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Discussions

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Interactive comment on "Past changes in the vertical distribution of ozone – Part 3: Analysis and interpretation of trends" *by* N. R. P. Harris et al.

Anonymous Referee #2

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This paper presents an analysis of global stratospheric ozone trends from data re-evaluated by a number of groups as part of the SI2N initiative. It is well-written and generally well-presented. There are no major issues, but I find a number of minor ones.

Detailed comments:

Page 8568, line 18: A "hint of a trend"?

Page 8571, Section 2.1: It would be helpful if the merged datasets (GOZCARDS, SWOOSH) were defined here. GOZCARDS is defined in Secton 3.1.2, but only for

the pre-1998 period, and I cannot find SWOOSH described at all.

Page 8576: Equation 1: The large number of fitting parameters (∼30) in the model is alarming. What checks have the authors made to be sure that their fits are robust, with all those degrees of freedom? QBO_orthog is not defined.

Page 8576, line 18: What is a "simple linear trend"? The term seems to suggest a simple linear regression to the data without the 30-odd adjustable coefficients of Equation 1. However, I expect you mean a linear trend derived using Equation 1, but with free endpoints. In that case I suggest "single linear trend", or "unconstrained linear trend".

Equation 2: Why is an AR(2) model used? How exactly is Equation 2 applied?

Page 8578, line 27: The phrase "care needs to be taken when comparing them", used here and elsewhere, is a vague phrase that doesn't really say anything. The issue is one of representativeness: these geographically sparse data may (no matter how much care is taken) yield trends that are different from the zonal mean.

Page 8581, lines 11-13: The error bars here on the ozonesonde data are quite a bit larger than one would expect from weekly data at just a single site, so presumably something other than simple atmospheric variability (representativeness error?) has been included. This statement should be expanded to explain what the large uncertainties really reflect. Moreover, in Figures 2, 4 and 6, the uncertainties for ozonesondes appear to be for the most part larger than the Umkehr, FTIR, microwave or lidar uncertainties, which seems quite inconsistent with the fact that there are far more ozonesonde sites. Something is funny here...

Figure 6: On the other hand, this figure is so small I could be reading those error bars incorrectly. Please make the little tiny plots at least as big as the little plots in Figures 2, 4, 7 and 8.

Page 8581, Section 3.2: The discussion of Figure 5 is unsatisfying; perhaps "...is hard

to be confident about the significance of this feature..." is meant to be typical British understatement? GOZCARDS and SWOOSH have (apparently statistically significant) trends in opposite directions below 40 hPa, and above 10 hPa the trends show little coherence between datasets. SAGE-GOMOS trends at the poles look seriously wonky.

Page 8582, line 12: Again, please define "simple linear trend".

Page 8582, line 13: Is there a rationale for using a PWLT in the troposphere? Do you include QBO, solar cycle, etc., there too?