

Interactive comment on “Evolution of stratospheric ozone and water vapour time series studied with satellite measurements” by A. Jones et al.

A. Jones et al.

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Reviewer 2

R: The paper deals with the investigation of the long term evolution of stratospheric ozone and water vapour extending satellite time series to April 2008. The main topic of the paper is the search for a trend reverse of the decline of the ozone layer; an essential problem of the anthropogenic impact on our environment. The analysis employs all available ozone and water vapour measurements by satellites. This was a huge task and different methodical problems had to be solved. A turn around in the ozone trend was detected. Although the changed trend is not yet significantly positive it indicates that the decrease of the ozone layer is, at least, stopped. I recommend the

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paper for publication in ACP after some minor corrections listed below.

In contrast to the discussion of the water vapour measurements the presentation of the analysis of the ozone observations is relatively longwinded. It is hard to follow the comparison between 9 bins discussed in the paper and the different satellites which monitored ozone in the period under consideration providing the data input for the analysis. Nevertheless the results are important to assess the anthropogenic impact on the ozone layer. In my feeling it is not so important when precisely a turn around of the ozone trend occurred but that evidently the ozone decline is stopped during the ninetieth and a recover of the ozone layer began after this time.

A: We understand that the explanation of the ozone results is somewhat extensive and that there is already a lot of previous study around the [ozone recovery](#) topic. The paper is however hopefully offering not just the results but rather an explanation of a useful technique (also used by others (for example, Newchurch et al 2006)), also hoping to offer advantages to why one may consider using it. The results for H₂O are reported in a compact way, since same method as for ozone has been applied (consistent treatment of H₂O is part of our method).

In a general sense the exact turn around point could be considered irrelevant and just by visual inspection one can see if there has been an apparent turn around in ozone decline. However, this paper just wanted to exemplify the importance of assumption about choosing a turn around year simply because it will effect the over all trend values and most importantly an estimation of a full ozone recovery (assuming a linear trend!).

R: A discussion of the background chemistry is not given, certainly not the main theme of the paper, but in the three altitude bins different chemical families determine the ozone loss. In context with the water vapour trend the behaviour of the methane mixing ratio in the stratosphere could be discussed in more detail supplemented by some citations. The same remark is valid for the dependence of ozone on the solar cycle and the QBO.

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A: We feel this is a long paper as it is. Furthermore, attribution of trends is beyond the focus of this paper, since for ozone different chemical families (ClOx, NOx, HOx) contribute to the trend, and changes of transport might also play a role. Similar for water vapour, where methane and transport may contribute (methane trend has already been mentioned in the paper, as well as BD transport changes).

R: The paper should be thoroughly checked with respect to the citations.

The authors should be listed in the order of year. Exchange in the list of references the sequences of Nazaran et al., 2007 and 2005; Nedoluha et al., 2003 and 2002; Newman et al., 2007 and 2006; Steinbrecht et al., 2006 and 2003.

Dvortsov and Solomon, 2001; Dohmse et al., 2008; Mauldin et al., 1985; McCormick et al., 1989, 1992; Chu et al., 1989; Wang 2002; Jegou et al., 2008 and Stiller et al., 2007 are missing in the list of references.

There are some contradictions between the year quoted in the text and in the list of references. Steinbrecht et al., 2003 or 2004; Haley et al., 2007 or 2004; Brasseur and Solomon 1984 or 1997?

A: The above references have been amended.

R: Page 1171 In Equation (1) are only 3 lines written not 5 as mentioned by the text. The second mention of Table 1 in the text on page 1178 should certainly read Table 2.

Page 1176 last line: liner model Page 1183: Table 4 instead table 4

A: These above points have been amended

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