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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Increased UV radiation due to polar ozone chemical depletion and vortex occurrences at southern sub-polar latitudes in the period (1997–2005)" *by* A. F. Pazmino et al.

Anonymous Referee #1

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Review of Manuscript Increased UV radiation due to polar ozonechemical depletion and vortex occurrences at southern sub-polar latitudes in the period (1997–2005) by A. F. Pazmino, S. Godin-Beekmann, E. A. Luccini, R. D. Piacentini, E. J. Quel, and A. Hauchecorne

General Comments

The paper is well written and thorough. The care taken by the authors in the analysis contemplated in the manuscript is clear. However there are some relevant aspects of the analysis the authors need to explain further.

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Discussion Paper

Why did the authors consider a zonal mean climatology for their baseline? Why not use a spatial (lat-lon) climatology? Over the SH the stratosphere and the ozone layer have a distinct asymmetry determined by the presence of the quasi stationary wave 1. Furthermore, as noted in Malanca et al. (2005), this important aspect of mid to high latitude TOC has changed over time both in intensity and longitudinal location, affecting the baseline needed for the instrusion analysis. As these authors noted the evolution of the midlatitude TOC depends also on season, June and October showing different trends. Would it not have been better to consider such TOC climatology for the analysis? The authors are encouraged to consider and discuss this issue in the analysis in order to consolidate their conclusions. Also, why use only the moving average for TOC and not UV? To what extent the presence of snow cover in Tierra del Fuego and southern Patagonia, whose sparsely vegetated soil, particularly in winter, could also have a high reflectivity, may have affected the choice of clear-sky days during polar vortex intrusions, limiting the size of the sample? Why use LIMS HNO3 rather than more recent UARS retrievals? Your comments regarding the Marambio and Lauder stations when compared with the ATOLL model outputs are interesting. On the one hand the fact that the model is able to reproduce the complex behaviour of ozone near the vortex edge is an important aspect of the model validation, which should be stressed. On the other hand, it is important to note that ozone at Lauder does not show significant depletion trends and that ozone variability there is primarily determined by the midlatitude dynamic variability. The longitudinal analysis in section 3 is very relevant. Inspection of the figure shows a certain degree of longitudinal variability in peak occurrence from year to year. It would be of interest to compare this variability with the variability in the position of the quasi-stationary wave 1 discussed in Malanca et al. (2005) at least for the years where the samples overlap. In section 5 again the zonal mean approach is considered. Please refer here too to the comparison with a spatial climatology. Figure 6 is a bit hard to visualize due to the small size of the maps. Would it be possible to device an improved visualization without significantly increasing the size of the figure? In the discussion of preferred locations for vortex intrusions at midlatitudes reference

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should be made of the following paper: Moustaoui, M., H. Teitelbaum, and F.P.J. Valero (2003), Vertical Displacements Induced by Quasi-Stationary Waves in the Southern Hemisphere Stratosphere during Spring, Quart. J. Roy. Met. Soc., 131, 2279-2289. This paper includes a relevant dynamic analysis of the issue. This paper has also a very relevant discussion on the behaviour of quasi-stationary wave 1 which may be of interest to the authors. Furthermore, the following paper has discussed where the Antartic ozone loss has large impacts at southern mid to high latitudes: Ajtic´, J., B. J. Connor, B. N. Lawrence, G. E. Bodeker, K. W. Hoppel, J. E. Rosenfield, and D. N. Heuff (2004), Dilution of the Antarctic ozone hole into southern midlatitudes, 1998–2000, J. Geophys. Res., 109, D17107, doi:10.1029/2003JD004500. 9) What is the basis for a possible decrease in cloudiness in the future? According to models run under the IPCC scenarios (IPCC, 2007), in particular regional model downscaling, the stormtracks will probably move south increasing precipitation in southern Patagonia and Tierra del Fuego. This on the contrary could imply more cloud cover in the region, particularly during winter and probably also during spring. What will happen with cloud cover there is a matter of speculation. Thus the valid speculation on cloud cover and hence surfave UV changes ought to be presented with a strong caveat.

Malanca, F.E., P.O. Canziani, P.O., and G.A. Argüello (2005), Longitudinal and latitudinal behavior of ozone change between 1980 and 2000 at mid-latitudes over the Southern Hemisphere. Decadal differences in trends, J. Geophys. Res., 110, D05102,doi:10.1029/2004JD004977.

Minor Comments:

There are a number of gallicisms throughout the text. The authors are encouraged to revise and edit the text accordingly.

1. Chili should be replaced by Chile. 2. The word diminution (usual in French and in Spanish) is frequently used. A more appropriate term would be decrease. The authors should take care to adjust the corresponding sentences when replacing this word. 3.

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The sentence These simulations were used to relate UV changes and chemical ozone loss. should read as follows: These simulations were used to link UV changes with chemical ozone loss. 4. P.6317, page 17 of manuscript, line 11. Reference is made to section 3.1 which does not seem to exist in the manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 6501, 2008.