Answers to Reviewer 1

We want to thank Reviewer 1 for his comments.

We apologize for many small errors and missing explanations. The real content of the paper has been quite a demanding undertaking and energy for polishing the text has been in short supply.

We have made an effort to take into account all the comments of the reviewers. All larger changes in the manuscript are shown in **bold**.

Changes by the authors

Independently from corrections suggested by the reviewers, authors have corrected typos and mistakes in the manuscript. The following corrections need to be mentioned:

1. The numbers of GOMOS and SAGE II measurements in text and in Figs. 1-2 are now consistent.

2. Figure reordering: 5 (old)->7(new), 6->8, 7->5, 8->6, 7->9. Note that in reviews and answers below old figure numbers are used.

3. Figure 5 in the discussion paper was erroneously based on pre-release of GOMOS version 6 data. The new figure (Fig. 7 after reordering the figures) is now based on the same data release as other results in this paper.

4. We have added references to a companion paper "Analyzing time varying trends in stratospheric ozone time series using state space approach" by M. Laine et al. that was submitted (11.7. 2013) to the same special issue as this paper. This new paper makes use a more flexible time series modeling than the present paper.

5. In order to handle autocorrelations and especially their impact on error estimates, we have applied the standard Cochrane-Orcutt transformation. This transformation causes only some minor changes to the final trend results, but shrinks somewhat the confidence regions. Text in the appropriate places has been modified. The cause of autocorrelations, modeling imperfections, are discussed in the companion paper mentioned above.

Below we have answers to general and specific questions from Reviewer 1. Note: Apparently the reviewer has used the first version of the paper submitted to ACPD. The comments are, however, also relevant to the published discussion paper.

SPECIFIC COMMENTS

Line 4: I think that some indication needs to be given as to what 'good vertical resolution' is.

Answer: Values are included in Table 1.

Line 21: Rather than using a linear fit with an inflexion point, wouldn't it be easier and also make more physical sense if you used EESC (Equivalent Effective Stratospheric Chlorine) as a basis function in your regression model? That would also remove any uncertainty around where to put the point of inflexion.

Answer: In this paper, we have no intention to make an attribution study for ozone changes. This interesting subject requires a much deeper (and further) analysis. Rather, we are interested to see any long term changes in ozone whatever the reason is.

Lines 25-26: Over which altitude range does this statement apply?

Answer: The altitude ranges are added to the manuscript.

Lines 32-33: I think that you should also mention bromine here since this has also contributed significantly to ozone decreases.

Answer: Added.

Line 35: It would be better to use the word 'project' rather than 'predict' here. The models do not make predictions. They make projections based on emissions scenarios. The world may evolve in a very different way to what those scenarios say. In that case the projections would still be correct, but they would fail as predictions.

Answer: We prefer here the word predict.

Line 38: I think that you should say 'ozone sondes' here rather than just 'sondes'.

Answer: Done.

Line 42: Please make it clear here what you mean by recovery. Do you mean just ozone increasing (which could e.g. be the result of changes in dynamics and not necessarily resulting from reductions in chlorine and bromine) or do you mean ozone recovering from the effects of chlorine and bromine?

Answer: Long-term change in ozone. Whatever the reason. Clarified in the text.

Line 44: Please provide references in support of the assertion that signs of the ozone recovery have already been detected.

Answer: Done.

Line 83: You need to explain what MERRA is or at the very least expand the acronym.

Answer: Done.

Line 117: Sensitive to local fluctuations in what?

Answer: Added: in temperature.

Line 121: You need to explain what ECMWF is or at the very least expand the acronym.

Answer: Done.

Line 126: You need to explain what MSIS90 is or at the very least expand the acronym.

Answer: Done.

Lines 155-156: And, presumably, this information is provided in the GOMOS data files?

Answer: These lines refer to SAGE II. Anyhow, all filtering rules are described in read me or disclaimer documents and the parameters are included or can be derived from the parameters included in the data files of SAGE II and GOMOS.

Line 158: You need to explain why a profile containing an ozone value of -0.49 ppm would not be rejected.

Answer: If we assume that the distribution of ozone values from the retrieval is normal, we have to accept also negative values. Data from a good to signal-to-noise instrument show a negligible number of negative values, but for GOMOS a negative value is not a rare exception (the signal-to-noise ratio is not always high). In addition to normal random variation of values, a negative or a very large positive value can pinpoint to a real difficulty in measured data or in the retrieval process (outliers). Usually in this case also the whole profile shows unhealthy features. The mixing ratio limits we have established are used to filter these outlier profiles. In future we can hopefully find these sick profiles before the species retrieval.

Line 164: I think you need to be more specific here and say 'solar zenith angle larger than 105°'.

Answer: Done.

Line 191: Again you need to be more specific and say 'real diurnal differences in ozone in the atmosphere'.

Answer: Done.