Atmos. Chem. Phys. Discuss., 5, S288–S290, 2005
www.atmos-chem-phys.org/acpd/5/S288/
European Geosciences Union

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Fall vortex ozone as a predictor of springtime total ozone at high northern latitudes" *by* S. R. Kawa et al.

S. R. Kawa et al.

Received and published: 1 April 2005

We thank Dr. Hood for his careful reading of the manuscript and his thoughtful comments. The essence of his general comments is to hypothesize how the observed November vortex O3 variability may be related to a modulation of the equatorial winds in the upper stratosphere. He suggests that we look for correlation with the lower mesospheric subtropical jet.

We have done this analysis as described below, and we do not find any significant relationship between tropical upper stratospheric winds in Fall and the November ozone anomalies or March temperatures.

We have explored the relationship with March polar temperature (60-90 N, 50 hPa) and

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upper-stratospheric winds using the ECMWF ERA-40 reanalysis (1978-2001). We find no significant correlation with equatorial winds. We do see a modest correlation (0.25) of the JF 30 hPa polar temperature with U in the tropics at 2 hPa. These correlations are probably associated with the minor correlations that are due to the QBO.

We have also explored the relationship of the tropical zonal wind with polar temperatures. We take the 1 hPa wind (20 S-20 N) for Sept.-Oct. and correlate this with individual months (Sept. to March) in U, T, heat flux, and momentum flux. We see a nice correlation with the downward propagating QBO in the tropics and mid-latitudes in both U, and T for all months. In general, we see no significant impact ($r<0.25$) of these 1 hPa tropical winds on the northern extra-tropical eddy heat flux, or the eddy momentum flux for any month. The single exception is a moderate correlation of the January heat flux at 100 hPa, 60 N with the S-O tropical wind. Since higher heat flux results in warmer polar temperatures, the 50 hPa February temperature is moderately correlated (r = 0.4) with the S-O 1 hPa zonal wind. This is not a particularly significant correlation and is probably fortuitous.

Direct correlation of the November 600 K ozone anomalies yields low correlations with tropical zonal winds and temperatures.

Specific minor comments will be addressed in the revised manuscript: Vortex boundary and potential temperatures ranges will be added. The reference to the cross section figure in Kawa et al. [1992] is really more for background appreciation of the vortex structure. It is not essential for the discussion here.

We do not use SBUV data below 30 hPa in the correlations and will make this clearer.

The Newman et al. [1997] reference in the caption contains a complete list of the total O3 data sources including SBUV for 1995 and 1996. We can repeat that list here.

There are years of no data for SBUV (1980) and POAM (1997). The SBUV time series should be 25 years.

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Captions and labels in question will be enhanced, and sentences reworded.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 155, 2005.