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Atmospheric Measurement Techniques Discussions

Interactive comment on "Quality assessment of the Ozone_cci Climate Research Data Package (release 2017): 1. Ground-based validation of total ozone column data products" *by* Katerina Garane et al.

Anonymous Referee #1

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General Comments:

Data records of satellite borne instruments are only temporary in contrast to most of the ground based total ozone column (TOC) records. Thus the development of a method to compare the available satellite records and to merge them to create a long term, homogeneous TOC data set, is a very valuable contribution to the monitoring of the ozone layer. This publication gives a very good description of the validation of such merged data records with ground based records of Dobson, Brewer and SAOZ instruments.

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Specific Comments:

1. It should be mentioned that the used Dobson and Brewer TOC data records are still based on the “old” Bass and Paur ozone cross sections, whereas it seems that the satellite data are produced using the new ozone cross sections (Bremen, IUP?), good place for this explanation would be page 7 after line 25.

2. Dependence on effective temperature of the Dobsons (p 5- 6): Basher 1982 is not an appropriate reference, as it was written, when the ozone cross-sections after Vigroux had been valid. Current data sets are processed using Bass and Paur. Better and up to date references for this issue are: Koukouli et al., 2016 (cited later in the text, page 7) Scarnato et al., 2009: Temperature and slant path effects in Dobson and Brewer total ozone measurements, Journal of Geophysical Research: Atmospheres, Vol. 114, Issue D24 Kerr, J. B., I. A. Asbridge, and W. F. J. Evans, Intercomparison of total ozone measured by the Brewer and Dobson spectrophotometers at Toronto, J. Geophys. Res., 93, 11,129– 11,140, 1988. Kerr, 2002, New methodology for deriving total ozone and other atmospheric variables from Brewer spectrophotometer direct sun spectra, JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 107, NO. D23

3. The use of SAOZ might be seen a little bit problematically with its accuracy of 6% (page 6)

4. On page 12 a correction for the Izana record due to the altitude is mentioned. Such a correction should make sense for other mountain stations too, especially when they are more or less isolated compared with the 150km footprint of the satellite data. A first guess of correction would be +0.1% per 100m difference of station altitude and environmental altitude. There are some mountain stations with significant differences (e.g. Arosa, Hohenpeissenberg, Mauna Loa). This information can be included in the tables S1 – S3.

5. Addition information in these tables about the lengths of the records would be informative, as not all stations have measured from 1995 to 2017.

6. The explanation on page 9, why the SZA-dependence for the Dobsons are not drawn is misleading. As reason a high correlation between Dobsons' large stratospheric effective temperature dependence and the SZA is mentioned. This correlation is physically not correct. The SZA of daily means of TOC is larger during winter season, when the sun is not very high. In addition in winter the Teff is lower than the used -46 degree Celsius. Thus it is an indirect correlation, which is e.g. not valid during summer season, when Teff is "normal" and Dobson TOCs drop at very high SZA (mue > than 3.5 depending on turbidity) -values because of straylight effects but not because of temperature dependence. In any case it is justified not to use Dobson data at SZA larger than 75 degrees, even if they were available.

7. In figures 4, 5 and 10 Brewer observations are drawn above SZA of 75 degrees. The slant path mue of these measurements are larger than 3.5. Observations with larger mue-values are not accurate enough, especially when using single Brewers. Double Brewers might be able to measure up mue = 4, before the TOC drops (reason see Dobson explanation of straylight effects in the bullet point before).

8. Concerning the seasonality of SAOZ-difference mentioned on page 9 and seen in figure 3: Is there an explanation for this pattern?

Technical corrections:

1. In references Serdyuchenko on page 26 "‐ Part 2" is written instead of "- Part 2". 2. Kerr et al. 1988 is cited on page 5, line 18, but cannot be found in the references.

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