Atmos. Chem. Phys. Discuss., 8, S4122–S4124, 2008
www.atmos-chem-phys-discuss.net/8/S4122/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Assimilation of stratospheric and mesospheric temperatures from MLS and SABER into a global NWP model" *by* K. W. Hoppel et al.

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Received and published: 25 June 2008

1. This work used the latest SABER retrievals that were available at the time (version 1.06), as issued by the SABER team for science studies (see, e.g., Manney et al., ACP, 2008). Given known issues with these retrievals, we only assimilated SABER v1.06 data up to 0.01 hPa (˜ 80 km), which, as our earlier online discussion with Dr. Feofilov made clear, circumvents most of the v1.06 versus v1.07 issues (see also Schwartz et al., JGR, 2008). The Remsberg et al. draft (unwritten at the time of our work) does not show large changes at these levels except near the summer mesopause, which is "warmer and several km higher" in the v1.07 retrievals. SABER is yawed to the north (away from the summer mesopause) during most of the period focused upon in this study. Other differences between v1.06 and v1.07, which mainly impact the quality of

the v1.06 at altitudes above the 0.01 hPa level, are not relevant to this paper either because these data are not assimilated. As an aside, we are currently using v1.07 in new studies and at higher altitudes and expect to discuss the quality of the SABER v1.07 temperatures in the papers that use that data (e.g., Eckermann et al., JASTP, submitted, 2008).

2. Calculating the radiative heating more frequently than every 2 hours has negligible impact on the assimilation below 0.01 hPa. In our opinion, the 6 hour analysis window and incrementing procedure provides the more relevant constraints on the accuracy of the mesospheric tidal assimilation at present (see, e.g., Swinbank et al., JGR, 1999; Sankey et al., JGR, 2007; Eckermann et al., JASTP, 2008).

3. Mesospheric ozone varies diurnally in the mesosphere. It is very short photochemical lifetime does not make it especially useful as an observational proxy for validating forecasts of either mesospheric temperature or dynamics.

As is well-known, individual TIDI measurements have large measurement uncertainties. While recent studies indicate that extensive averaging of these data can provide reliable monthly-mean MLT wind climatologies [e.g., Oberheide et al., JGR, 2006], such highly averaged asynoptic data are not ideal for validating NOGAPS-ALPHA winds, for which instantaneous point data are needed for computing O-Fs. Since no mesospheric wind data are assimilated directly, our analyzed MLT winds are a secondary analysis product that requires a careful and dedicated validation study that is beyond the scope of the current work. We are currently comparing mesospheric winds from our newer higher-altitude assimilations (Eckermann et al., JASTP, 2008) with MLT winds acquired by ground-based radars.

4. Section 3.1 lists the important satellite instruments assimilated operationally and gives a reference for a list of all the observations. The text has been updated to say that these observations are also used in this study. Although extended-range tropospheric forecasting is one motivation for middle atmosphere data assimilation, it is not the

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focus of this study. To effectively examine extended range tropospheric forecasts, we would need to run the forecast model at a higher horizontal resolution typical of current operational configurations and examine statistics over a much longer time period.

5. The word "global" has been removed from the Fig. 7 caption.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 8455, 2008.