



## **Tropospheric specific humidity climate data record derived from multi-mission GPS Radio Occultations**

Johannes K. Nielsen, Hans Gleisner, Stig Syndergaard, and Kent B. Lauritsen

Danish Meteorological Institute, Middle Atmosphere Research Division, Copenhagen, Denmark (jkn@dmi.dk)

The ROM SAF reprocessed CDR Version 1.0 contains profiles of meteorological variables retrieved globally from multiple GPS Radio Occultation (RO) missions. Temperature, specific humidity and pressure are derived with a 1D-Var approach, using RO refractivities along with ERA-Interim forecast information as inputs.

Applying a relatively low observation error and a relatively high specific humidity background error causes the retrieved specific humidity to be weighted towards the measured refractivity, while the tropospheric temperature is weighted towards the ERA-Interim temperature. Furthermore the quality control on humidity has been relaxed so there are no assumptions about humidity being non-negative or not supersaturated. This retrieval configuration allows us to study the specific humidity as an almost independently observed climate variable in the free troposphere.

In this presentation we focus on validation and comparison of the 1D-Var products against ERA-I, ECMWF operational data and collocated radio soundings from the GCOS Reference Upper Air Network (GRUAN). Preliminary results suggested that ERA-Interim temperature was 0.2 K positively biased and specific humidity was up to 0.2 g/kg positively biased in the lower troposphere relative to GPS RO. This humidity bias was consistent with a similar bias between ERA-Interim forecast and ECMWF operational daily forecast. However, both the temperature and specific humidity bias issues were resolved by applying the form suggested by Simmons and Burridge (MWR, 1981) to the full level ERA-I model pressure calculation. These findings will be demonstrated in validation plots for all latitude bands.