

Interactive comment on “EUBREWNET RBCC-E Huelva 2015 Ozone Brewer Intercomparison” by Alberto Redondas et al.

Anonymous Referee #1

Received and published: 29 January 2018

General comments:

The content of the paper is very interesting and contributes to the understanding of shortcomings in the total ozone observations, especially of single Brewers, and presents possible corrections to improve data measured at low sun. In principle the publication is recommended after some revisions.

- One major deficit is that SO₂-calibration is not discussed. The effect of SO₂-values on the comparison with Dobsons and also between the different Brewers is important for the interpretation of the results. As far as I know the SO₂-values of BR017 in clear air is around Zero, whereas Brewers calibrated against the Tenerife triad show up to -5 DU equivalent SO₂ and subsequently higher TOC values. This leads to misinterpretation when only TOC is looked at.

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- Only the influence of internal stray light (unwanted radiation of “wrong” wavelengths inside the instrument) is discussed, but the external one (scattered sun light from the sky around the sun disc) is not mentioned and discussed as a source of similar effects.

Specific comments:

- p1, line 6 and p3, line 7/8: Davos as location for the WRC-UV should be mentioned; the exact name is World Calibration Center – Ultraviolet Section (WCC-UV) at the Physikalisch-Meteorologisches Observatorium Davos / World Radiation Center (PMOD/WRC).

- p2, line 8: it is not easy to find the correct name of the mentioned SAG, but in any case ozone should be added: “WMO/GAW Scientific Advisory Groups (SAG) on Ozone” as proposal.

- p5, section 2.1.: Stray light effect should be distinguished between internal stray light, which means unwanted measured radiation in other wavelengths inside the instrument (double Brewers show a better stray light suppression than single Brewers) and external stray light: scattered sky light around the sun disc with a different spectral composition than direct sun light. This external stray light also leads to a drop in ozone values at lower sun depending on the turbidity (aerosol amount and or haze) and the instrument’s field of view (similar effect with single and double Brewers). This is one reason why the TOC measured with Dobsons with their wider FOV drops earlier than TOC even from single Brewer, although this old sepectrometer is a double monochromator with relatively small amount of internal stray light.

- p5, line 26: OSC is the product of TOC and relative slant path through the ozone layer mue and not the airmass, which are significantly different at low sun.

- p5, line 28: in this context the statement “For this type of Brewer, only the stray-light-free region is used to determine the ETC, which generally ranges from 300 to 900 DU in the OSC, depending on the instrument.” is a little bit misleading. The given maximum

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of 900 DU of a stray light free region of single Brewer seems to be very low. It means, that the single Brewer TOC of 300 DU already drops when a μ -value of 3 is reached, which should not be the case under normally clear sky condition for normal Brewers. In this special case an OSC of 600 for BR 117 shows a very bad instrument with strong internal stray light effect. This should be mentioned explicitly.

- p6, line 5, an amendment with the word “empirically” before the word “corrected” would make it clearer, that it is not a physically based correction.

- p8, line 5-6: the statement that BR017 is underestimating ozone at high OSC above 600 DU seems to be too strong, although it is shown in Fig. 8, which is, however, not mentioned in the text. In my opinion (see also second last comment) 600 DU represents very small μ -values of around 2 at normal TOC of 300 DU. These μ -value is not common for TOC-drops of single Brewer observations after my experience. Perhaps it would be helpful to present a graph for different Brewers (reference, single and double) showing the daily course of TOC with μ as x-axis.

- p8, line 13: the SL test is not an ozone measurement, as there is definitely no amount of ozone between the lamp and the PMT. It is a check of the spectral response as mentioned in line 14.

- p9, Figure 6 and p10, Figure 7: no explanation is given in the text of the caption for the numbers of the boxes. For an insider it is clear that the rel. deviation in the different OSC bins is mentioned. In Figure 7 some blue and red circles are drawn. What do they mean? - p11, Figure 9: BR151 is outside the range.

- p12, Figure 10: is not very clear, the difference between the two panels is not explained; are there differences between the captions for the y-axis?

- p15, Figure 13 caption: in even years correspond to Arosa and in odd years in Huelva.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-1210>, 2018.