Author's Response: amt-2017-229 originally submitted on 07 Jul 2017
Title: Drift corrected Odin-OSIRIS ozone product: algorithm and updated stratospheric ozone trends
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Thank you to both referees for the helpful reviews. The referee comments are provided below, with our response in blue.

Referee #1:

This is a short but important paper in that it describes the correction to OSIRIS pointing that is needed to make the data useful for trend calculation. The RSAS technique used to monitor the pointing errors is well established and they seem to understand its limitations. They have applied it to the OSIRIS data to determine a more accurate pointing and reprocessed the entire data set. The correction for the long term trend in pointing, the goal of this exercise, is nicely done. Figure 5 shows this very clearly. But the extent to which the scatter is cleaned up, especially in the first two years is remarkable. Can you explain this reduction in scatter?

We also agree that the reduction in scatter is quite remarkable, and attribute it to the robustness of the RSAS correction. There must exist short time scale (~daily) error in the Odin attitude solution that is reliably detected and corrected by the RSAS algorithm. As we note in the paper (section 3, paragraph 4): "The overall observed variability at shorter time scales has also decreased significantly in the v5.10 comparison. This effect can be observed in most time periods, but it is most noticeable from 2005 to mid-2007. The reduction in variability of this difference on a daily average scale gives us confidence that the short term variability in the calculated RSAS correction is in fact real and not simply noise or an artefact of the technique."

Page 2 line 1 - need to note whether the trends Harris et al. refer to are for total column ozone or upper stratosphere.

Yes, thank you. This statement refers to the upper stratosphere. We have clarified this in the revision.

P2 line 2 - "in upper stratospheric ozone..."

Correction done.

Figure 3 - a better color scale might show the RSAS offsets more clearly. With this scale you can't tell where the offsets are near zero.

A good point; we have revised the figure to use a more dynamic color scale that more clearly shows the lower values. See below.

Page 5 last paragraph - is the daily average correction latitude dependent? This needs to be described a bit more clearly.

The daily average correction is not latitude dependent, and we have now explicitly pointed this out in the text in this paragraph. We now state, "regions with high aerosol extinction or high/low albedo values that are discarded by the RSAS algorithm can have a large extent geographically, but even so there are still typically many valid scans in any given day that are used to construct the daily average. This yields one point per day with no geographical dependence." However, as noted in the last paragraph of section 4, "because the latitudinal coverage varies throughout the year due to the sun-synchronous terminator orbit,

the daily average RSAS pointing correction can manifest with meridional structure even though latitudinal dependence is averaged over any given day."

It is probably noted in the Bourassa paper, but the pre 1997 trend from SAGE shown in Figure 7 has a comparison issue in the upper stratosphere because SAGE measures near terminator while OSIRIS measures at non-terminator times. This is not an issue for the MLS comparisons.

Yes, the trend results must be treated carefully at the uppermost altitudes due to the photochemical dependence of ozone, although this is the case for essentially all trend analyses that use the SAGE II dataset, see for example the comprehensive results by Sofieva et al., AMT, 2017, and Steinbrecht et al., AMT, 2017. As pointed out by the referee, this is not an issue for the MLS comparisons.

Need to say how the version 5.10 data can be obtained. Provide links please.

The link to the OSIRIS Level 2 products with download instructions is now provided.
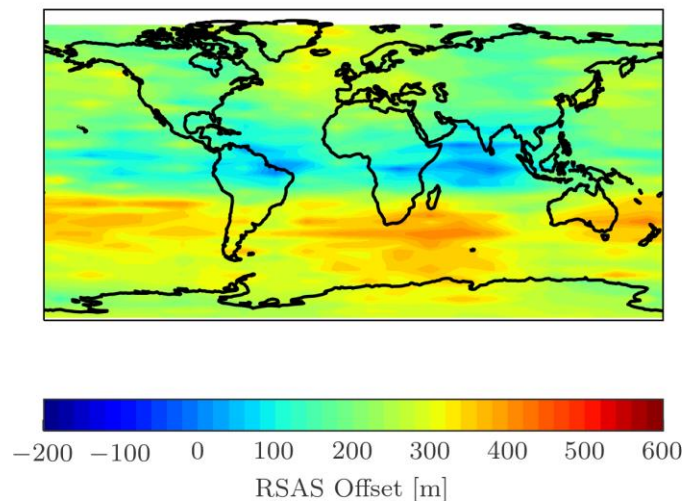
New version of **Figure 3: Globally binned in latitude and longitude RSAS offsets for time period beginning in 2004 and ending in 2010. Values where the OSIRIS optics temperature is less than 18° C are excluded.**