

Interactive comment on “Differences between the QBO in the first and in the second half of the ERA-40 reanalysis” by H. J. Punge and M. A. Giorgetta

Anonymous Referee #1

Received and published: 27 September 2006

This paper analyzes changes in the representation of the QBO in ERA-40 reanalysis before and after 1980, roughly when satellite data is presumed to have an impact on the assimilation. The paper finds that between 10 and 2 hPa, there are large differences in the mean zonal wind, and small differences in the QBO amplitude between the two periods. No obvious explanation for the differences was found; it is not clear whether the atmosphere changed or the ERA-40 analysis changed.

I think that the analysis is intriguing, and I hope that the authors can push the analysis further before final publication. Ideally, I would like to see the differences explained, or at least documented more thoroughly, so that the reader has an idea when the changes

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

took place.

There is no problem doing detailed analysis up to 10 hPa, because we have the monthly-mean Naujokat data. This analysis shows that the QBO was fairly consistent over the time span, in agreement with Baldwin and Gray (2005)–their figure 1. They analyzed the QBO in ERA-40, Naujokat radiosonde, and rocketsonde data, so it is worth summarizing their findings. They found excellent agreement between ERA-40 and radiosondes to above 10 hPa. Above 10 hPa they used rocketsondes (which agreed well in the overlap with radiosondes). They suggested that above 2-3 hPa, the ERA-40 data were questionable. Curiously, in comparisons with radiosondes, they found no evidence for improvement when satellite data were assimilated. However, agreement did improve after the mid-1980s and again around 1995. The rocketsonde record lasts only a few years past 1980, so it is not possible to do a reliable validation of pre- and post-satellite periods above 10 hPa.

Nevertheless, I am hopeful that further analysis of the ERA-40 U time series may reveal the times at which these changes occurred. Is there a jump at 1979, or are the first half/second half differences due to other changes? Do the changes correspond to changes in the assimilated data or to ERA-40 assimilation streams, which began on certain dates?

Minor comments:

1) Figure 1 needs to be larger. 2) Averaging between 5S and 5N will slightly reduce the QBO amplitude. 3) I suggest analyzing the seasonal cycle in early vs. late data.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 9259, 2006.