Interactive comment on “Total ozone trends and variability during 1979–2012 from merged datasets of various satellites” by W. Chehade et al.

Anonymous Referee #2

Answer to referee 2.

Dear referee, thank you very much for your interest in our work and your valuable comments, most of which we agree with and help us in improving this study.

General comments:

Most of the article and the analysis is based on MOD V8.0, while the new SBUV/SBUV-2 version V8.6 as well the use of the GOME-SCIA-GOME2 dataset is used as sensitivity in a paragraph related to the quality of the data used. To my understanding the paper focuses on trends, aims to provide the updated estimates based on satellite data, and therefore the authors should use as core dataset the latest available version (i.e. v8.6). Then eventually for comparison reasons with previous estimates based on earlier versions of the data they could show estimates with v8.0.

MOD 8.6 is used as a core dataset in this study and MOD 8.0 and GSG combined with MOD 8.6 are used in the sensitivity study.

Although the detailed description of the processes involved in the multiple linear regression is interesting and well written, as a text occupies almost half of the manuscript and therefore it could be shortened, without however omitting the necessary information to justify a stand-alone paper.

The introduction part is shortened.

Specific comments:

Introduction: Although the authors provide many references concerning the processes and methodologies considered in previous trend studies and assessment, little quantitative information is given what was our knowledge

before their update. Most important ,they should write a short paragraph to justify why an update is necessary. In addition there is no reference to recent trend studies (e.g. Nair et al, ACP 2013).

Done.

Section 3. See also my general comment above. The authors should justify why they don't use the latest available version as a core dataset. Concerning the quality of the data used they do not provide any reference to validation studies, related to the satellite data used. For checking the consistency of the various datasets used, they show in Figure 2, for certain belts, time series of annual means. However they don't discuss this figure at all. As a result the reader actually gets little information on the quality of the satellite data used. Concerning the GSG dataset the authors should also provide information if these data are consistent with the official ESA data.

MOD 8.6 is used as a core dataset.
The state of ozone columns a the validation studies of the different datasets are included.

Page 30420 Line 16. It is confusing. As it is written it leaves the impression that there is a physical mechanism that correlates volcanic aerosol and ENSO. The authors should provide here a comment to avoid misinterpretations.

We mean here that the highest correlation between the proxies is found between ENSO and aerosols but the calculated value is still small. This will be cleared.

Results: In all plots, where both r and R^2 are shown, the authors should use only one of these, since they provide actually the same information. R^2 can directly provide information for the explained variance and could be preferred.

Only R^2 will be used.

Page 30421 Lines 14-17. The numbers mentioned in the text are not supported by Figure 3, where they seem smaller than the ones reported here.

Done.

Figure 5: This figure is extremely "heavy" and hard to read. They authors could eventually consider a time-latitude cross sections instead, as contour plots. In addition they should eventually discuss here, what is the added value of calculating trends in such a high (5 deg) resolution.

The figure is replaced with another showing selected latitude bands that depict the change of proxy response over 65°S – 65°N.

5° step is used to show the phase transition of the QBO and the smooth behavior of the proxy response.

Page 30423, Lines 1-4. There is an asymmetry between the two hemispheres in R2 especially in the subtropics. This should be commented and discussed.

Done.

Page 30423, Line 17. The statement about symmetry of the QBO is not completely supported by figure 6. There are differences between North and South latitudes.

Done.

Section 7. The title of this section is misleading. The reader would expect here a quality assurance of the individual data sets. Such a paragraph would be required already in section 3. This section is actually a sensitivity of the trend analysis when different datasets are used. See also my general comment for the core data set.

The title is change to 'Sensitivity of the trends acquired from different satellite ozone data records'.