

Interactive comment on “Estimation of Antarctic ozone loss from Ground-based total column measurements” by J. Kuttippurath et al.

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General comments: The paper presents an estimation Antarctic ozone loss applying the passive tracer method to ground based and satellite measurements of total column ozone. This method has been applied for many years in the northern hemisphere and it is interesting to see the method used for the southern hemisphere. The presentation of the data, method and results is fine. However I miss a comparison of the ozone loss results of this analysis with other result from Antarctica e.g. from ozone sondes. Even if there are no results from the same years the relatively small inter annual variability in Antarctica still makes comparison relevant. I also find the discussion on trends somewhat weak and again I miss comparison with and references to other papers on the subject. Finally the language is not very fluent. A brush up from some of the native

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English speakers among the authors would improve on the readability of the paper.

Specific comments:

p. 7649 l. 6: 'The SAOZ observations are continuous throughout the winter'. . . . This does not apply to all SAOZ stations in the analysis and definitely not to the Dobson and Brewer stations. It would be useful to have an overview of measurement periods in Table 1. It is apparent from figure 4 that there are more data points toward the end of the period.

p. 7649 l. 24: 'The sites well-inside the vortex experience more loss than those at the edge. Therefore, South Pole, Belgrano or Neumayer observe more severe loss than Dumont d'Urville or Faraday in each winter. The loss at Concordia and Rothera is less than that of South Pole and larger than those of Dumont d'Urville due to the strength and longevity of the vortex over the respective locations.' This does not seem to be true for all stations e.g. Faraday sees as large an ozone depletion as South Pole and Belgrano in 2007 according to figure 4 ?

p. 7654 l. 17: Figure 8 does not show a large increase in ozone loss. The figure shows total ozone and therefore a decrease in total ozone.

p. 7654 l. 17: 'These show large increase in ozone loss until early 1990s, but the control of emissions by various treaties helped the situation to improve and hence, saturation of the ozone loss is evident after 1993 at all stations in conjunction with decrease in ozone depleting substances as indicated by EESC.' This sentence seems to mix saturation of ozone loss with levelling of of EESC. Saturation of ozone loss is due to the fact that ozone is completely depleted at certain levels. Thus a levelling of in total column ozone may be seen because there is no more ozone left to deplete. This is not the same as levelling of due to decreasing ozone depleting substances.

p. 7654 l. 21. I don't see that figure 9 shows anything that might not as well be seen in figure 8? Also it is disturbing that the same stations have different colours in e.g. figure

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8 and 9.

p. 7656 l. 4. 'The ground-based measurements from Amundsen-Scott, Arrival heights, Belgrano, Dumont d'Urville, Concordia, Faraday, Halley, Marambio, Neumayer, Rothera, Syowa and Zhongshan show substantial loss in 2005–2009.' This is not surprising. It should be commented that this is in line with what would be expected from previous work by others.

p. 7656 l. 11 'The biggest advantage of the ground-based visible instruments (e.g. SAOZ) is the capability of measuring early winter ozone loss and thus covering the whole winter/ spring to enable the complete evaluation, whereas the satellite measurements start in spring only.' this sentence does not belong in the conclusion. It is not new information that came out of this work. However a sentence in the end of the conclusion on how this work emphasizes the importance of GB measurements for early winter ozone loss and analysis of long term changes would be in place.

Figure 4 and others: It needs to be explained what is used as reference for the percentage changes.

Technical comments:

South Pole and Amundsen/Scott are used inconsistently for the same station.

p. 7648 l. 16 (the first derivative of potential vorticity (PV)) change to (maximum first derivative of potential vorticity (PV))

p. 7649 l. 23 Remove 'As in the case of the time of onset'.

p. 7655 l. 24 Replace 'cities' with 'stations'.

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