Extra daily standard deviation.

- CM-SAF temperature and humidity products have to meet the service specifications that are defined for each products.
- To check whether the CM-SAF temperature and humidity products comply with the given service specifications they are validated against radiosonde observations that meet the quality standard of the GCOS Upper Air Network (GUAN). 173 GUAN stations are available.
- The validation process do not account for the spatiotemporal mismatch of radiosonde and satellite observations, nor for the radiosonde errors.

# Validation 2004-2009

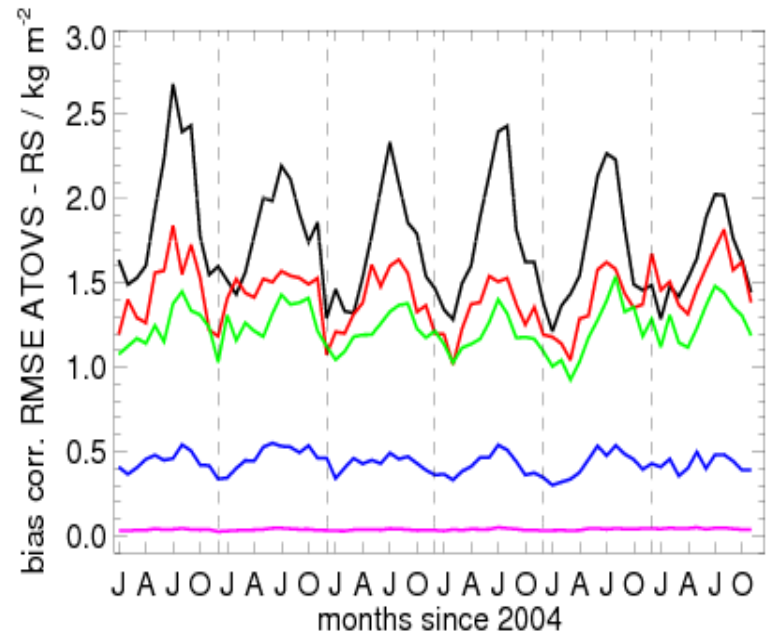
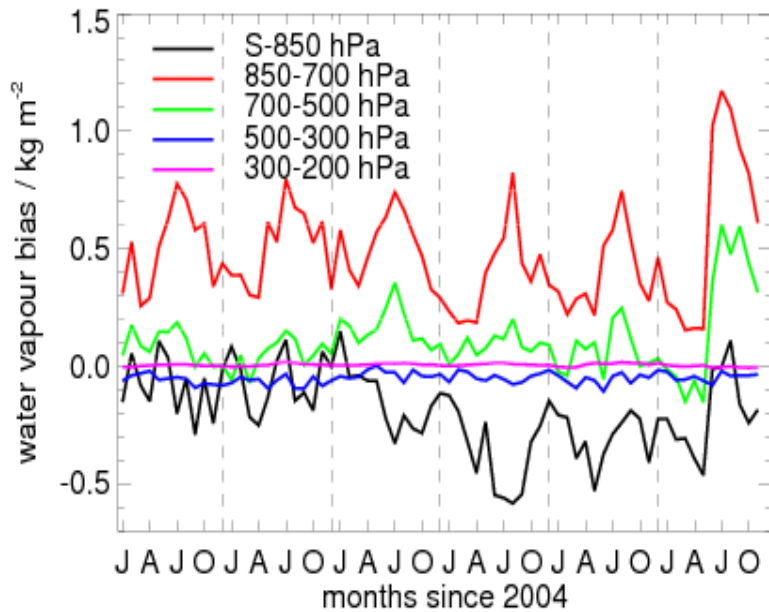
## Monthly means



Time series of the bias and bias corrected RMSE between TPW from ATOVS and radiosondes.

# Validation 2004-2009

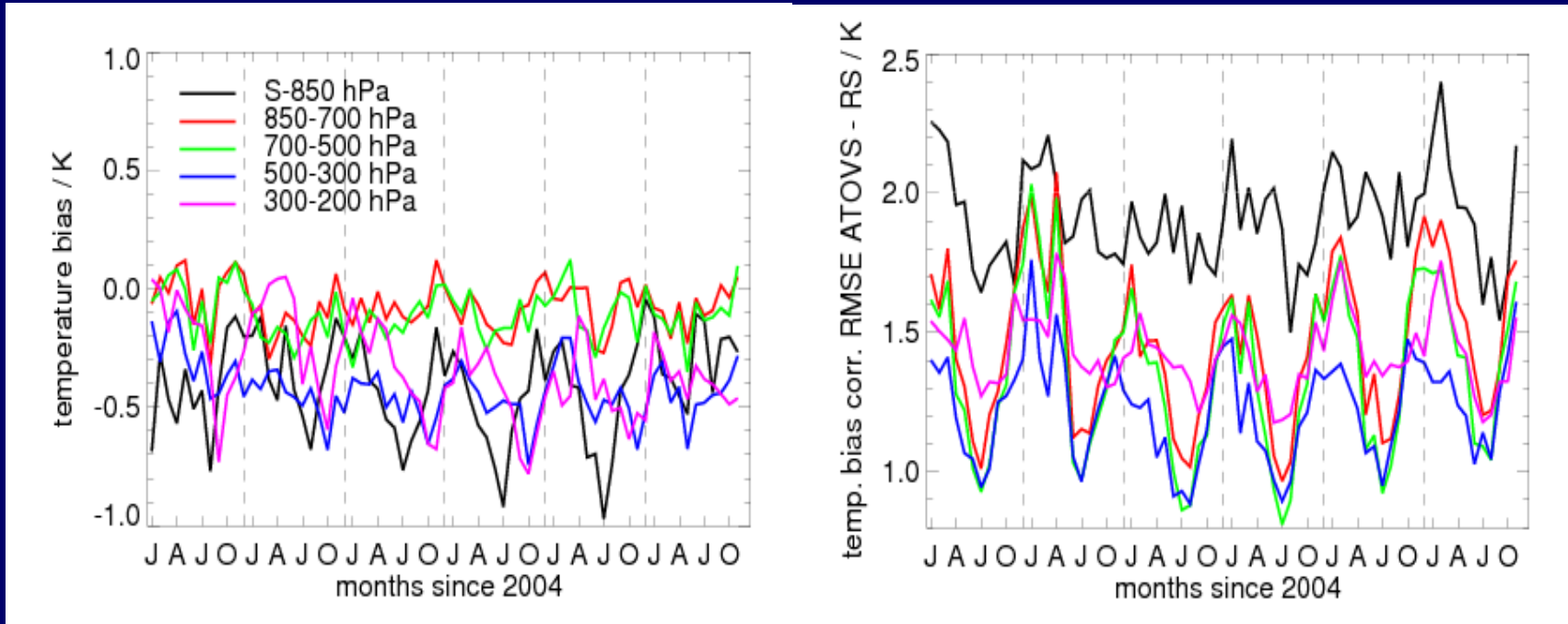
## Monthly means



Time series of the bias (left) and bias corrected RMSE (right) between LPW 1-5 from ATOVS and radiosondes.

# Validation 2004-2009

## Monthly means



Time series of the bias (left) and bias corrected RMSE (right) between T1-5 from ATOVS and radiosondes.

- Reprocessing from 1999 until now, all on the same system and with the same software versions.
- Using the ERA interim fields as first guess input instead of the GME fields.
- Using as many of the ATOVS data as we can.

- The CM-SAF temperature and humidity products exhibit high quality.
- Implementation of the use of the data collected by the ATOVS instruments onboard the MetOp and NOAA-19 satellites into the processing scheme.
- Reprocessing of the ATOVS products from 1999 is ongoing work.

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