

Interactive comment on “A more representative “best representative value” for daily total column ozone reporting” by Andrew R. D. Smedley et al.

Anonymous Referee #3

Received and published: 5 September 2017

In the manuscript, the authors describe and assess a new methodology for determining a best representative daily value (BRDV) of total column ozone from Brewer spectrophotometer observations. The authors propose a method, which take into account the possibility of changes in the total ozone column (TOC) during the day, and having unevenly sampled observations. All measurements (DS and ZS) of the day are taken into account in case they meet the specified validity criteria and have passed the tail removal check. This is a welcome approach, especially at sites, where cloudiness is frequent and the number of DS measurement is restricted. It would be pity not to use good ZS measurements, as it would be the case if choosing the “traditional” way, where possibly only couple of day’s DS measurements would be used. The paper is well written and easy to follow, and is a good opening for discussion in the ozone measurement

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community. I recommend the paper to be published after minor corrections. Please find here below my specific comments.

Specific comments:

- Please add as reference Karppinen et al. 2016, (especially Figures 2 and 5). Citation: Karppinen, T., Lakkala, K., Karhu, J. M., Heikkinen, P., Kivi, R., and Kyrö, E.: Brewer spectrometer total ozone column measurements in Sodankylä, Geosci. Instrum. Method. Data Syst., 5, 229-239, <https://doi.org/10.5194/gi-5-229-2016>, 2016.
- Page 3, line 1: not five wavelengths for ozone measurements?
- Chapter 3, Figure 1: Could there be a bias/offset between the DS and ZS measurements of around 5 DU? Looking at quasi simultaneous DS and ZS measurements at around 14h and 16h, there seems to be a difference of around 5 DU, can you explain this?
- FIG 1: For days like this, also for cases with evenly spaced DS measurement and changing TOC during the day: why reporting the daily mean? Why not reporting all measurements?
- Could also other type of measurements be included in the analyze (FZ, FM)?
- Page 3, line 31: What is the range of biases between ds and zs observations?
- Page 4: increasing the limit value for ZS to 4.0: Does it increase the uncertainty of the measurement?
- Page 4, line 6: Include a reference to differences in stray light rejection of single and double Brewers.
- page 4, line 20: How did you end up to choose, for the first (and last) data point, to use the length of the first(last) inter-observation time period? Why not the half of it? What if you have one good ZS measurement in the early morning, no measurements during late morning/midday and many data points (e.g. DS) in the afternoon, isn't it

that in your method the ZS from the morning will get a big weight as the time t_1 in eq. 2. will be big? Can it cause problems, thinking that ZS are not as “good” as DS measurements?

-Page 5, What is the min SZA (airmass) in Manchester?

-Page 5: Refer earlier to FIG 2 (actually I didn't find any), otherwise it is difficult to follow the discussion at lines 11-19.

-Page 5: I don't find the definition of "representative time", how did you calculate it?

-Page 6: satellite comparison: Is the satellite TOC data meant to represent the daily mean TOC, or is it the overpass time TOC? I don't really see the point to compare the satellite data with other than the nearest of the overpass time. And the satellite should be compared to ground based, not ground-based to satellite. I don't really think that the bias between ground-based and satellite data is due to “that ground-validation of satellites relies upon the traditional methodology”, as it can be concluded from your sentence at line 14. But maybe from the way the satellite algorithm is built, satellite instrument errors/uncertainties, etc.

-Page 6: Chapter 5, please add discussion about the problem that e.g. in the morning, the Brewer is looking to East at low solar elevation, and in the afternoon/evening to West at low solar elevation: The geographical location, to which the TOC is calculated, is not really above the measurement station. In the morning at East from the station, in the Evening at West from the station. What if there is a strong strong East-West ozone gradient? Could the min air mass measurement be after all the most representative for the specific site ?

Technical corrections

-Missing references in the Reference list: Kerr et al., 1981 Smedley et al., 2010

- Page 3, line 17: "recorded between 1348 and 1549" ->between 13:48 - 15:49 UTC?

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- Figure 1: Time, UTC ?

- Table 1: Explain in the caption what is rep. time (even if we can see it from Figure 2).

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2017-181, 2017.

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