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Interactive comment on "Extended and refined multi sensor reanalysis of total ozone for the period 1970–2012" *by* R. J. van der A et al.

Anonymous Referee #2

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General Comments:

This is an important article in that it gives a comprehensive description about a useful total ozone assimilation product of use to the stratospheric community. I like the revision of the title as it clearly reflects what is new about this dataset as opposed to version 1. I would like to see more discussion and comparison to the previous version so that it is clear that more is happening here than a simple extension in the time period covered and higher resolution. I recommend publication, but significant work remains to correct grammar in the text and clarity of the figures.

Specific Comments:

1) P 3286 line 28 to P3287 line 1: I have several comments on the first sentence

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of this paragraph. First the phrase 'and the time period has been extended' should be deleted since previous paragraph has elaborated that point. Second, the intro sentence now says there are several improvements made to the methodology, but lists only the resolution change. The word 'several' means 3 or more. There are other methodology improvements listed further in the paper which could be mentioned here, for example 2nd order SZA correction, and the use of ERA-Interim instead of ERA-40. Last, as the paragraph stands the emphasis is on the resolution change. Unless new information is added to the product to support a change in resolution, adding more points could be nothing more than interpolation to intermediate points. This and an extension in the time period hardly motivate a new product name (MSR1 vs. MSR2) as there is no genuine difference in the two, simply time extension and interpolation. Even the use of updated satellite data does not justify this since you are then adjusting the satellite data to ground-based which potentially removes and advantage of the reprocessing. I do believe that MSR2 is an improved and distinct dataset and that the increased resolution is more than simple interpolation, but in this introductory section, you have not yet outlined the most significant improvements made in this work.

2) P 3290 line 16: Those regression coefficients that significantly reduce the RMS between satellite and ground are calculated and applied to the satellite data. What does this mean? How do you determine which to use, and then how are they calculated. Table 2 is the results of all being fit at once. Also the RMS in Tables 2 and 3 seem nearly the same, so it is unclear that your goal of reducing RMS is being achieved. Please elaborate.

3) P 3295 lines 12-14 and figure 6: The brief statement about the comparison to MSR1 seems lacking and a shallow reasoning for the improvement over MSR1. Indeed one of the aspects that MSR2 handles differently is the SZA corrections of the satellite data. Is there anything of interest in the dependence of OmF and OmA on SZA as demonstrated by the two different versions MSR1 and MSR2?

4) P3295 line 27-3296 line3: It seems that a comparison of OmA between MSR1 and

MSR2 would be more informative. Or is it that the OmA so small in both, it is not meaningful? It seems that Figure 8 is the only comparison between MSR1 and MSR2 in the paper that indeed shows where they differ. This deserves more discussion. Indeed there are lines for both in Figure 3, but these virtually overlap. I would like to see more discussion about what the improvements do. Is there a result for the increased resolution?

5) P3296 line 28: In fact the patterns seem to be mostly latitudinal bands, or perhaps tied to Northern vs Southern hemisphere.

6) P3297 line 10: This statement confuses me: "The data set is based on the observations of 15 different satellite instruments with nadir observation in the UV." This is the first mention of the 'nadir' requirement. Did you only use the nadir data, or was a nadir point critical in choosing the satellite. If you only used the nadir data, then how was Figure 6d created? I probably missed something that explains this.

7) P 3297 lines 23-24: states that OmA is better in MSR2 than MSR1, but you showed OmF instead in Figure 8.

Technical Corrections:

There are many remaining grammar errors. Some are listed below.

1) P 3286 line 8: the verb 'is' should be 'are'. ('applications are' for a proper subject/verb match).

2) P3289 line 22: Why are the Dobson/Brewers listed in an appendix table? There is no text for an appendix, and the table is discussed in the main text. It is not clear to me why this listing is simply not Table 3. Likewise Table A2 has only 2 columns of information of the 5 presented that are additional to that in Table 1. Perhaps these could be combined.

3) P 3290 lines 8-11. There is a troubling switching of verb tenses. in these lines: 'are avoided', has been created', 'was defined' and 'number is' shows a switch from

present tense to various forms of past tense , back to present tense. These several lines could be written as: By fitting all data together, regional biases that be be caused by offsets of individual ground instruments are avoided. For each satellite product an "overpass" dataset is created for all ground station and a maximum allowed distance between the centre of the ground pixel and the ground station is defined (see column "Dist." In Table 1). This number is...". These fluctuations in tense occur throughout the paper, for example the very next paragraph has many.

4) P 3291 line 7: first occurrence of TM5, please define the acronym.

5) P 3291 line 10 first occurrence of TMDAM in the main body of the paper. Please define the acronym.

6) P 3291 14, p3292 line 15 and P3292 line 24-25: you have "3 hourly"," 3-monthly" and "three monthly". Choose to hyphen or not, and to spell out the number or not, and be consistent. It seems to me that '3-month mean' and '3-month average' is preferred (month as opposed to monthly). The term 'monthly' only seems correct when it is a full single month in the mean. So P 3292 line 10 would be "The 6-hour instantaneous and monthly mean ozone fields..." for example.

7) It is appropriate to define acronyms separately in both the abstract and the main body text, it is not typically necessary to define the acronym multiply within the body. If there is justification to do so, then please choose to hyphenate of not consistently: OmF is defined in the abstract (P 3284 line 28) as "observation-minus-forecast (OmF)" and for the first time in the main body section 3 (P 3292 lines 4-5) as a paraphrased text, again in the main body section 4.2 (P3293 line 5) as observation minus forecast (OmF) without hyphens, again in section 4.3 (p3294 line 11 with the hyphens, I the Figure 4 caption without the hyphens. Be consistent please.

8) P 3293 line 3 "time independent" and "time-dependent" should either both be hyphened or not.

9) P3296 line2: MSR1 graph is no longer an inset in this version.

10) Figure 1: The years are unreadable. Perhaps best to only print every other year, and enlarge them. 11) Figure 2: The axis labels are too small. Replace Nr. With #.

12) Figure 3: Change: 'the orange line model values' to 'the orange line shows the model values' to avoid confusion of the use of the word model. All of the text in this figure is too small.

13) Figure 4: The grey titles on the right axis are too light and too small. In the caption unify the presentation of Observation minus Forecast. In the text you often use hyphens and always use lower case. 14) Figure 6: The fonts are upgraded here and more readable. Use these fonts on the other figures. In the caption change "the dashed lines represents" to "the dashed lines represent". A case of subject/verb mismatch.

15) Figure 9: The lines need to be thicker. What does msr214 refer to?

16) Figure 10: The Key is too light. The lines need to be thicker.

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