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Interactive Comment

Interactive comment on "Trends in stratospheric ozone derived from merged SAGE II and Odin-OSIRIS satellite observations" *by* A. E. Bourassa et al.

Anonymous Referee #2

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This is the review of the paper 'Trends in stratospheric ozone derived from merged SAGE II and Odin-OSIRIS satellite observations' by Bourassa et al. submitted for publication in ACP.

The authors present a merged time series of SAGE II and Odon-OSIRIS measurements for 1984-present and analyze decadal trends in stratospheric ozone between 60N and 60S. Further the authors use a linear regression approach including standard explanatory variables to analyze variability in the deseasonalized merged ozone time series. The manuscript is well written, easy to understand and is an interesting contribution to the field. I recommend the paper for publication in ACP after the authors addressed the points given below.

Minor comments:

1. The authors state that OSIRIS has a higher bias for latitudes south of 50S (particularly during austral summer), extending throughout the stratospheric altitudes. This can be clearly seen in the bottom panel of Fig. 2. Are the authors aware of any structural or technical cause for this increased bias? Also how does this increased difference between the two data sets south of 50S affect the multiple regression analysis? It is somewhat interesting that particularly in this region the tropopause pressure yields significant (no stippling) and negative coefficient estimates – compared to other latitudes.

2. The authors state that ENSO shows mostly insignificant effects on ozone outside of the tropical lower stratosphere. Nevertheless, Figure 9 shows significant positive coefficients also between 20-40N – indicating ozone enhancements during warm ENSO events at northern hemisphere extra-tropics in agreement with previous work (e.g., Brönnimann et al., 2004a; Brönnimann et al., 2004b; Rieder et al., 2013; Steinbrecht et al., 2006). I suggest adding a few words to this paragraph aiding the discussion on the influence of climate modes on ozone variability.

3. As also suggested by the other referee: Adding a section regarding the comparison between the newly merged SAGE II – OSIRIS data set and other long-term satellite data sets (e.g., SCIAMACHY, MIPAS) would further strengthen the manuscript.

Figures :

Figure 2: indicators ‘a’ and ‘b’ should also be briefly explained in the figure caption.
Figure 6: ‘trend’ is missing before ‘negative both before and after 1997.’

References:

Brönnimann, S., J. Luterbacher, J. Staehelin, and T. M. Svendby (2004a), An extreme anomaly in stratospheric ozone over Europe in 1940-1942, Geophysical Research Letters, 31(8), L08101.

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Rieder, H. E., L. Frossard, M. Ribatet, J. Staehelin, J. A. Maeder, S. Di Rocco, A. C. Davison, T. Peter, P. Weihs, and F. Holawe (2013), On the relationship between total ozone and atmospheric dynamics and chemistry at mid-latitudes - Part 2: The effects of the El Nino/Southern Oscillation, volcanic eruptions and contributions of atmospheric dynamics and chemistry to long-term total ozone changes, Atmospheric Chemistry and Physics, 13(1), 165-179.

Steinbrecht, W., et al. (2006), Interannual variation patterns of total ozone and lower stratospheric temperature in observations and model simulations, Atmospheric Chemistry and Physics, 6, 349-374.

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