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Atmospheric Measurement Techniques Discussions

Interactive comment on "Optical Characterization of Three Reference Dobsons in the ATMOZ Project – Verification of G. M. B. Dobson's Original Specifications" *by* Ulf Köhler et al.

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Response on the Reviews ATMOZ-Paper Köhler et al., AMT 2017-411

Referee 1:

Response to General Comments:

- The differences in total ozone are given in Table 3 (comparison between Bass/Paur-EAC and Bass/Paur nominal) and in Table 4 (comparison between IUP-EAC and Bass/Paur nominal). Description in the text on page 5 and 6.

- A separate publication will be written about a series of TuPS-measurements of more

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than 10 Dobson and their comparison.

- The references are amended in 2.1. with another Nevas et al., 2016 – publication.

- Expansion of section 3.2.: separate publications planned and mentioned in the text.

- More precise and quantitative statements are included.

- English improvements: Some of them are hopefully corrected applying referees' recommendations. The main author hoped that the review of the original version by one of the native English speakers would have removed most of the improper English wording and grammar.

- Dobson/Komhyr = Dobson slit function + Komhyr Bass/Paur x-sections/absorption coefficients. Dobson used older cross sections, which were valid in the fifties. Komhyr applied adjusted Bass/Paur x-sections using Dobson's nominal slit functions to determine the best set of absorption coefficients.

Special comments:

- P1 l16: Primary = world replaced by only world, locations removed, only countries mentioned - done

- P1 l18: ATMOZ "Traceability for atmospheric total ozone column" – done

- P1 l19-23: numbers mentioned, additionally better description Dobson nominal optical parameters and measured values – done

- P1 l25: better differentiaton between the IUP and BP-results with respect of the 0.98%-difference of D074 in IUP-EACs is done.

- P1 l28: the statement is "it will be possible to explain" (indeed a speculation, but very likely), thus this has still to be investigated. – corresponding amendment done.

- P1, l29: TOC was defined in the abstract (P1, line 24), but not clearly marked – done.
- P1, l29: 1920tie to 1920s – done.

- P1, l30: station to stations – done.

- P2, l3: 1960ties to 1960s – done.

- P2, l6: Fundamental constants is replaced by The essential constants (according referee 2) - done.

- P2, l10: It has been tried to explain the different error sources and their influence a little bit more in detail. In addition the Basher-report has been added to the references.

- P2, l12: 1970s and early 1980s – done

- P2, l18: I think “prescribed” is not better than “valid”, I replaced it by “recommended”

- P2, l25: Description of “Effective” is included.

- P2, l27-30: Effect of Teff is quantified as approx. 1%/10K. The statements in Redondas 2014 and Kerr 2002 are a little bit contradictory. A table in Redondas cites only a calculated T-dependence of 0.094%/K for BR#014 in Kerr’s paper, whereas Kerr gives in addition a revised value of -0.005%/K. The second one is as far as I know used for elimination of the annual course of the Brewer-Dobson difference, therefore I mentioned this 1%-dependence.

- P3, l3: correction “an” done.

- P3, l8: I agree that the two sections 2.1 and 2.2 are contribution of tow co-authors with different styles of writing. I am not sure whether a rewriting by the main author in order to achieve a “one-style-paper” would be an improvement, as I am not an expert in metrological measurements. The requested discussion of the similarities/differences is added before section 2.1

- P3 – P4: the inconsistent wording “characterisation” has been corrected to “characterization” in the entire text. In addition it was tried to improve the criticized minor English errors.

- P4, l26: corrected.

- P5, l4-6: Thanks for the positive comment.

- P5, l7: Dobson equation and explanation of the EAC effect on TOC included.

- P5, l10 and following: bandpass replaced by slit function in the entire text except under section 2 and 2.1 when this term is referred to the characteristic of the laser beam.

- P5, l17: In my opinion the amendment “central” does not make the content clearer, thus I did not add it here and later in the text.

- P5, l20: Explanation is given that the accepted misalignment of 0.3o of the Q-levers result in the mentioned 0.05 nm. In addition the function of the mentioned Q-levers is referred to the relevant Dobson manuals (Evans 2008 is added).

- P5, l25: More detailed explanation is given.

- P6, l4: Unfortunately I hadn’t the occasion and time to find out how many data sets out of almost 1 Mio Dobson data in the WOUDC are CD-based. My long term experience, however, with the European and African Dobsons is, that low and moderate latitude stations normally provide only AD-values as the more accurate data, because even in winter season mu-values below 3.0 or 3.2 (our limit at Hohenpeissenberg) are reached. CD-values come from higher latitude stations like Potsdam/Lindenberg, Hradec Kralove etc only during winter season. Thus my estimation is not completely wrong, that less than 20% (minority!) or even down to 10% of the WOUDC TOC data are CD-observations.

- P6, l7: The findings here are not in contradiction to Redondas et al., they are an amendment: On the one hand one fraction of the AD-CD difference can be explained by the new EACs, but on the other hand the new IUP cross sections can explain another fraction too. Only the cross section effect could be investigated in Redondas et al..

- P6, l10 and l12: This section has been improved (hopefully) to clarify/quantify the effects of EACs and IUP cross sections on the AD-CD Dobson differences and the Dobson-Brewer differences.

- P6, l17: It was clarified that here the re-evaluation is only applied to the reference instruments.

- P6, l19: see under P6, l10 and l12.

- P6, l20: This value refers only to the result of the three standard Dobsons, presented here (see alos P6, l17).

- P6, l23: “perfect” replaced by “very good” and “optimistic” removed.

- P6, l23: The last two sentences of this section are moved in front of the preceding sentence, which makes the context clearer.

- P6, l30: The statement about the TuPS is not a conclusion, but a kind of outlook, to describe the future of Dobson calibrations

- P7, l30: You are right! This publication is hard to find. There is a reference given under the link https://library.wmo.int/opac/index.php?lvl=author_see&id=11665, but when one tries to find it there: no chance. Another link http://www.tandfonline.com/toc/tato20/53/1?nav=tocList was more promising, but no Evans et al. proceeding could be found there as well. Thus I refer now to the corresponding poster, which was presented at the Quadrennial Ozone Symposium 2012 in Toronto and is available from the authors. It is clear, that it is not a peer reviewed publication, but this is the only source we have available.

- P7, Figure 2: carriage return symbols removed

- P13, Figure 7: In contrast to the comment of referee 1 would like to keep this figure in the paper, however, it might be better to show it as an overview first and then the other figures in detail. Thus I moved it as figure 4a-c in front of the detailed figures.

- P15, l5: quotation marks corrected.

Please also note the supplement to this comment:
https://www.atmos-meas-tech-discuss.net/amt-2017-411/amt-2017-411-AC3-supplement.pdf

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