

## ***Interactive comment on “Evolution of the eastward shift in the quasi-stationary minimum of the Antarctic total ozone column” by Asen Grytsai et al.***

### **Anonymous Referee #1**

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The paper presents new results that are useful for a better understanding of the spatio-temporal dynamics of the Antarctic ozone depletion. Therefore, the starting point for its publication is very positive.

However, missing cited literature on crucial thematic topics mentioned in the paper create negative impression to the reader. As an example, the citations given for both the ozone hole and the first major sudden stratospheric warming over Antarctica in 2002 are not adequate (see below my detailed comments).

In addition, discussion on the plausible contribution of El Nino events in 1988 and 2002 should be made. For instance, the existing literature on this subject suggests that El Nino characteristics in 1988 and 2002 may not have been similar. Brief discussion on

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it should be added.

Furthermore, it has been suggested often that the delayed SSWs in Antarctica are being directly and primarily caused by the ozone destruction by CFCs. It would be worthwhile short discussion on this for the years 1988 and 2002 to be incorporated.

Finally, comments on the discrepancies observed in the ozone vertical distribution alongwith TOC variability would be very informative. For example, the cases in 2001 and 2002 would be very interesting to be added.

A few additional points of interest are:

Page 1, L 34-35: There are earlier papers on the field and should be cited, e.g.:

Chubachi, Shigeru. Preliminary result of ozone observations at Syowa station from February 1982 to January 1983. *Memoirs of National Institute of Polar Research. Special issue* 34 (1984): 13-19.

Page 1, L 37-38: This has already been published 20 years before Solomon et al., (2005). See for instance Chubachi, (1984) and read the fourth result in the Summary of this paper and the discussion presented in it.

Page 2, L 48-53: The fundamental citations on the field of first major sudden stratospheric warming over Antarctica in Sept 2002 and the vortex split are missing.

Page 3, L 123-124: In both formulas insert space between  $m\lambda$  and  $d\lambda$

Page 5, L 174: Add a note that  $r$  stands for the correlation coefficient and briefly discuss its statistical significance

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