Author Response to Reviewer #1

We thank Reviewer #1 for the additional comments. We have now addressed those below. The original reviewer comments are reproduced in black text, our responses in red text and additions to the manuscript in blue text. The reference to line numbers is based on the resubmitted manuscript and we have numbered Reviewer #1's comments.

1. Although I believe that the scientific quality and presentation of this work can still be improved (possibly requiring more time and resources than currently available), at this point I agree with the other reviewers that it has sufficient merit for inclusion in the TOAR-II special issue. The authors have corrected many initially poor phrasings and have substantially enhanced the manuscript content, especially on the methodology. Some questions remain, I believe, but they are no longer detrimental to publishing. The text still has a few erroneous phrasings and typos that should be corrected for.

We thank Reviewer #1 for their comments, and we are pleased to see that they are generally satisfied with our responses and update to the manuscript in the "Interactive Discussion" stage. We have now updated the manuscript to address the remaining concerns of the reviewer.

2. The update in reply to critical point 1 is appreciated, but for linear regressions Y = C + B*X (+ period + residuals, as in your Eq. 2), it is still not clear from the text (to me) why you would bother correcting for differences in the intercepts C if you are eventually only interested in the coefficients B (Table 2), especially if the corrections involve information that affects B? (cf. Reviewer 2, comment 5) Note: Critical points 2 and 3 have been extensively and appropriately addressed, respectively. The reply on the former at least partially addresses point 4 as well.

The reviewer is correct that the bias correction offsets (BCOs) have negligible influence on the linear trend (B) and correct for the systematic difference in the intercept (C). However, we believe that this is an appropriate step when presenting the data. By applying the BCOs, this creates a more robust product, which are then important for the evaluation of UKESM in the Supplementary Material (SM). To make this point clear, we have added the following text on Page 4 Line 139:

"By applying the BCOs, this is improving the robustness of the satellite datasets (in absolute terms). This is important when intercomparing the products but also when using them to evaluate UKESM and determining the model's skill to simulate $LTCO_3$ as used in this study (see **S4**).".

3. Lines 40-42: "Trends in the satellite apriori datasets show negligible trends indicating that any year-to-year changes in spatiotemporal sampling over of these satellite data sets over the period concerned has not influenced derived trends in." The erroneous phrasing that has been corrected for in the "key points" is still in the abstract: "trends … show … trends"

We have now reworded this on Page 1 & 2 Lines 36-38:

"The satellite apriori datasets show negligible trends indicating that any year-to-year changes in spatiotemporal sampling of these satellite data sets, over the period concerned, has not artificially influenced their $LTCO_3$ temporal evolution.".

4. Line 151: "ozonesonde sonde"

This has been corrected.