The authors thank the referees and Editor for providing the constructive comments on our paper.

Response to Editor Review (07 Sep 2014)

Comment: Concerning the first comment of referee 3 (usefulness of total ozone derived from profiling algorithm), I am not really convinced by the argument that accurate total ozone is a prerequisite for profile inversion. Why not stressing the point you make in the discussion, that ozone profiling algorithms have a potential for being more accurate than "simple" total ozone algorithms because they use a broader spectral range (so inherently have more information content). This should in my view be the key motivation for including integrated profiles in the total ozone comparison.

Response: We have followed the editor and replaced the sentence: " Although high quality of the integrated total ozone does not necessarily mean high quality of retrieved profile, the total ozone quality is generally an important prerequisite to the overall quality of the retrieved profile." with the sentence in the same paragraph: " In principle, OE-based profile algorithms should have the potential to provide more accurate total ozone estimates than the two primary total ozone algorithms because of its use of a wider wavelength range (270-330 nm) than that used for total ozone (Bhartia and Wellemeyer, 2002; Veefkind et al., 2006)." and change the second sentence to "Despite the potential of ozone profile algorithms for improving total ozone retrieval, the successful performance ...."

Responses to Reviewer # 1 (10 Apr 2014)

General comments:

In this paper, the authors need to provide more discussions about the possible impacts of cross-section change. Ground-based Brewer measurements are employed to characterize the accuracy of the ozone retrieval algorithms. However Brewer data are retrieved using Bass and Paur (1985) ozone cross-sections, which are also used by the OMI TOMS algorithm, but are different from the BDM cross-sections used by the SOE, the KOE, and the OMI DOAS algorithms. It is mentioned in this paper that Brewer retrieved ozone columns would be significantly different if the BDM cross-sections are used instead of Bass and Paur (page 4059, lines 5 – 8). Furthermore, the temperature dependence of these two ozone cross-sections are different, indicating that switching one with the other would not be a simple bias in the Brewer data, but more complex differences that depend on the observing conditions. It is therefore important for the authors to expand the discussion about the impacts of Brewer errors on the evaluation of algorithm performances, whether smaller differences between OMI and Brewer columns would signify more accurate retrievals, and if the scatter would be changed.

Response:
According to recent studies by Fragkos et al. (2013) and Redonas et al. (2014), switching from BP cross section will reduce the total ozone by ~3.2%. In addition, current Brewer total ozone does not consider temperature variation and uses a fixed temperature of -45°, and therefore does not consider the temperature dependence of ozone cross sections. Switching from BP to BDM and considering the

effect of temperature variation and the temperature dependence of the retrievals, the Brewer total ozone at Thessaloniki, Greece, will be reduced from -2.8% to -4.5% as a function of time (with a seasonal variation of ~0.8%) compared to the original Brewer retrieval with of 0.2%/decade (Fragkos et al., 2013).

In 2009, WMO/GAC-IO3C has established the ACSO (Absorption Cross Sections of Ozone, http://igaco-o3.fmi.fi/ACSO/) Committee to review the current ozone cross sections and determine the impacts of changing ozone cross sections on retrievals from different instruments (both ground-based and satellite). According to the activities from ASCO members, switching from BP to BDM has different impacts on retrievals from different instruments/retrieval algorithms due to the use of different wavelengths/spectral regions and the quality of ozone cross sections in the used wavelengths/spectral regions. For example, the switch from BP to BDM will typically increase our SOE total ozone by ~1% (Figure 1) with a standard deviation of approximately of 0.6 %(also see C. Liu et al., 2013) for solar zenith angle less than ~70°. The change in Brewer total ozone is -3.2% (Redonas et al., 2014; Fragkos et al., 2013). The OMTO3 would increase by ~1.5% (Bhartia et al., 2013; http://igaco-o3.fmi.fi/ACSO/presentations_2013/satellite/WS_2013_Bhartia.pdf). The Dobson total ozone is insensitive to the use of current high-resolution ozone cross sections (Redonas et al., 2013). The mean changes on KOE, OMDOAS total ozone are -0.9 and -0.5 DU, respectively (Veefkind et al., 2010, http://igaco-o3.fmi.fi/ACSO/presentations_2010/satellite/OTM_2010_Veefkind.pdf). The change in WFDOAS total ozone is typically within 0.5% (Weber et a., 2013, http://igaco-o3.fmi.fi/ACSO/presentations_2013/satellite/WS_2013_Weber.pdf). The change in GDOAS total ozone is within 1% from GOME, SCIAMACHY, and GOME-2 (Lerot et al., 2010, http://igaco-o3.fmi.fi/ACSO/presentations_2010/satellite/OTM_2010_Lerot.pdf). The BDM cross section dataset is recommended for use in our ozone profile retrieval algorithm (Liu et al., 2007; C. Liu et al., 2013). But the ozone cross section dataset by Institute of Environmental Physics, Bremen University (IUP dataset, Gorshelev et al., 2014; Serdyuchenko et al., 2014) is recommended for ground-based Dobson and Brewer measurements, because using this dataset reduces the Dobson/Brewer difference to within 1% and the seasonality of the differences; the use of BDM cross section dataset also removes the seasonality of the Dobson/Brewer differences, but causes ~2-3% Dobson/Brewer differences (Redonas et al., 2014; Fragkos et al., 2013).

If the Brewer retrieval algorithm uses the recommended IUP cross section dataset and accounts for the temperature dependence of the retrievals, then the retrieved total ozone is slightly reduced by -0.5% with a very small seasonal dependence of ~0.2% (as the Brewer wavelengths have been chosen to minimize the effects of temperature changes on retrievals) and a very small change in the trend on the order of 0.05% per decade, compared to the current Brewer total ozone (Fragkos et al., 2013; Redonas et al., 2014). So using improved Brewer retrieval would slightly change the biases between various satellite retrievals and Brewer data by ~0.5%, but pose very small changes to the seasonal variation (also in Kerr, 2002; Weber et al., 2005; Vanicek et al., 2006) and the long-term trend. In summary, the Brewer results using the best ozone cross sections (IUP cross section) and accounting for temperature dependence is very close to the current Brewer data, so the main conclusions of our studies are not affected much.

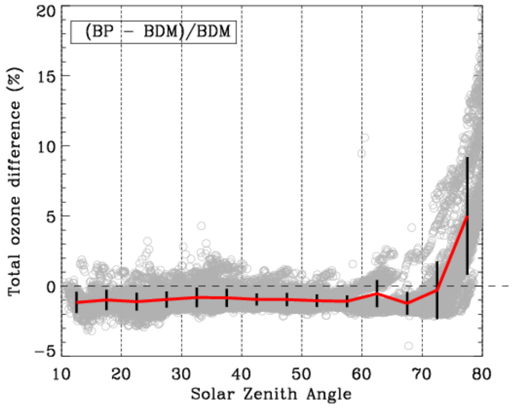


Figure 1. Relative differences between retrieved SOE total column ozone using BDM and Bass-Paur (BP) cross sections as a function of Solar Zenith angle for the NH of orbit 15876 on July 10, 2007. The red line and vertical bars indicate the mean biases and 1- σ standard deviations in bins of 5 °.

In revised manuscript, this discussion has been added in section 2.2 (describing Brewer total ozone data) and at the end of the paper.

Specific comments:

Comment #1: Page 4059, line 9, "can be a problem". Perhaps re-phrase this sentence, and specify the problem.

Response #1: We have mentioned in the response to general comment that the current Brewer wavelengths have been chosen to minimize the effects of temperature changes on retrievals. Switching from BP to BDM and considering the effect of temperature variation and the temperature dependence of the retrievals, the Brewer total ozone at Thessaloniki, Greece, will be reduced from -2.8% to -4.5% as a function of time, but with a small seasonal variation of ~0.8% and with a small long-term variation of 0.2%/decade, compared to the original Brewer retrieval (Fragkos et al., 2013).

The associated sentence has been revised for more clarification.

- Revised Text (p.8, line13-p.9, line2): Absorption coefficients based on Bass and Paur (1985) data are used in the standard Brewer algorithm. In addition, the standard Brewer algorithm does not consider the temperature dependence of ozone cross sections and instead uses a fixed temperature of -45℃. Several studies have evaluated the effects of using newer high-resolution ozone cross section datasets and accounting for temperature dependence on Brewer total ozone retrievals and their consistency with retrievals from Dobson spectrometers (Fragkos et al., 2013; Redonas et al., 2014). The two newer cross-section datasets are the BDM dataset (used in SOE, KOE, and DOAS algorithms) and the dataset by Institute of Environmental Physics, Bremen University (IUP dataset, Gorshelev et al., 2014; Serdyuchenko et al., 2014). Using both BDM and IUP datasets removes the seasonality of the Dobson/Brewer differences after accounting for the temperature dependence. However, using the BDM dataset produces Dobson/Brewer biases of ~2-3% as the Brewer total ozone is reduced by ~3.2% (Redonas et al., 2014), while using the IUP dataset reduces the Dobson/Brewer differences to within 1%. Therefore, the IUP dataset has been recommended for ground-based Brewer and Dobson measurements. According to Fragkos et al. (2013), using the recommeded IUP dataset and accounting for its temperature dependence reduces the Brewer total ozone at a mid-latitude station (Thessaloniki, Greece) by ~-0.7% on average with a seasonal dependence of ~0.2% and a trend change on the order of 0.05%/decade compared to the operational Brewer total ozone. These studies imply that the operational total ozone, despite the deficiencies in the standard Brewer algorithm, is close to that from the improved algorithm with a positive bias of ~0.7% and a very small seasonal dependence of ~0.2%.

Comment # 2: Page 4057, line 13, "soft calibration" for TOMS needs to be characterized, similar to that for SOE, page 4056, lines 8 – 10.

Response #2: In response to the reviewer's comments, we have summarized the OMTO3 soft-calibration in Section 2.1 and added references for the reader.

- **Section 2.1**: OMTO3 total ozone measurements largely rely on OMI's pre-launch radiometric calibration at nadir described by Dobber et al. (2006) and validated by Jaross and Warner (2008). Small residual errors in the Collection 3 radiances (Dobber et al., 2008) are further reduced using soft-calibration techniques where biases and irregularities that vary with viewing angle and wavelength are estimated and reduced by comparing the measured radiances with forward model calculations. This approach is applied only to select data where the variability in ozone is low and therefore the radiances can be simulated reliably.

Comment # 3: Page 4054, lines 18 – 20, "Both OMTO3 and OMDOAO3 were validated previously by several groups using various reference data (e.g., Balis et al., 2007; Kroon et al., 2008; McPeters et al., 2008; Antón and Loyola, 2011)". Need to describe somewhere in this paper if the findings of this work are consistent with those of previous comparisons.

Response #3: According to the review's comments, we have revised the manuscript and added some sentence in revised manuscript.

- **(p.14, line 9-16):** The DOAS differences show obvious dependence ranging from -2.2% at SZA 22.5° to -0.6 at SZA 77.5° (i.e., bias change by 1.6 % or 5.3 DU), although the SZA dependence of this product processed with v 1.2.3.1 of the DOAS algorithm from collection 3 OMI level-1b data has been significantly improved over the previous version of data. For example, an increase in the mean bias of more than 2% due to SZA was found in OMDOAO3 (v 1.0.5, collection 3) - Brewer data (Koukouli et al., 2012) and the OMDOAO3 collection 2 product showed a much stronger SZA dependence of ~ 4% (Balis et al., 2007; McPeters et al., 2008).

- **(p.15, line 25-28)**: Similar results were reported in Anton et al. (2009), where they showed no obvious dependence on viewing zenith angle in either the TOMS or DOAS total ozone, but more variability in the DOAS mean biases.

- **(p.18, line 22-24):** This seasonally dependent pattern agrees well with the comparison of the Brewer data from Hradec Kralove with EP-TOMS v8 data presented in Vanicek (2006), which showed -2 % difference during winter and -1 % difference in summer.

Responses to Reviewer # 3 (24 Jul 203)

General comments

Comment #1: The authors should make a comment on the usefulness of the total ozone products as an integral from the ozone profile products, in comparison to the direct total ozone products. Is the consistency with the long-term series of the SBUV an objective of such a study and if yes, the authors should provide some relevant information. There are studies in the literature that compare column products with SBUV so the comparison of SOE and KOE with SBUV would be very interesting.

Response #1: There are several purposes to compare integrated total ozone from ozone profile with directly retrieved total ozone. First, as total ozone column is the just the sum of our retrieved partial ozone columns at each layer, the quality of integrated total ozone is generally considered as a prerequisite to the quality of ozone profile retrieval, and we have not validated the retrieved SOE total ozone against ground-based measurements as mentioned in the ACPD manuscript P4054 lines 4-6. Second, as we have mentioned this in the ACPD manuscript P4054 lines 23-29, the ozone profile algorithms have the potential to provide more accurate retrievals of total ozone than the two total ozone algorithms due to the use of broader spectral ranges that those used for the total ozone retrievals. However, the successful performance of ozone profile retrieval algorithms can be accomplished only when accurate calibration and forward model simulations and good knowledge of measurement errors and the a priori covariance matrix are available. This still need to be verified. So we compare the total ozone retrieval performance of two profile algorithms and two total ozone algorithms from the same OMI observations, minimizing the instrument and sampling differences. Although evaluating the consistency of long-term series between SBUV (a series of different type of instruments, different spectral and spatiotemporal sampling from OMI, different time periods of availability) and OMI SOE retrieval is very interesting, it is beyond the scope of this study (focus on the evaluation of OMI retrievals).

Comment #2: I agree with the other reviewer that the impact of the use of different absorption cross sections when comparing different total ozone data sets should be discussed in more detail and respective comments should be included in the manuscript, especially concerning the observed biases.

Response #2: We have already answered about the similar comment in the response to the first reviewer's general comment as follows. We added two paragraphs to address this issue, 1 in section 2.2 (describing Brewer total ozone data) and 1 at the end of the paper.

In section 2.2, we added after "Absorption coefficients based on Bass and Paur (1985) data are used in the standard Brewer algorithm" the following:

Several studies have evaluated the effects of using newer high-resolution ozone cross section datasets and accounting for temperature dependence on Brewer total ozone retrievals and their consistency with retrievals from Dobson spectrometers (Fragkos et al., 2013; Redonas et al., 2014). The two newer cross-section datasets are the BDM dataset (used in SOE, KOE, and DOAS algorithms) and the dataset by Institute of Environmental Physics, Bremen University (IUP dataset, Gorshelev et al., 2014; Serdyuchenko et al., 2014). Using both BDM and IUP datasets removes the seasonality of the Dobson/Brewer differences after accounting for the temperature dependence. However, using the BDM dataset produces Dobson/Brewer biases of ~2-3% as the Brewer total ozone is reduced by ~3.2% (Redonas et al., 2014), while using the IUP dataset reduces the Dobson/Brewer differences to within 1%. Therefore, the IUP dataset has been recommended for ground-based Brewer and Dobson measurements. According to Fragkos et al. (2013), using the recommeded IUP dataset and accounting for its temperature dependence reduces the Brewer total ozone at a mid-latitude station (Thessaloniki, Greece) by ~-0.7% on average with a seasonal dependence of ~0.2% and a trend change on the order of 0.05%/decade compared to the operational Brewer total ozone. These studies imply that the operational total ozone, despite the deficiencies in the standard Brewer algorithm, is close to that from the improved algorithm with a positive bias of ~0.7% and a very small seasonal dependence of ~0.2%.

We also added at the end of paper:

It is important to discuss the possible impacts of cross sections on the evaluation of algorithm performances as different cross sections are used in the OMI and Brewer algorithms. In 2009, WMO/GAC-IO3C has established the ACSO (Absorption Cross Sections of Ozone, http://igaco-o3.fmi.fi/ACSO/) Committee to review the current ozone cross sections and determine the impacts of changing ozone cross sections on retrievals from different satellite and ground-based instruments. According to the activities from ASCO members, switching from BP to newer BDM and IUP datasets has different impacts on retrievals from different instruments/retrieval algorithms due to the use of different wavelengths/spectral regions and the quality of ozone cross sections in the used wavelengths/spectral regions. The BDM cross section dataset is recommended for use in our ozone profile retrieval algorithm and the TOMS algorithm (Liu et al., 2013; Bhartia, 2013, http://igaco-o3.fmi.fi/ACSO/presentations_2013/satellite/WS_2013_Bhartia.pdf) and is used in all OMI algorithms except for the TOMS algorithm. If it is used in the TOMS algorithm, the OMTO3 would increase by ~1.5%. However, using BDM reduces the Brewer total ozone by ~3.2% and produces Dobson/Brewer differences of 2-3% (Fragkos et al., 2013; Redonas et al., 2014). On the other hand, the IUP dataset is recommended for ground-based Dobson and Brewer measurements as it minimizes the Dobson/Brewer differences to within 1%; using the IUP dataset, and accounting for its temperature dependence would reduce the Brewer total ozone by ~ -0.7 % with a small seasonal dependence (Fragkos et al., 2013). If using the recommended cross sections for different algorithms (i.e., switch to the BDM dataset for the TOMS algorithm and to the IUP dataset for the Brewer algorithm), the SOE and TOMS total ozone would show positive biases of ~0.5-0.7%, DOAS total ozone would show negative biases of ~1% and KOE total ozone would show positive biases of 3-4%. Because the very small change in seasonal dependence and trend of Brewer total ozone, and the systematic bias in TOMS total ozone, the evaluation of algorithm performance with respect to different geophysical variables should not change much. Overall, the main conclusions of this study are not affected much except for the mean OMI/Brewer biases.

Comment #3: A summary table with the main characteristics of the four algorithms (e.g. wavelength window, cross-sections, principle, calibration etc) would be very useful for the reader to follow the discussion and the figures.

Response #3: According to Reviewer, the indicated summary table is newly included as Table 1 in the revised manuscript.

Table 1. Main Characteristics of SOE, KOE, TOMS, and DOAS ozone algorithms.

	SOE	KOE	TOMS	DOAS
Retrieval Method	Optimal Estimation	Optimal Estimation	TOMS	DOAS fitting and SCD to VCD conversion
Algorithm Version	X*	1.1.1 (1.1.0 before 2 January 2006)	8.5	1.2.3.1
Fitting window	270-330 nm	270-330 nm	312.6, 317.6, 331.3 nm	331.1-336 nm
Ozone cross section	BDM	BDM	Bass and Paur	BDM
Ozone A Priori	Mean and a prior error from LLM	Mean from LLM, 20% a priori error	TOMS V8 climatology (mean)	TOMS V8 climatology (mean)
Soft Calibration	Yes	No	Yes	No
Cloud Pressure	O_2-O_2 algorithm	O_2-O_2 algorithm	RRS algorithm	O_2-O_2 algorithm

*No official version, the first version is provided in Liu et al. (2010) and then some updates are described in Kim et al. (2013).

Specific comments

Comment #1: Page 4054, line 8, correct "Would" to "World"

Response #1: We have corrected "Would" to World".

Comment #2: Page 4056, line 8. Although the authors cite the paper by Liu et al., it would be very useful here to provide briefly some more information on the soft calibration since this is a major factor that affects the quality of the SOE data.

Response #2: We have added a few sentences to provide more information on the soft calibration.

- Added text (p.5, line 23-25). This first-order correction is derived using the average percent difference between measured and simulated radiance derived from 2 days of MLS data in the tropics as shown in section 2.3 and Figure 1 of Liu et al. (2010a).

Comment #3: Page 4056, line 23. Please mention briefly what concerns the updates described by Kim et al.

Response #3: The main updates are mainly to improve radiative transfer calculations and address the retrieval impacts of correcting the OMI L1b random-noise error overestimate by ~2-5 times [Braak, 2010]. We have removed the sentence "It should be noted that the SOE algorithm used in this study has several updates from the version presented by Liu et al. (2010a), which are described in Kim et al. (2013)", and changed the last sentence in the previous paragraph "with several updates described in Kim et al. (2013) to improve radiative transfer calculations and address the impacts of correcting the OMI L1b random-noise error overestimates (Braak, 2010) on the retrieval. Detailed information about the KOE algorithm can be found in Kroon et al. (2011)."

Comment #4: Page 4057, line 13. I guess that the soft calibration mentioned here has no connection with the SOE one mentioned before, but as it is written can be very confusing for the Reader, so please avoid using the same term for different corrections.

Response #4: We have revised the manuscript to provide more detail on soft calibration done in the TOMS algorithm according to both reviewer #1 and reviewer #3.

- Revised text (p.6, line 21-28): The TOMS algorithm uses ozone cross sections data based on Bass and Paur (1985). OMTO3 total ozone measurements largely rely on OMI's pre-launch radiometric calibration at nadir described by Dobber et al. (2006) and validated by Jaross and Warner (2008). Small residual errors in the Collection 3 radiances (Dobber et al., 2008) are further reduced using soft-calibration techniques where biases and irregularities that vary with viewing angle and wavelength are estimated and reduced by comparing the measured radiances with forward model calculations. This approach is applied only to select data where the variability in ozone is low and therefore the radiances can be simulated reliably.

Comment #5: Section 3.1. Stations that seem problematic (and there are references for that) should be removed. The authors do that any way in a second step, but their inclusion in the discussion and then the exclusion can be confusing.

Response #5: We mainly followed the methodology used in Balis et al. [2007]; those excluded stations were not mentioned in that study. In addition, we have indicated that "the filled and opened symbols represent stations selected and rejected, respectively" in the caption of figure 1 to avoid confusing. We think that it is useful for readers (especially who have no experience in this kind of validation study) to provide how to select the good reference.

Comment #6: Page 4063. Line 6. Please write "trend of the differences", since as it is written it can be confusing meaning trend in total ozone.

Response # 6: We have corrected "trend" to "trend of the differences" on p.12, line 10 in the revised manuscript.

Comment #7: Page 4063, Line 13. Please write "the average difference of trends". As it is written one can easily wrongly conclude that the average difference in total ozone is only 0.02%!

Response #7: The indicated value of 0.02 % (presented in Table 2 in previous manuscript and in Table 3 in the revised manuscript) represents the average difference between SOE and Brewer in the Northern Hemisphere. Therefore, we did not change it.

Comment #9: Section 5. The main conclusion from this comparison seems to be that the large KOE/SOE differences are mainly caused by other implementation details. I think that here the authors should try to be more specific. Which could be the other variables used in the fitting, what could be the source of differences in the RT simulations etc., and if there are plans to investigate these in more detail?

Response #9: As we specified in Section 2.1, the fitting variables of SOE algorithm include ozone values at 24 layers from the surface to ~0.087 hPa, surface albedo, cloud fraction, scaling parameters for the Ring effect, radiance/O3 cross section wavelength shift, radiance/irradiance wavelength shift, and a scaling parameter for mean fitting residual. In other hand, the fitting variables of the KOE algorithm include ozone profiles at 18 layers from the surface to 0.3 hPa, surface albedo, cloud albedo, and straylight correction parameters. There are the sources of differences in the RT simulations: different RT models, forward spectroscopic/atmospheric/surface inputs. The investigation of all kind of sources is very worth and interesting, but we think that it is out of scope in this paper, as it requires close coordination with the KOE developers or access to the KOE source code. However, the first author (Juseon Bak) of this paper has a plan to investigate the effect of each implementation on ozone retrieval to get a better understanding on the SOE algorithm. As the first step, Juseon Bak and her co-worker are preparing a paper to show the effect of the cloud variables on the ozone profile, total ozone, and tropospheric ozone from the SOE algorithm.

Comment #8: (a) Section 4. This short paragraph could be merged with the section 3 when discussing the comparison results for the high latitudes as a confirmation. As it is written it hardly justifies to be considered a different section in the manuscript. (b) A comment on possible differences between double and single Brewer comparisons should be added.

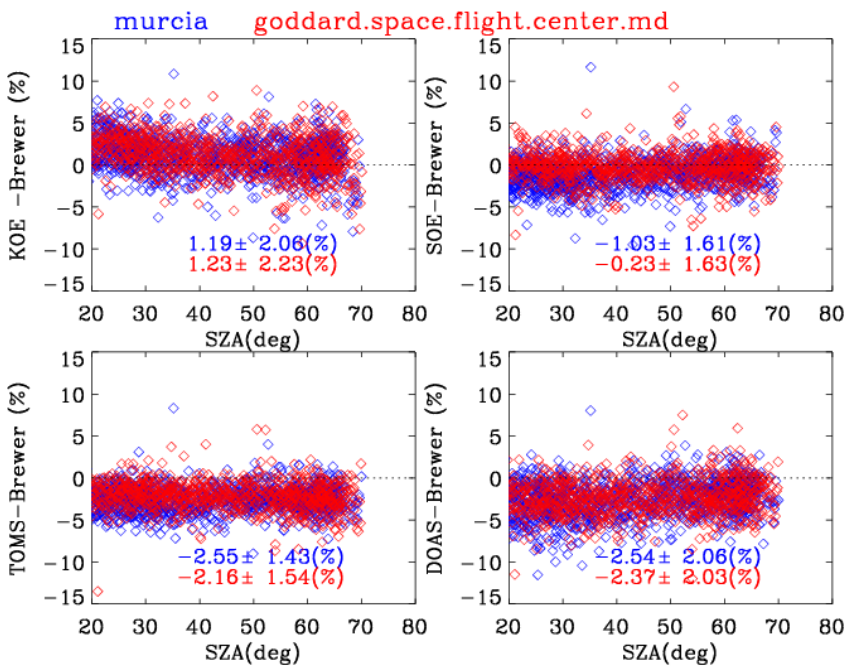
Response #8:

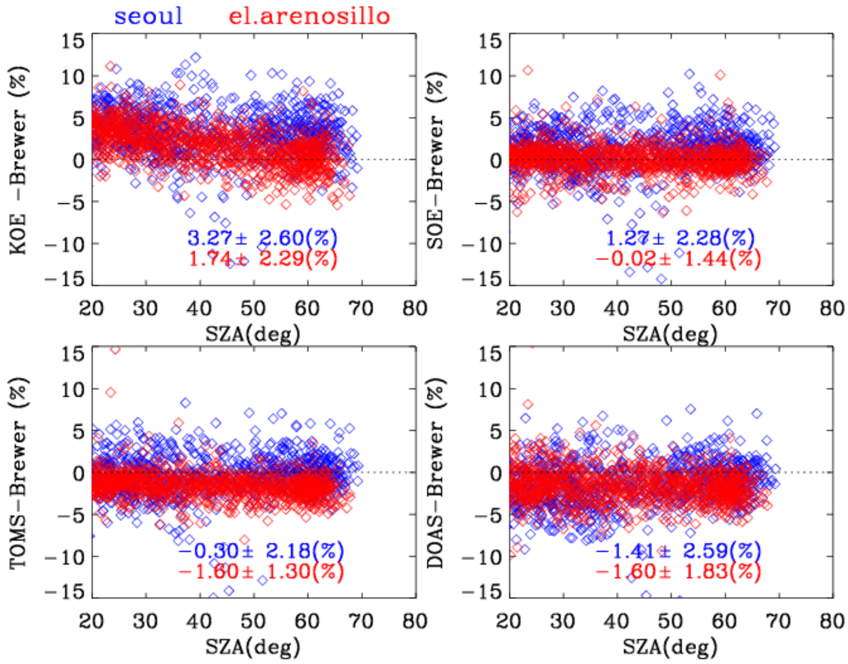
(a) The paragraph of Section 4 has been moved to Section 3.1

(b) According to Reviewer #3, we have compared total ozone difference between OMI and Brewer as function of SZA at single (blue) and double (red) brewer stations, respectively in five figures below. Except at UCCLE station, there is no station where both single and double brewers are installed and thereby other brewer stations are compared with latitudinally adjacent single brewer stations. In most cases, we can see generally less scatter at double Brewer stations, but did not see significant SZA-dependence reduction in the differences with double Brewer measurements. According to Figure 2, a smaller trend of the differences between OMI and Brewer is also observed at double brewer stations. The revision to include this result is followings.

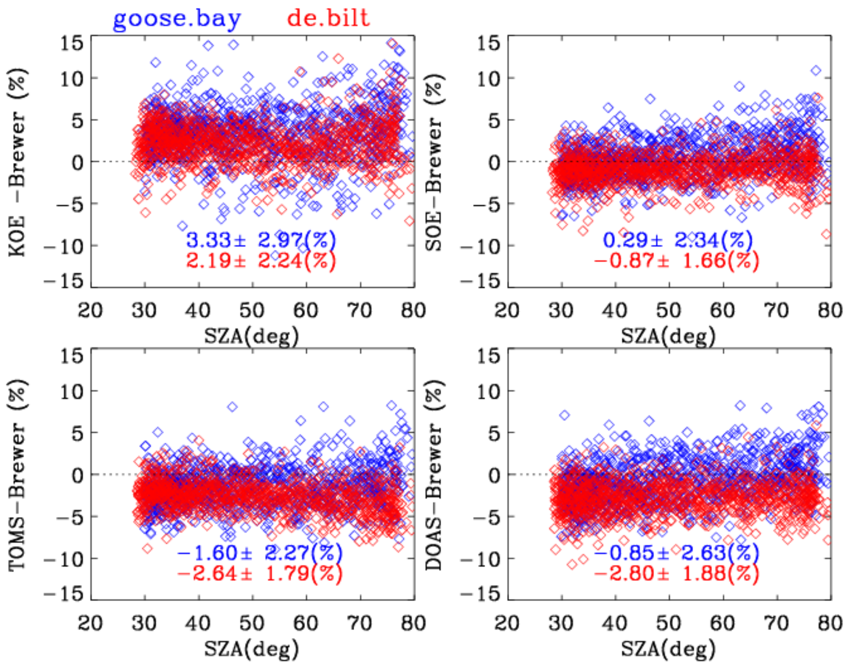
- Added text (13p., line 8-15): In Figure 3, both single and double Brewer measurements at Uccle station are compared with the four OMI datasets. This comparison with double Brewer measurements shows less scatter, but insignificant SZA-dependent reduction of OMI/Brewer differences although it is known that the performance of single Brewer instruments has a distinct dependence on SZA, especially at large SZA due to the influence of stray-light (Bais and Zerefos, 1996). In addition, comparisons at other double Brewer stations also show less scatter and even smaller trend in the OMI/Brewer differences compared to those latitudinally adjacent stations with single Brewer instruments (Figure 1 and Figure 2).

- Added new figure 3: Comparison between OMI and Brewer total ozone measurements as a function of solar zenith angle at single (blue) and double (red) Brewer Uccle stations, respectively. We also give the mean biases and 1σ standard deviations for relative differences in the legend.

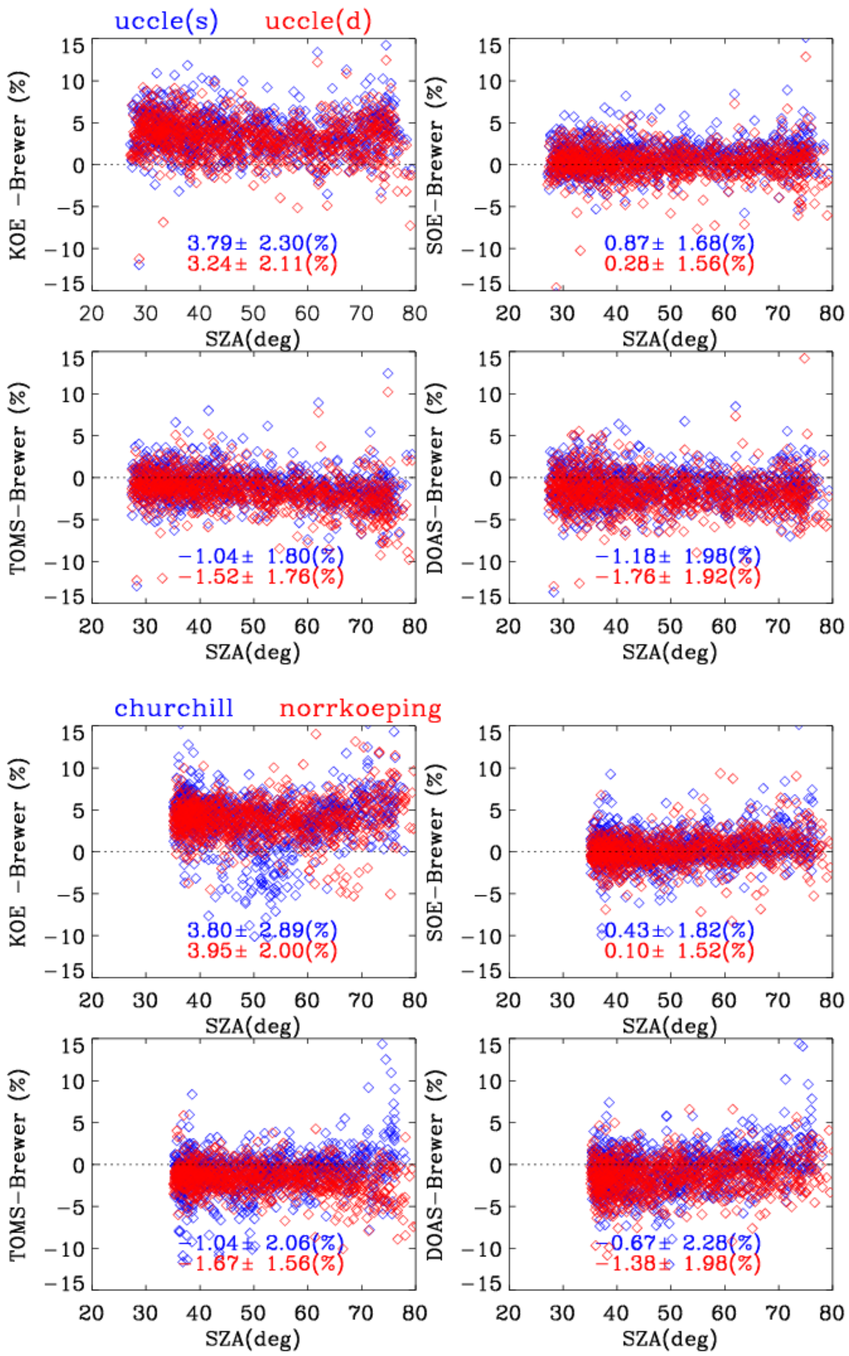




seoul
el.arenosillo
KOE −Brewer (%)
SOE−Brewer (%)
TOMS−Brewer (%)
DOAS−Brewer (%)
SZA(deg)
3.27± 2.60(%)
1.74± 2.29(%)
1.27± 2.28(%)
−0.02± 1.44(%)
−0.30± 2.18(%)
−1.60± 1.30(%)
−1.41± 2.59(%)
−1.60± 1.83(%)



goose.bay
de.bilt
KOE −Brewer (%)
SOE−Brewer (%)
TOMS−Brewer (%)
DOAS−Brewer (%)
SZA(deg)
3.33± 2.97(%)
2.19± 2.24(%)
0.29± 2.34(%)
−0.87± 1.66(%)
−1.60± 2.27(%)
−2.64± 1.79(%)
−0.85± 2.63(%)
−2.80± 1.88(%)


uccle(s)
uccle(d)
KOE −Brewer (%)
SOE−Brewer (%)
TOMS−Brewer (%)
DOAS−Brewer (%)
SZA(deg)
3.79± 2.30(%)
3.24± 2.11(%)
0.87± 1.68(%)
0.28± 1.56(%)
−1.04± 1.80(%)
−1.52± 1.76(%)
−1.18± 1.98(%)
−1.76± 1.92(%)
churchill
norrkoeping
3.80± 2.89(%)
3.95± 2.00(%)
0.43± 1.82(%)
0.10± 1.52(%)
−1.04± 2.06(%)
−1.67± 1.56(%)
−0.67± 2.28(%)
−1.38± 1.98(%)