

Interactive comment on “Early ship-based upper-air data and comparison with the Twentieth Century Reanalysis” by S. Brönnimann et al.

S. Worley (Referee)

worley@ucar.edu

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General Comments

Well documented, interesting history of marine-based upper air sounding from periods separated by about 30 years (1906-1938). Very thorough analysis of the metadata (papers, past publications, and many other ancillary information) surround the instruments used, procedures used on board ship, and the methods the soundings were evaluated and recorded. Very nice effort to use old data and cross-examine results from an atmospheric reanalysis. More works like this are needed to improve our understanding and study of climate systems. The observational data work is very challenging, but as shown in this paper much can be gained from it. This work, which builds on the CHUAN experience, compares data to the 20 Century Reanalysis that is based solely on sur-
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face pressure measurements and monthly SST analysis for a boundary condition. This comparison at the far southern latitudes is a most stringent test for the reanalysis. The results are surprisingly good.

The early atmospheric moisture measurements from the Schwabenland likely contain significant errors. The instrumentation, hair hygrometer, was very new and temperature sensitive. Error estimations are not attempted in this case.

Work and experience by Brönnimann 2003 is extensively used here for preparing the marine-based upper air sounding pressure and temperatures. It seems to me, reasonable approaches and sensible approximations are used to estimate the magnitudes of errors associated with these data. I defer true critique in this area to other expert reviewers.

That marine-based soundings were compared to ensemble mean and standard deviation fields of temperature, GPH, and humidity from the 20 Century Reanalysis (20CR).

Some surface pressure measurements from the SMS Planet were used in the 20CR whereas measurements from the MS Schwabenland were not. This could be made more explicitly clear (p. 2433, l. 20). In general, both ships were making upper air measurements in very remote locations where little supporting surface data is available for the 20CR.

This paper effectively uses different data components in different ways; first with observed data from the SMS Planet to show weakness in the 20CR (undetected inversion), and then with 20CR and NNR climatology to establish a likely data processing error for the MS Schwabenland observations.

Over all I rate this publication as significant in need of only minor changes.

Specific Comments

Figure 1: Some profile numbering would improve the utility of this Figure.

page 2427, l 22: "controlling " => quality controlling

p. 2427, l 23: define a.s.l the first time it is used

p 2431, l 1: "sketched" = described

p 2431, l 8: "manual of" = manual for

p 2431, l 3-15: The phrase "German sonde" is first introduced here is it the same as a Lang sonde? This follows on to the next paragraph as well, and could be clearer.

p 2432, l 15: "among" = between

Figure 1 caption, "the analyses", better if 20CR is spelled out. You will see (below as well) this reviewer prefers the captions for Figures and Tables to stand on their own, i.e. to be very complete.

Table 2 and Table caption, The functional meaning of "r" and "P" should be defined.

p. 2434-2435, l. 19-4: It would be helpful to explicitly know which panel in Figure 3 is being referred to.

p. 2435, l. 9: cite Table 2?

p. 2435, l.10: "correlations ... absolute values" - At first "absolute" made me think of the mathematical sense, especially when used in conjunction with correlation. Would "observed values of temperature" be better?

p. 2435, l. 21: More consistent ordering here would help, i.e. (colours and contours) ... (yellow and dashed lines).

p. 2435, l. 26: "misses" may be better "did not capture". Figure 4 is nicely done - having the ship name and profile number in the caption would add value.

p2436, l, 11: "absolute values.... 20CR" – perhaps clearer as "sonde observations and co-located analysis values from 20CR"

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p. 2438, l 11-12: Helpful to cite Table 3 here?

p. 2438, l. 12: "anomaly correlations of 0.6-0.7" - From Table 3, if Zanom and Tanom are considered, it looks more like 0.5-0.7 to me. In fact, the abstract cites 0.5-0.7. Need to tighten this up a little bit.

p. 2438, l. 15: Might also be helpful to note this statement excludes the 1000 hPa level where differences are 10-13%.

Figure 8. : The area is not defined and the continents are barely visible - could be improved.

Interactive comment on Clim. Past Discuss., 6, 2423, 2010.

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