

Interactive comment on “A review of sources of systematic errors and uncertainties in observations and simulations at 183GHz” by H  l  ne Brogniez et al.

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p4 111 ‘The GRUAN RS92 profile for humidity does not vary greatly from Vaisala’s default processing below the upper troposphere’

Vaisala’s processing changed at version 3.64 of DigiCora III. This is the ‘Dec 2010’ change described at <http://www.vaisala.com/en/meteorology/products/soundingsystemsandradiosondes/sounding-Data-Continuity/Pages/humiditymeasurementimprovedalgorithm.aspx> Note that practical implementation can be delayed - for example German and UK stations only implemented it in 2015 and a few countries have DigiCora I or II which don’t have the radiation and time-lag corrections for humidity. In TEMP

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code there is no indication which version of DigiCora III is in use but for BUFR reports generated by Vaisala software the information is provided, see <https://software.ecmwf.int/wiki/display/TCBUF/Radiosonde>.

NB. Radiosonde reports include humidity as dew point temperature. At low temperatures (below about -40C) it matters which saturation vapour pressure equation is used in conversions to RH or specific humidity <http://cires1.colorado.edu/~voemel/vp.html> gives a useful overview. Vaisala radiosondes assume the Hyland and Wexler formula. The WMO CIMO Guide (2014 edition, <http://www.wmo.int/pages/prog/www/IMOP/IMOP-home.html>) recommends several similar formulae (Hyland, Hyland and Wexler or Sonntag) for processing radiosonde humidities.

p8 237 humidity corrections ... Agusti-Panareda et al 2009

The Agusti-Panareda/Vasiljevic (AP09) correction was developed at ECMWF and is used at various European NWP centres (not the Met Office who trialled it and decided not to use it). One problem is that (as mentioned above) there are some RS92 reports bias corrected at the station and others not and no way (from TEMP) to distinguish them. Another problem is that the AP09 method assumes homogeneous background error biases - probably less warranted for humidity than temperature. The bias correction of radiosonde humidity is currently under investigation at ECMWF.

p10 291 ‘The differences in Table 2 show consistent results’ The point that strikes me from Table 2 is that all the instruments show rather a jump from the first channel (most positive difference) to the next channel. However I note that the second SAPHIR channel f0 +/-1.1 is more negative than the f0 +/-1 channels on the other instruments.

p11 317 ‘new Vaisala RS41 probes, which are likely to be even more accurate than the RS92’ Yes, because there is a temperature sensor within the humidity sensor there is no need for a radiation bias correction to the humidity (eg Jensen et al, 2015)

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Comparison of Vaisala radiosondes RS41 and RS92 at the ARM Southern Great Plains Site M. P. Jensen, D. Holdridge, P. Survo, R. Lehtinen, S. Baxter, T. Toto, and K. L. Johnson Atmos. Meas. Tech. Discuss., 8, 11323-11368, doi:10.5194/amtd-8-11323-2015, 2015

p11 319 'in-situ' - 'laboratory and ground-based' might be clearer I presume that in a laboratory it is difficult if not impossible to obtain a good simulation of clouds - perhaps making it more likely that clouds are a significant part of the discrepancy.

Table 1 and Figure 1. I found the description of frequency and bandwidth very confusing. It became clear after email discussion with the lead author: each "channel" is actually the combination of two channels. For example the third SSMIS channel is given as 183.31 \pm 6.6 in Table 1. It has a lower side channel "looking" at the range [175.21, 178.21] while the upper side channel looks at the range [188.41, 191.41] These two parts are then averaged to form 1 measurement (they basically do that to lower the noise, and reach the required radiometric sensitivity). - An example like this should be provided to clarify matters. - In Figure 1 only the upper side channels are represented. - If raw data for the separate side channels are available these might help in understanding the spectral characteristics better.

Figure 2b 'Suomi' misspelt in the top line of the title.

Personally, I would like to see typical humidity weighting functions for typical mid-latitude and tropical profiles - perhaps for SAPHIR channels.

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