

Interactive comment on “Technical Note: On the intercalibration of HIRS channel 12 brightness temperatures following the transition from HIRS 2 to HIRS 3/4 for ice saturation studies” by Klaus Gierens and Kostas Eleftheratos

Anonymous Referee #2

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In this study, the authors examined time series of the intercalibrated HIRS brightness temperature data at channel 12 (T12), and found a discontinuity in the time series of ice supersaturation inferred from T12 during the transition period from the HIRS 2 to the HIRS 3 instrument, which involved a shift of the central wavelength in the channel. To correct for this apparent discontinuity at the low end of T12, the authors proposed an additional correction method based on the cumulative distribution functions of T12 from NOAA-14 and -15 satellites. The proposed correction method is expected to help remove large part of the bias at the low end of T12. The authors may consider the following issues to further demonstrate the robustness of the conclusions.

C1

Cloud contamination of infrared measurements can cause a positive bias in the upper tropospheric humidity estimated from T12 observations. This means that differences in the cloud clearance between HIRS 2 and HIRS 3/4 may contribute to the discontinuity in the time series. As a result, it is important to make sure that the cloud clearance at the low end of T12 is consistent between HIRS 2 and HIRS 3.

Due to the diurnal variations of cloud ice mass and humidity in the upper troposphere, difference in the local observation time between satellites may lead to discrepancy in the observed brightness temperatures. In addition, the orbit of NOAA-14 has substantially drifted during the transition period. Have potential biases arising from these factors been taken into account here?

The proposed intercalibration method is based on the assumption that the probability of supersaturation did not change during the transition period from the HIRS 2 to the HIRS 3 instrument. The validity of this assumption can be assessed using microwave observations (e.g., Buehler et al., 2008, JGR) or the free-tropospheric humidity data set constructed from the Meteosat MVIRI and SEVIRI observations (e.g., Schroder et al., 2014, ACP).

L400-410, Fig. 8: This portion is confusing because the data pairs of the unmodified values show better agreement than the pairs of the modified values.

L515-519, Table 1: The mean fraction of exceedances is very small for the examined UTHi thresholds. This gives an impression that it might be okay not to correct for the discontinuity at the low end of T12.

Fig. 1: To further demonstrate that the discontinuity during the transition period is caused by the shift of the central wavelength, the authors may also present scatter plots for matching pairs between NOAA-12 and NOAA-14 and between NOAA-15 and NOAA-16.

Fig. 3: the $y = 0$ line instead of the $x = 0$ line?

C2

Fig. 4: “cfd” needs to be replaced by “cdf”

Fig. 5: As Fig. 1 instead of As Fig. 2?

Fig. 9: The scales are all the same.

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