Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2017-862-RC2, 2017
© Author(s) 2017. This work is distributed under
the Creative Commons Attribution 4.0 License.

Atmospheric Chemistry and Physics Discussions
Open Access
EGU

Interactive comment on "Continuous decline in lower stratospheric ozone offsets ozone layer recovery" *by* William T. Ball et al.

Anonymous Referee #1

Received and published: 3 November 2017

The manuscript "Continuous decline in lower stratospheric ozone offsets ozone layer recovery" by Ball et al. describes analyses of vertically resolved stratospheric ozone data sets of different origin with regard to detection of ozone recovery. For this, a relatively new method in ozone analyses, Dynamical Linear Modelling, is used. Obtained results indicate an increase in upper stratospheric ozone, especially in the mid-latitudes, and a decrease in lower stratospheric layers, especially in the mid-latitudes and tropics. The stratospheric profiles of the different data sets are then integrated to partial columns to analyze the different trend behavior in more detail. Results are compared to tropospheric ozone time series and results of two chemistry-climate model simulations (calculated in specified dynamics mode) to better understand the lower stratospheric ozone trends in particular.

Printer-friendly version

Discussion paper

The structure of the manuscript is clear, and it is very well written. The applied methods are described mostly in sufficient detail to allow the reader to understand what was done. It is also stated with plenty of references from the recent literature where this study compares to previous findings, and where new results are presented. There are a few minor things that I would like the authors to address (mainly clarifications, shortening/expansion of explanations, etc.) before I would recommend the manuscript for publication.

General suggestions/comments:

- There are several acronyms that are specified multiple times throughout the manuscript (StCO, PCO, TrCO...). In most cases this is not necessary, but only slightly annoying for the reader. I would suggest either using the full name throughout the manuscript (if the authors think that the reader might not remember the acronym), or defining them once and using them from thereon.

- In some cases throughout the manuscript the authors could be slightly more specific when describing something, e.g.: page 2, line 34 'Models predict...' -> what kind of models?; page 3, line 37 'Only recently has a TCO recovery been detected during the austral spring...' -> the recovery was detected in Antarctica, which is not necessarily deductible from the description; page 4, line 106 'Our aim here is to quantify the absolute changes in ozone...' -> which ozone is referred to here? Stratospheric or tropospheric, global or specific latitude bands? I would suggest that the authors check the manuscript carefully to make sure all descriptions are detailed enough so that it is clear what is described.

- Some lines in the contour plots (e.g. Figure 1, Figure 5, Figure A1...) are hard to see if the contour colors are very dark. If that is the case, maybe the contours for the probability changes (that are black now) could be white instead? That might help them having better visibility.

CC BY

Specific comments:

- Page 1, title: I think the title is not precise enough. I would suggest changing 'ozone layer recovery' to 'total column ozone recovery' (or something along those lines). As far as I understood, that was the focus of the study.
- Page 4, line 95: after the parenthesis, 'km' is too much
- Page 6, section 2.3: This section is too brief in my opinion. It is not clear how exactly the DLM works, and how the probabilities are calculated. I don't think the explanations have to go into too much detail, but some more explanations would be great.
- Page 7, line 188: '...developed by (Ball et al., 2017), ...' -> parenthesis are placed wrong
- Page 17, line 418-441: The comparisons between the CCMVal-2 results are too lengthy and in some aspects unnecessary. I think these paragraphs could be shortened quite a bit.
- Page 18, Section 5: The conclusion section starts slightly abrupt in my opinion. It would be good to start with some perspective again: where do the findings fit in the bigger picture? What exactly did the authors want to present? Starting with this, it would be easier for the reader to follow the summary of the results that are given with the Roman numberings.
- Page 18, line 467-468: parenthesis for the references Plummer et al. (2010) and Dietmüller et al. (2014) seem wrong
- Page 19, last paragraph: The list of positive effects of the lower stratospheric ozone decrease (decreasing exchange with troposphere, radiative forcing offset, etc.) comes across a little too strong compared to the reasoning why the decline

CC BY

could be bad for life on Earth. The authors might want to think about rewording some of it to strengthen the point why the decline in stratospheric ozone might indeed be not so good.

- Page 19, line 485: ‘trends’ should be ‘trend’? After all, it is only the lower stratospheric ozone that shows that decline

---

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-862, 2017.

CC BY