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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Drift-corrected trends and periodic variations in MIPAS IMK/IAA ozone measurements" *by* E. Eckert et al.

Anonymous Referee #2

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The authors of this paper perform a time-series analysis of monthly, zonal means of MIPAS IMK/IAA ozone data and look at the resulting components of the regression. The methodology is straightforward and widely used. The authors then go on to determine the magnitude, if any, of drift of the MIPAS data relative to other instruments (e.g. MLS). This is accomplished via the same regression to the difference of coincident pairs of events between MIPAS and other instruments. I, however, have a few questions/concerns regarding this analysis technique.

The authors compute component terms from a regression to data, while drifts in trends come from a regression to differences of coincident pairs. Any time monthly, zonal means are taken, a potential sampling bias can be introduced, whereby the data is not evenly spaced throughout the month and is thus not necessarily representative

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of the middle of that month. Table 2 provides the coincidence criteria, as well as the total number of coincidences, but it does not provide a breakdown of coincidences by latitudinal band. While it is likely that a sampling bias does not exist given the large number of coincident pairs between MIPAS and MLS, it would be good to ensure one is not present given the difference in the retrieval of trends and drifts in trends.

The authors state that the reason for regressing to the differences between instruments "is to account for possible dependence of the differences on the atmospheric state" (pg. 17860, line 27). However, it appears that the authors assume that all of the differences can be accounted for by the atmospheric state. If the differences cannot be entirely explained by the atmospheric state, then any lacking ability of the regression model to fit to the data, particularly at the edges of the time periods, can bias the linear term. This would be readily apparent as large differences in separate fits (e.g. at different latitude bands) and could explain the banding structure seen in Figures 3 and 4. This can be better determined by varying the time period of the regression (e.g. less one year at one or both ends) to see how the phase of the oscillation of the residuals at the edges affects the retrieved trend term. This can also apply to the retrieval of the trend term itself (i.e. from just MIPAS data), and could perhaps contribute to the strong correlations seen between Figures 8 and 10.

It would be interesting to compare the drifts in trends computed via the method outlined in this paper, and by outright regressing to the other instruments and deriving a trend term and comparing.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 17849, 2013.