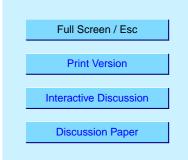**Atmospheric Chemistry and Physics Discussions**

Interactive Comment

Interactive comment on "The mean meridional circulation and midlatitude ozone buildup" by G. Nikulin and A. Karpechko

Anonymous Referee #2

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This article presents an interesting study on the buildup of stratospheric ozone in winter in the Northern hemisphere. It deals with several proxies representing the meridional circulation in the stratosphere, such as the eddy heat flux or the residual vertical velocity, and it evaluates the correlation between the monthly ozone tendency and these proxies at various pressure levels. Such a study is useful for the evaluation of the main factors that drive the ozone variability and also eventually its long term evolution. The fact that ozone builds up first in October over the North Pacific is particularly interesting. The article is well presented and well written. However it sometimes lacks a precise definition of the parameters studied and how they are calculated. The article is heavily based on the computation of correlation between various parameters. It is

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rather lengthy and clear conclusions on the results obtained together with a physical explanation of the correlations obtained are sometimes lacking.

Detailed comments

2. Data and method

Page 4228, line 10: The sentence here is not clear enough. What do the mean by the period depends on total ozone distribution. Page 4228, line 15: The iterative computation of the residual circulation should be explained here. Page 4228, line 12: What do the author mean by "really questionable"? What is the amplitude of the uncertainty?

3. Ozone tendencies

Page 4229, line 14: How is evaluated the confidence level in Table 1?

4. Heat flux and ozone tendencies

Page 4231, line 14: The definition of HF and how it is computed is needed here. The correlation patterns in Figure 3 seem to follow roughly the location of the edge of the polar vortex where the eddy heat flux should be maximum. Do the authors have an explanation for this? Also it is interesting to note that the high correlation patterns persist up to 3 hPa. What is the point of using HF at 10 hPa instead of 100 hPa as is usually done?

5. Heat fluxes and the residual circulation

Since it is widely accepted that the heat flux should correlate with the parameters of the residual circulation such as w*, v* and dT/dt, the authors should emphasize what are the new results there and focus the paragraph more on these results.

6. The residual circulation and ozone tendencies

The discussion is somewhat fuzzy here and tentative physical explanation of the correlation patterns is needed. For example, what is the interest of using separately v*

and w* to evaluate the residual circulation. Wouldn't a stream function be more appropriate? What is the explanation for the large negative correlation pattern in the mid-latitude in Figure 8c, which indicates that ozone at mid-latitudes is more influenced by vertical transport than polar ozone. Is there an explanation in the latitudinal gradient of ozone as a function of altitude?

7. Discussion

After the lengthy discussions on the correlation patterns, the authors should give here their conclusions on what is the best proxy for the study of ozone variability in the stratosphere.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 4223, 2005.

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