Alberto Redondas:

Referee Report A Calibration Procedure Which Accounts for Non-linearity in Single-monochromator Brewer Ozone Spectrophotometer Measurements Zahra Vaziri Zanjani, Omid Moeini, Tom McElroy, David Barton, and Vladimir Savastiouk

This paper deals with an important topic of accounting for the errors introduced into stratospheric ozone measurements by the effects of stray light on the Brewer Ozone Spectrophotometer. The method allows obtaining not only stray light characterization but also instrumental parameters like the Dead Time using the Langley Plot method of calibration. The method is novel and good presented but not enough tested, is only discussed with two days of observations.

 The paper should be published with the following minor revision.


1. The absorption function calculation is not enough described, in particular how are the intensities are calculated from the PMT counts. I think is important as counts, dead time and neutral density filters are used on the model. Can this method can be applied to the determination of the temperature coefficients ?.
2. A good indication of the model could be the comparison of the obtained parameters with ones used on the standard ozone retrieval.  In particular is the differences in the Extraterrestrial constant (Fo).
3. I also miss the discussion on how the different parameters affect ozone, splitting the influence of straylight, neutral density filters or dead time.   This will help the discussion obtained results. For example, also the modeled double brewer increase the ozone at noon, this is due DT or is a filter effect ?.

4. I suggest showing as an appendix the Jacobian calculations (Mik), who can illustrate the influence of the different parameters.
5. To get a Langley the ozone, and any other interfering species should be constant during the measurement period, how this effect if this condition is not meet, as the observations on 25 of October were the ozone change about ~10 DU  on the double brewer.



Oher technical comments:

Page 1 Line 25: References needed for the mentioned studies.

Page 1 Line 32: "Both" are confusing,  Karppinen method is not based on double brewer comparison.

Page 2 Line 5:  It requires langley conditions (stable)  so this limits the applicability of the method.

Page 2 Line 20:  There is another source of straylight, the atmospheric due field of view of the instrument (see for example Jossefson 1992).

Page 2 Line 30;  Bais is not dealing with ozone on his paper, the 10% error addressed must be referenced

Page 3 Line 10 % Brewer wavelength changing from instrument to instrument.

Page 4, Line 27: ND filter vector is not defined

Page 6, Line 1 : There is no description of the convergence,  number of iterations needed or the condition to finish the the interation.

Page 6  Line 5: The photon counts on the spectrometer are related with the neutral density filter used, is not unusual that the counts are lower during the high sun, due the use of high attenuation filter. A plot with the weighted/unweighted observations could clarify this. Dobson Langley use the regression against 1/m to avoid this effect (Kiedrom & Michalsky 2016)

Page 7 Line 6: The DT procedure is usually done daily  (Granjar et al  2008)

Alberto Redondas


References

Grajnar, T., Savastiouk, V., and McElroy, T.: Brewer Standard Operative Procedure (Draft) http://www.io3.ca/Download/Brewer_SOP_DRAFT.pdf (last access: 20 October 2015), 2008.


T. Pulli, T. Karppinen, S. Nevas, P. Kärhä, K. Lakkala, J. M. Karhu, M. Sildoja, A. Vaskuri, M. Shpak, F. Manoocheri, L. Doppler, S. Gross, J. Mes & E. Ikonen. Out-of-Range Stray Light Characterization of Single-Monochromator Brewer Spectrophotometers


Josefsson, W.: Focused sun observations using a Brewer ozone spectrophotometer, 97, 15 813–15817,https://doi.org/10.1029/92JD01030,https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/92JD01030.5

KIEDRON, P. W.; MICHALSKY, J. J. Non-parametric, and least squares Langley plot methods. Atmospheric Measurement Techniques, 2016, vol. 9, no 1, p. 215-225.