

## ***Interactive comment on “Total Ozone Dobson, Brewer, Saoz and satellites comparisons at the historical station Arosa” by Jean-Pierre Pommereau et al.***

### **Anonymous Referee #2**

Received and published: 11 September 2019

The manuscript “Total Ozone Dobson, Brewer, Saoz and satellites comparisons at the historical station Arosa” by Pommereau et al. describes the comparisons between different ground-based total column ozone measuring instruments (Dobson, Brewer and SAOZ) at Arosa station during the period October 2015 to March 2017. Additionally, the SAOZ measurements are compared to total column ozone measurements from a suite of satellite instruments. The measurement differences between the individual instruments are discussed and mostly explained, however, some parts of the manuscript describing the methods are very brief and, in my opinion, incomplete. Stable ground-based measurements are very important for satellite validation, so the overall topic of the manuscript is interesting and valuable. While the comparison of the ground-based

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instruments is mainly well described, I thought that the description of the satellite-SAOZ comparison was too brief and lacking some important details. Therefore I recommend the manuscript for publication with major revisions, and I would like to see the following comments and suggestions considered.

### **General suggestions/comments:**

- As mentioned in the previous paragraph, in my opinion, Section 5 of the manuscript is lacking detail in the description of the applied methods, and also in the discussion of the results. It is not clear what temporal resolution the compared measurements have (monthly means are mentioned in the beginning of the section, however Figure 4 shows the unit of the x-axis as “Day of Year”). Additionally, it is not clear how the individual measurements (obtained multiple times a day, once a day, every other day?) were aggregated to the displayed time unit. The aggregation could make a difference when comparing the individual measurement systems. It is also not explained what kind of spatial aggregation has been performed. Were the point measurements of the SAOZ (with the coordinates of Arosa) compared to a whole satellite measurement grid cell? This also could cause differences in the comparisons. I highly recommend that Section 5 is reworked thoroughly, and a lot more information about the methods, and also discussion of the results is added.
- The description of the results in Section 5 seems a little unstructured and maybe not well formulated. I recommend rephrasing this section with great caution to make sure that descriptions are correct and understandable.
- How exactly is the overall bias between two instruments calculated? Table 1 only provides one value for the bias, however, in all figures the bias between instruments is not static at this value, but changes over the displayed period. Please describe the underlying method here.

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- Some sentence structures are too complicated and not grammatically correct. I recommend having a native speaker look over the manuscript to identify and correct these problems.

**Minor comments:**

- Page 1, line 1: Should “Saoz” not be “SAOZ” (all capitalized)?
- Page 1, line 8: Remove the “the” after “importance of”
- Page 1, line 10: Should be “instrument” not “instruments”
- Page 1, line 12: Should be “data set” not “data sets”
- Page 1, line 13, 14, 17: Should there be references in the abstract?
- Page 1, line 14: Is there the word “instrument” missing after “OMI AURA”?
- Page 1, line 16: Should be “satellite” not “satellites”
- Page 1, line 25: I would remove the word “remarkably” since it is not clear why this is remarkable
- Page 1, line 27: The word should be “Aside” not “Asides”. There are several of these throughout the manuscript that should be corrected.
- Page 1, line 27: Should be “satellite” not “satellites”
- Page 1, line 28: Should be “satellite measurement” not “satellites measurements”
- Page 1, line 29: “are” missing between “satellites” and “sensitive”?
- Page 2, line 6: Explain “CINDI”.

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- Page 2, line 33: I think a word like “measured by”, “obtained by”, or “provided by” is missing between “are” and “the”
- Page 4, line 9: The minimum of the comparison Brewer-SAOZ in Figure 1 is not in March, but in May. Maybe rephrase this part of the sentence?
- Page 4, Figure 1: Why does the Brewer data only start at the beginning of 2016?
- Page 4, Figure 1: Why are there no error bars on the Brewer-SAOZ comparison?
- Page 5, lines 7-9: The meaning of the sentence starting with “However, while. . .” is not clear. Please rephrase.
- Page 5, lines 21-25: This is one sentence. It is too long and therefore really hard to understand. Please rephrase. Also, this paragraph describes the explanation for the differences, and for that it is actually too short, in my opinion. Please add more detail here.
- Page 5, line 25: Is there a reference for the seasonal differences in Payerne ozone-sonde peak ozone levels?
- Page 6, lines 8-9: This reference to the top part of Figure 1 is not clear. The differences between ground-based measurement systems and SOAZ are shown in the bottom panel of Figure 1, so should the reference not be for that part of the figure?
- Page 6, line 18: IASI was defined in line 17 without the addition of “A” and “B”. So it is confusing to mention these two IASI options here. Please add their definition to line 17.
- Page 7, line 27: Shouldn’t the header of this section be “OMPS” instead of “SUOMI-NPP”? All the other section headers are named after satellite instruments not satellites.

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- Page 9, lines 9-10: This sentence does not seem correct in its meaning: radio-sonde profiles do not provide ozone profiles.
- Page 9, line 18: The bias scatter is reduced, but the bias is still high with +1.7% to +2.4%!
- Page 10, Figure 5: The lines for GOME2A, GOME2B and OMI are shorter than the Brewer and Dobson lines, why?
- Page 11, lines 14-15: It is mentioned here for the first time that the ozone climatology used for the TOC calculations is actually a zonal mean climatology, and that the longitudinal and local variations could be causing some of the differences. I think this is a piece of information that should be mentioned earlier already!

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