

Interactive comment on “Validation of meteorological analyses and trajectories in the Antarctic lower stratosphere using Concordiasi superpressure balloon observations” by Lars Hoffmann et al.

Anonymous Referee #1

Received and published: 22 February 2017

Review:

Summary: This study provides validation of four lower stratospheric temperature and wind analyses through comparisons with independent (not incorporated into the analyses) long duration constant pressure balloon observations from Sep 2010 to Dec 2011. In addition to direct temperature and wind comparisons, the study compares trajectory errors, a quantity that is important to understand for the interpretation of stratospheric transport and chemistry. The observations, analyses, and methods are clearly presented and the results clearly explained. Past work is appropriately referenced, figures

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are clear, and the paper is very well written. The balloons provide an excellent source of independent, in situ, stratosphere observations, that are well exploited by this study. Overall this work should be of interest to many readers of ACP.

Main Point:

MERRA-2 was released in the Fall of 2015 and should really be included in place of, or better yet, in addition to the MERRA results. MERRA-2 replaces MERRA and will be used in more future studies than the previous, and no longer produced, MERRA system. Including MERRA-2 comparisons should make the paper much more useful and more widely cited. It is difficult to recommend publications as is, with only the out-of-date MERRA system included.

Minor Points:

Table 2: The MERRA and MERRA-2 products are also provided on the 72 model vertical levels. The higher vertical resolution available may change the balloon comparison results. Was there a reason for examining the pressure level output?

Figure 4, Caption: Add text for the latitude of the outer circle and the longitude orientation.

Line 23, “40 m/s”: There are still some 50 m/s contours in the 2010-12-01 figure. Is the 40 m/s number an average?

Line 21, “grid-scale variances”. How are the grid-scale variances calculated? Are they space or time variances?

Figures 5 and 6: The meridional wind bias plot might show differences more clearly with a different vertical scale. The values are small and the circulation will change over the balloon record and with latitude, however the small average meridional wind error is still of interest.

Figures in general: The multi panel figures should be labelled a, b, c, . . . and referred

to as such in the figure captions and text.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2017-71, 2017.

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