

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 #3

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The manuscript is generally well written with nice figures and a clear presentation of the methods applied. But unfortunately I consider the applied method to be flawed. By having access to the operational ECMWF analysis feedback data and to the ECMWF ERA-Interim analysis feedback archive, I can confirm that the Concordiasi temperature and wind observations were assimilated by both data assimilation systems. ECMWF assimilated the data distributed on the GTS (15 minutes frequency). 68% of the data was assimilated and 32% removed by thinning.

The ERA-Interim statistics for the whole Concordiasi campaign showed balloon data

C1

minus analysis departures for temperature: Standard deviation 0.7K, bias -0.3K. Compared against 12-hour background fields the values were: Standard deviation 0.8K, bias -0.5K. The similar statistics for zonal wind: analysis departures: Standard Deviation 1.2 m/s, bias -0.1 m/s. Background departures: Standard deviation 1.9 m/s, bias -0.1 m/s. Meridional wind: analysis departures: standard deviation 1.2 m/s, bias 0 m/s. Background departures: Standard deviation: 1.9 m/s, bias -0.1 m/s. Around 41000 temperature Concordiasi measurements were assimilated during the three months. 41500 zonal and 41500 Concordiasi meridional measurements were assimilated.

These detailed statistics are included here to confirm that the Concordiasi data was fitted well by the ERA-Interim analysis and therefore cannot be considered independent data. Similarly can be said for the operational ECMWF analysis (not shown). This means that this is not a valid comparison of the four (re)analysis systems, if it is true the data was not assimilated in NCEP reanalysis and the MERIS reanalysis. This means that the core part of the manuscript, the inter-comparison, would not make much sense and would not be fair. Based on this I would recommend that the editor rejects the paper.

Additional costly assimilation experiments without assimilation of the Concordiasi in the ECMWF systems would be required for a fair comparison. It would require a very significant rewrite of the manuscript to remove all the parts that relates to inter-comparison, or clearly split the description and evaluation of the ECMWF systems' results and NCEP/MERIS. No matter what it would not provide a proper inter-comparison.

At this stage it does not make sense for me to provide detailed comments. The two main issues I have are related to use of interpolated model data and the 15 hour time filtering.

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C2