

The authors would like to extend their thanks to the Editor and the Reviewers for the devoted time and efforts on our manuscript.

Thank you very much for preparing the revision. Given the favourable reviews on the scientific content from both referees, I am happy to accept the manuscript for publication subject to the authors dealing with the technical corrections as noted by referee #1, including improving the figure quality. I would ask that they also respond to that referee's comment on the R6 values.

Please find our response to your comments (in bold). The responses are listed below each question. We have made changes to the original manuscript and the changes were written in red in the latest revised manuscript.

Finally, from me, I would ask that the authors make their conclusion section be able to be read in isolation, meaning the acronyms are defined/explained. Please also take care with tense in the results section: present tense for describing what the figures SHOW (e.g. correct past tense in L531).

The manuscript was undergone a careful revision and in the conclusion the acronyms were explained according to the definitions given in the manuscript.

Referee #1

General comments:

In general the figures are very blurry. They need to be redone with higher resolution and larger font size and marker size.

All figures in the latest revised manuscript were redone.

Somehow I would have liked to have more details in the section 3.1.3 where the difference in the R6 values are small. Other than that I find the depth of the paper sufficient.

The difference among the rejection rules was also reported as follows:

“The high individual ozone value generated by O3Brewer (618.7 DU) is due to the lack of the rejection rule of the maximum ozone in this code which is also included in the calculation of the daily mean. Another example is provided for Aosta (Fig. 11, lower panel). On 5/1/2010 the daily average is 323.5 DU for BPS whereas it is 208.4 DU for O3Brewer. The BPS rejection rules (reported in Section 2.3) can explain the discard of the nine O3Brewer ozone values, since the first check in the BPS is on raw counts, when they are less than 2500, then the ozone is not calculated”

In section 3.1.3 Figure 10 was replaced by a new Figure showing the “Time plot of the difference between the number of individual ozone values per day calculated by O3Brewer and BPS”

There are still quite a few spelling and grammar errors to be corrected.

The manuscript was undergone a careful revision.

More specific comments:

line 26: here investigated -> investigated here

done

line 30 from Brewer -> from a Brewer

done

line 37 Brewer spectrophotometry -> Brewer spectrophotometers

done

line 66 one sentence paragraph, attach to earlier paragraph?

done

line 76 as well as -> or

done

line 108 you cannot use a method as a light source -> rephrase

The statement was rephrased as: "It is also possible to determine total ozone using the moon as a light source (Kerr et al., 1990), or measuring the global spectral irradiance in the UV region (Kerr and Davis, 2007)."

line 117 unnecessary paragraph change

unnecessary paragraph change was eliminated

line 175 unnecessary paragraph change

unnecessary paragraph change was eliminated

line 200 unnecessary paragraph change

unnecessary paragraph change was eliminated

line 214 will be not adjusted -> will not be adjusted

done

line 227 The application of the ETC correction is done ->The ETC correction is applied when... and line 228 a certain value -> a predefined value

It was modified as: The ETC correction is applied when the difference between the reference $R_{6_{ref}}$ and R_6 from SL test results does not exceed a predefined value (the default value is 500 units).

line 291 remove .TOC. ?

done

line 316 start a new paragraph from "Two algorithms..."

done

line 352 We applied the same methodology... -> We applied the methodology...

“same” was cancelled

line 399 minimum larger than maximum?

In the revised manuscript the sign was at the end of the line (-304.4 DU), in the latest revised manuscript the sign is before the number to avoid misunderstanding.

figure 6 BPS seems to follow the R6 spikes. Why does it not follow the ones in december 2007 and december 2008?

BPS discarded the two spikes in December 2007 and December 2008, and no ozone value was calculated. This was also specified in the caption.

figure 7 was easier to read in the previous version of the manuscript

Figure 7 was redone

line 467 subtracting to -> subtracting from ?

done

line 487 was to 3000 -> was set to 3000?

done

line 490 R6_smooth is noisier than R6_smooth?

It was better specified in the latest revised manuscript that:

“In addition, ozone data were further processed by turning off the smoothing filter, in that case the $R6_{smooth}$ was not applied and the daily mean values of the SL test were used for the correction of the ETC. Fig. 8 shows the time series of the ratios $R6$, $R6_{BPS}$ and $R6_{smooth_{3000}}$ (setting the SL maximal limit to 3000 units) at Rome. It can be noticed that $R6_{smooth_{3000}}$ has now similar behaviour as $R6_{BPS}$, nevertheless in some circumstances its behaviour is noisier than both $R6_{smooth}$ (when the SL maximal limit is set to 500 units and shown in Fig.6) and $R6_{BPS}$.”

figure 8 Maybe a more detailed figure of summer 2011 -summer 2012 or year 2015 to see what causes the weird difference in R6 BPS and R6smooth. This difference causes a weird wave in the TOC difference plot figure 12.

Figure 8 shows the $R6_{smooth}$ with the cut off set to 3000 units. In Figure 12 TOC values were generated by O3Brewer applying the $R6_{smooth}$ correction setting the SL maximal limit to 500 DU.

In the caption of Figures 8 and 12 the different SL maximal limit to generate $R6_{smooth}$ used to correct ozone was specified.

figure 9 legend: Is blue no correction at all? Or correction using daily mean but without using any filter?

Figure 9 shows individual ozone values processed by the BPS (black), by O3Brewer turning off the R6smooth correction (blue), in this case the daily mean values of the SL test are used for the correction of the ETC with the cut off set to 500 units (red), with the cut off set to 3000 units (green), over the period of the R6 drift in 2006 -2007 at Rome.

The above issue was better specified in the caption and in the latest revised manuscript.

line 535 and figure 11 Would be nice to know on what basis the BPS discards these measurements because most of them are within the minimum-maximum -limits.

In the latest revised manuscript it was specified that: "The high individual ozone value generated by O3Brewer (618.7 DU) is due to the lack of the rejection rule of the maximum ozone in this code which is also included in the calculation of the daily mean. Another example is provided for Aosta (Fig. 11, lower panel). On 5/1/2010 the daily average is 323.5 DU for BPS whereas it is 208.4 DU for O3Brewer. The BPS rejection rules (reported in Section 2.3) can explain the discard of the nine O3Brewer ozone values, since the first check in the BPS is the raw counts, when they are less than 2500, then the ozone is not calculated."

figure 11 caption: "where large difference between...". Between what?

It was specified in the caption "where differences between BPS and O3Brewer averages occurred although the $R6_{BPS}$ is similar to $R6_{smooth}$ ".

line 546 Would all the data not belong to one of the groups above? (1. R6smooth higher than R6bps 2. R6b. ps higher than R6smooth 3. R6smooth similar to R6bps?)

In the latest revised manuscript it was specified that "In the following analysis we considered ozone calculated by O3Brewer only with the cut off at 500 units. Data belonging to the three circumstances described in the previous sections were not included in the statistical comparison".

line 552 which above conditions? When the difference in R6 corrections was small?

In the latest revised manuscript the phrase "when data belonging to the above conditions" was removed, since it was specified in the previous paragraph which data are not used in the comparison.

line 568 it is unclear to me what periods you mean. The periods when R6_bps is considerably different from R6_smooth?

In the latest revised manuscript it was specified that: "The comparison was performed not including BPS and O3Brewer ozone data of the three circumstances described in 3.1.1, 3.1.2, 3.1.3."

figure 15 So is R6 the individual standard lamp tests or daily averages or from BPS for O3Brewer? Seems like EUBREWNET creates spikes in the data itself.

There is no difference among individual values of $R6_{BPS}$ within the same day, the same is for $R6_{smooth}$ and $R6_{EUBREWNET}$.

Figure 15 shows the daily averaged of R6 and $R6_{EUBREWNET}$, the latter downloaded by EUBREWNET platform.

In the latest revised manuscript it was specified that "It seems that problems of the standard lamp values not properly filtered by the currently applied 7-days window smoothing, have generated less reliable results (see the temporal behaviour of $R6_{EUBREWNET}$ in Fig.15). This problem could be solved in the level 2

data, in which a filter in the R6 values is planned to be taken into account in the EUBREWNET algorithm (Fountoulakis, personal communication 2018).”

line 604 I dont see this. Only place where it deviates more is at Aosta close to 250 DU.

Figure 16 was improved and now it is more visible the deviation of EUBREWNET ozone data also at Rome.

line 640 confusing sentence, maybe "It is clear from Table 6 that there are no significant differences in the trends among the three codes, when data affected by rapid changes in R6 were removed "

The sentence was modified as “It is clear from Table 6 that there are no significant differences in the trends among the three codes, when data affected by rapid changes or persistent drift in R6 were removed”

line 657 ... to a higher value, which is useful when a large R6 drift is experienced

done

line 663 is experienced -> are experienced

done

line 670 less than 1% or about 1%?

“About” was eliminated

line 676 I understand what you are trying to say but this needs to be rephrased somehow. "different codes, do not seem to be affected when ..."

The sentence was modified as “Yet, the estimate of the trends using the ozone retrievals from the three different codes, do not seem to be affected when ozone data with anomalous R6 values are removed”