

## Reply to referee #2 comments on the manuscript AMT-2017-158

The reviewer considered our manuscript to be accepted for publication with minor revisions. We thank the reviewer for the careful reading and the suggestions that allows us to improve our manuscript.

### Referee RC 2

- Comment 1     There is however, one issue, which is not addressed and should be discussed as an amendment: The long term Arosa TOC record is based on Dobson measurements since 1926, the investigation of the compatibility is done with a Brewer, which are in operation since 1998. A brief section describing the principal differences and/or good agreement between Dobsons and Brewers would help to accept, that the presented good results for Brewer observations can be transferred to the Dobson long term record too.
- Reply 1     We have addressed this point in the discussion by pointing to the studies by Scarnato et al. 2014 and Redondas et al. 2014 who have both studied the comparison of the Brewer and Dobson data from Arosa. The reference to the presently running campaign of comparison of the two sites with Dobson instruments was already mentioned in the conclusion.
- Comment 2     1,19: An additional reference of Dobson, 1968 (Forty Years' Research on Atmospheric Ozone at Oxford: a History. March 1968 / Vol. 7, No. 3 / APPLIED OPTICS) will complete the references.
- Reply 2     The reference has been added and it appears now in line 19, p. 1.
- Comment 3     2,2: Here an additional reference of a relevant Dütsch publication is recommended.
- Reply 3     A reference to the 1984 article from Dütsch has been added at page 2, line 5.
- Comment 4     2,6: The citation of Scarnato 2009 does not make sense at this point.
- Reply 4     The citation has been removed.
- Comment 5     2,17: The reference Yang et al. refers to Antarctic ozone recovery, but not to the LKO series.
- Reply 5     The reference was cited as an example of analysis showing the different stages of the ozone layer recovery but not as a reference to the Arosa series. We agree that it was confusing and so we have removed it.
- Comment 6     2, 19 + 18,18: Kerr an Mc Elroy is indeed published in 1995 and not in 1989
- Reply 6     The reference has been corrected.
- Comment 7     As reason for the limitation of observations (mue-values less than 4) stray light interference in the single monochromator is mentioned. This is an incomplete explanation: two straylight effects have influence on the TOC observations. Internal straylight in the instrument (especially in single monochromators like Brewer Mk II) is caused by misrouted light mostly of longer wavelengths. The discussed muedepending limitation effect, however, is mainly caused by external stray light. This means, that light comes from the sky around the sun disc, which has a different spectral composition (larger fraction of longer wavelengths) than direct sunlight. The hazier sky is the larger is this effect, resulting in a drop of the TOC value at low sun. Dobsons with a larger field of view around the sun (8 degree) than the Brewer (3 degree) are stronger affected and show an earlier drop of the TOC than Brewers (even than the single monochromators). This relation should be described a little more in detail. Whether the lower altitude in Davos (1590 m) than in Arosa (1850 m) with potentially larger turbidity leads to a lower mue-limit for good measurements cannot be stated, but is rather supposable in the Dobson data than in Brewer observations.

- Reply 7 A new paragraph has been added to better introduce the stray light problem.
- Comment 8 The citation of at least one reference for the different straylight effects would be helpful.
- Reply 8 References to the stray light discussion have been added too.