

# ***Interactive comment on “Comparison of the optical depth of total ozone and atmospheric aerosols in Poprad-Gánovce, Slovakia” by Peter Hrabčák***

## **Anonymous Referee #2**

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### 1) General comments

The present paper includes a long UV AOD series spanning from 1994 to 2016 which may be useful to provide further insight on the role of aerosols on the Earth's climate. Furthermore, these data may be also used to demonstrate the capability of the Brewer spectrophotometer to measure AOD, most of these instruments being used only for ozone measurements.

In my opinion, these two points make the paper interesting for the scientific community. There are however three main issues:

a) There is still room to improve the scientific discussion, see points 2a-i below

b) It is extremely important to show that the Brewer AOD is correct. For that, you need to provide meaningful comparisons with data from other instruments, see points 2j-k.

c) The quality of the presentation and, specially, of the English has to be improved, see Section 3 below.

Without improvements in these three areas, I can not support the publication of the paper in ACP. With a view to help the author improve the paper, I will provide specific questions and comments next.

## 2) Scientific discussion

a) On page 3, line 16, the author states that "In this case, the AOD calculation algorithm is part of the main control program for Brewer. The main difference from previous method is that the ETCs for individual wavelengths are not determined by LPM method but they are obtained during calibrating the instrument, i.e. every 2 years". Could the author explain how the ETCs are determined during this calibration of the instrument? Have you compared the results from the LPM and the so-called calibration methods?

b) On page 7, Fig. 1, there is an entry with the label "AOD-AAOD<0.5". This part of the screening algorithm does not seem to be explained in the text, and the definition of "AAOD" seems to be missing from the paper.

c) On page 7, line 13, the author states that "Daily averages are calculated as arithmetic average of all values of a given day (from at least one value)." So, a daily average is considered valid even if there is just one AOD value for the day? How many AOD measurements do you obtain on average for each day? How many times do you get just one measurement in a day?

d) From the discussion on page 8 about the calibration periods, it is not clear how they are selected. Are they the same as the period between the standard ozone calibrations? If so, does the author find that the stability of the ozone and AOD configurations are the same? Did the author try to use shorter calibration periods?

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e) On Page 9, line 14, the author mentions that "ground measurements from the nearby station in Hradec Králové and satellite data" were used to complete the series down to 1962. What type of ground instrument operates at Hradec Králové? What satellite data was used? Could the author show the full series from 1962 to 2016?

f) From Figs. 2 and 4 and text, it's clear that the year 1994 is very noisy for the AOD data. Was this year included in the analyses (specially, the determination of the trends) in Section 3.2?

g) Could the author provide some explanation for the behavior shown in Figs. 6 and 7? (E.g., are the peaks be related to weather conditions?)

h) What conclusions does the author extract from Fig. 8?

i) On page 13, line 20, the author states that "Such a significant difference is caused by inconsistent methodology for the calculation of total ozone through ZS measurements". Could the author elaborate further why does he consider the ZS measurement method inconsistent?

j) On page 13, line 27, while comparing the Brewer and OMI AOD data, the author writes that "The correlation coefficient has reached the value of 0.51 in comparison with each other what represents a strong positive correlation". I don't believe 0.51 should be considered a strong correlation. For comparison, what's the correlation coefficient between the Brewer and OMI ozone data? Instead of the bar plots in Fig. 9, could you plot the fits as in Fig. 10?

k) As stated above, showing the readers that your Brewer AOD is correct is of the utmost importance. The comparison with the satellite data, as shown in this work and others before, sometimes might not be straightforward. Making a comparison with other ground-based instruments would be thus a better option. According to the AERONET database, there is level 2.0 Cimel AOD data at 340 nm for the Poprad-Gánovce site from December 2014 to January 2017, see

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[https://aeronet.gsfc.nasa.gov/cgi-bin/type\\_one\\_station\\_opera\\_v2\\_new?site=Poprad-Ganovce&nachal=0&year=22&aero\\_water=0&level=3&if\\_day=0&if\\_err=0&place\\_code=10&year\\_or\\_month=1](https://aeronet.gsfc.nasa.gov/cgi-bin/type_one_station_opera_v2_new?site=Poprad-Ganovce&nachal=0&year=22&aero_water=0&level=3&if_day=0&if_err=0&place_code=10&year_or_month=1)

Could the author use these data to compare with the Brewer AOD? If not, could they provide a comparison with another ground-based instrument? If not, has the author considered the possibility of attending to some inter-comparison campaign?

### 3) Presentation

a) First and foremost, the quality of the English has to be improved. This is not a purely cosmetic question, there are sentences that are very difficult to understand, like e.g. "The lower limit of uncertainty was calculated using average value ETC from which its standard deviation has been deducted in the given calibration period" on page 9. Please, do check the whole paper and improve the English to an acceptable level.

b) As mentioned before, it is critical to demonstrate that the Brewer AOD is correct. Such proof should come immediately after the AOD calculation method is presented and before any other discussion of the data. I thus suggest inserting Sec 3.3 (now including a comparison with AERONET data) before Sec 3.1

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-286>, 2017.

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