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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Radiosondes stratospheric temperatures from 1957 to 2008 at Dumont d'Urville (Antarctica): trends and link with Polar Stratospheric Clouds" *by* C. David et al.

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It was very interesting for me to read your paper, because I'm working on homogenization of antarctic radiosonde temperature time series with the RAOBCORE Method at the University of Vienna. Especially your table 1 with radiosonde- and balloon types is very interesting for me. It differs in some details from the metadata in the IGRA which are used in RAOBCORE. There are three aspects I want to comment on, the first is about the temperature trends at Dumont Station the second is about homogeneity testing and maybe corrections and the third is about the bimodal structure in your figure 3.

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Interactive Discussion

Discussion Paper

On page 25704 line 6 and also in your abstract you wrote, that you "found a significant cooling of about 2.3 K/decade at 20 km between 1957 and 2008". 2.3 K/decade is a very strong trend and means a cooling of 11.5 K during the last 50 years and I think this is surprisingly large. Is it possible, that it is 2.3 K/century and not K/decade? I'm also investigating temperature trends and how they change if corrections for inhomogeneities are applied and found a trend for Dumont station for the uncorrected data in 50 hPa of 0.23 K/decade between 1958 and 2008, which would be the same as 2.3 K/century.

On page 25692 line 23-27 you wrote, that "despite the instrumental changes, according to the statistical analysis, no significant bias appeared within the 1979-2008 period". With RAOBCORE one can find at least two inhomogeneities between 1979 and 2008. The last published version is version 1.4 and you can find it on the website

`http://homepage.univie.ac.at/leopold.haimberger/RAOBCORE_T_1.4.html`

if you want to have a look at it or download the correction file. In version 1.4 the first inhomogeneity at Dumont Station is found in 2002 where there was the change between the VAISALA RS80 and RS90, and the second is found in 1989, where there is a change between PHILIPS and VAISALA RS80 documented in IGRA (that's one of the differences to your table 1). In version 1.5 which isn't published yet but uses ERA-Interim background-departures (instead of ERA-40 or operational analysis) where possible and contains some enhancement of break size estimation at antarctic stations the first inhomogeneity is found in 2005 instead of 2002 when there was the change from VAISALA to MODEM sonde (the analyzed time series is a little bit longer now, so it's easier to find something in 2005). The correction is of similar magnitude. An additional inhomogeneity is found in 1979, but this will not effect your analysis too much since it starts in 1979. This will only effect the long term trend. The RAOBCORE corrections alter the trend in 50 hPa temperatures at Dumont station such that there is a little bit more cooling.

ACPD

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In your chapter 3 Data validation you refer to your figure 3 which shows the distributions of differences between the Radiosonde temperature and the ozone sonde temperature which show a bimodal distribution where the two peaks get more separated with height. Have you homogeneity tested the difference time series between the two sondes? Do you still get the bimodal distribution if you make separate figures for the different sonde types used since 1992? Has the ozone sonde temperature sensor type changed since 1992? An inhomogeneity in one or both time series due to changes in instrumentation, software or balloon would be one possible explanation for the bimodal distribution and the increasing separation of the peaks with height.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 25687, 2009.