Response to Reviewer #3

The authors would like to thank the referee for her/his positive general comments about the manuscript and her/his useful suggestions and corrections, which have helped us clarifying several points and improving the manuscript. Below are our responses to the comments brought up by the referee. The referee's comments and our responses are marked in blue and in black, respectively. In italic are the changes made in the manuscript.

1. The discussion of the factors affecting biases in the IASI dataset is confusing as it is integrated into the subsections describing intercomparison results. In some subsections, the brightness temperature is discussed, but in other sections things like the temperature and a priori profiles are mentioned. It is not clear which latitudes/altitudes/seasons these factors are expected to be the most relevant and why they are mentioned in some subsections but not others. I think it would be useful if discussion of contributions to the various biases was consolidated and discussed separately from the comparison results between each validation dataset. Ideally, this discussion would explain which factors might be the most relevant at which latitudes/altitudes/seasons. Furthermore, this discussion could help explain the improvements observed in the new v20151001 dataset.

We made the description of the factors affecting biases in the IASI dataset clearer in the new manuscript. In particular, we added a paragraph at the end of Section 4.1 discussing the factors that are the most relevant for different latitudes/seasons. In order to avoid redundancy, in Section 4.2 and 4.3, which are also related to IASI/UV-vis instrument comparisons, we refer the reader to Section 4.1 for the description of the factors affecting biases in the IASI dataset. In Section 5 are included the possible reasons explaining which factors might be the most relevant for different altitude ranges.

Here are the changes we made in Section 4.1 (p. 12-13 in the new manuscript):
"Although further investigation is needed to understand the reasons of the local discrepancies (e.g. Antarctica, mountains region, desert), the global difference could be attributed to:

1. *The different observation modes: i) the ground footprint is different for both instruments (12 km diameter at nadir for IASI versus 40 x 80 km for GOME-2), leading to different cloud contamination; ii) the observations have different geometry i.e. IASI and GOME-2 do not look in the same direction (GOME-2 looking globally in the direction of the solar reflected radiation), which implies that different air masses are probed;*
2. *The ~4% disagreement between the ozone absorption coefficients in the IR and UV spectral regions (Picquet-Varrault et al., 2005; Gratien et al., 2010);*
3. *The different weighting functions and vertical sensitivities: GOME-2 has a maximum sensitivity in the stratosphere, while IASI presents a maximum sensitivity in the free troposphere (Boynard et al., 2009).*

Possible reasons for the larger discrepancies observed at high latitudes are i) the limited information content in the IASI observations in these regions due to low brightness temperatures (c.f. Fig. 2 and Table 1), ii) a misrepresentation of the emissivity above ice surfaces, iii) the temperature profiles used in FORLI that are less reliable at high latitudes and over elevated terrain as shown in August et al. (2012), and iv) the errors associated with TOC retrievals in the UV-vis spectral range increasing at high solar zenith angles in these regions, mostly because of the larger sensitivity of the retrieval to the a priori O_3 profile shape (Lerot et al., 2014). In the tropics, the largest differences are observed above regions characterized by sharp emissivity features, which are misrepresented in FORLI processing."

Since Section 5 has been significantly modified (based on Referee #2 comments), we invite the referee to read Section 5 of the new manuscript to see the changes made. Also as the referee asked to better describe the methodology for calculating the relative difference for each comparison, the methodology for calculating the relative difference between IASI and sonde data was changed. However, only the new statistical results (Table 5 in the updated manuscript) slightly change. The methodology is better described in Section 5 (p. 17 l. 18-19).

2. On a related note, I agree with Referee #2 that figures showing how brightness temperature varies with latitude/season and how it affects retrieved ozone would be very useful.

As suggested by both referees, we included a figure and a table showing the spatial and seasonal distributions of surface temperature and DOFS for TOC in order to better understand how it affects ozone retrievals. The changes have been made p. 7 and in Fig. 2 of the new manuscript:

"In order to get a global view of IASI vertical sensitivity and its relation with surface temperature, Fig. 2 illustrates the spatial distribution of surface temperature along with total DOFS for the period 2008-2014 for daytime measurements. Data were averaged monthly over a 1°x1° grid cell, then the monthly data were averaged over the period 2008-2014. The mean values of surface temperature and DOFS for the O_3 profiles for different seasons and latitude bands are given in Table 1. As expected, surface temperature varies with latitude and season, with the highest values found in the tropics during summer (~300 K on average) and the lowest values in the high latitudes especially over Antarctica (245-255 K). Same patterns are observed for the DOFS global distribution with the lowest values at high latitude (~2) and the highest values in the tropics (>4), which indicates that IASI is more sensitive in the tropics. There is no significant seasonal change in both surface temperature and DOFS in the tropics and Southern mid-latitude. However, at high latitudes and in the Northern mid-latitudes, surface temperature and DOFS can differ by 10-30 K and 0.7, respectively, between winter and summer."

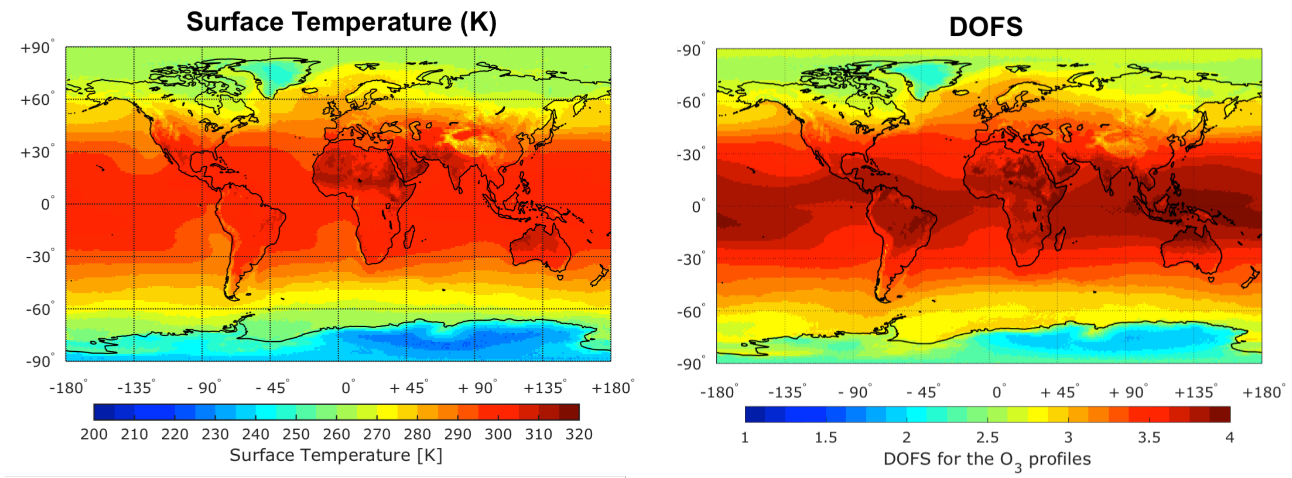

Figure 2: Global distribution averaged over 1°x1° for the period 2008-2014 for daytime measurements: (left) IASI surface temperature, and (right) DOFS for TOC.

Table 1. Mean values of surface temperature (K) and DOFS for TOC for different seasons and latitude bands for the period 2008-2014 for daytime measurements. The standard deviation is also indicated.

Latitude range	Dec-Jan-Feb		Mar-Apr-May		Jun-Jul-Aug		Sep-Oct-Nov	
	Surface temperature	DOFS	Surface temperature	DOFS	Surface temperature	DOFS	Surface temperature	DOFS
60–90°N	250±3	2.31±0.11	260±2	2.50±0.06	277±2	2.98±0.05	265±2	2.72±0.08
30–60°N	273±4	2.91±0.09	285±2	3.14±0.06	295±2	3.41±0.05	287±2	3.28±0.05
0–30°N	298±2	3.72±0.04	301±2	3.73±0.03	302±3	3.74±0.03	301±2	3.79±0.03
0–30°S	299±2	3.76±0.03	299±1	3.76±0.03	296±1	3.67±0.04	298±2	3.69±0.04
30–60°S	284±2	3.25±0.04	283±1	3.22±0.03	280±1	3.13±0.04	280±2	3.12±0.04
60–90°S	255±2	2.52±0.07	247±2	2.15±0.06	246±2	2.65±0.12	245±2	2.70±0.08

3. Additionally, I found that in some of the subsections, the steps taken in the data analysis are unclear. For example, sometimes it's hard to tell how exactly data were averaged before comparing. Also, when mean relative differences are presented with an error, is this the standard deviation or the standard error or something else? I've included some specific comments where I've noticed this, but please check throughout the paper that methodologies are clearly described.

The methodologies for calculating the mean relative differences are better described in the updated manuscript. When relative differences are presented with an error, this is the standard deviation. We made it clearer in the updated manuscript.

SPECIFIC COMMENTS:

1. Page 6, line 13: You discuss several possible reasons for differences between IASI-A and IASI-B datasets. Could you go into more detail about these?

In the manuscript we were trying to point out the challenge in comparing the ozone product from the two IASI instruments. Looking at a particular overpass over one particular location, we can see how the IASI footprint is actually different for the two instruments: Spatial differences between the two instruments are clear, both in number, location (see Fig. R1) and time. We understand that the details explaining the differences between IASI-A and IASI-B are not straightforward. We provided more information here by moving the text in p. 4, l. 10-14 to this section, which makes more sense (new changes are in bold). We also added some explanation of why we gridded the data (also in bold).

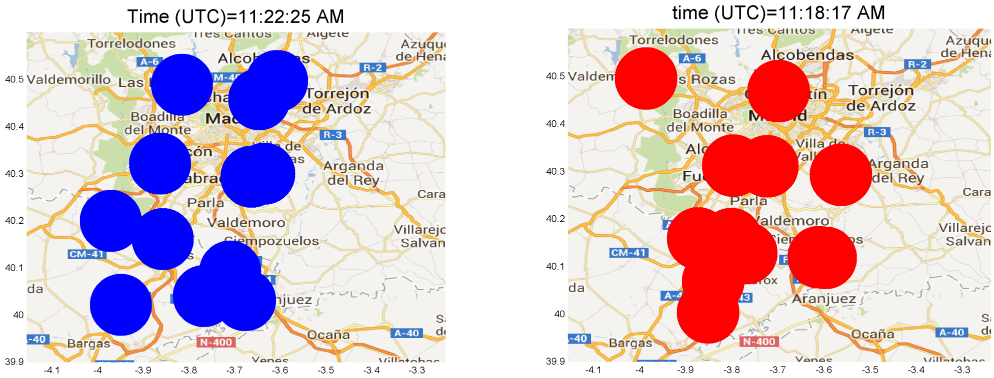

Figure R1: Ground track of part of the morning orbit (until the hour shown in the title of each figure) of the O_3 product from IASI-A (blue) and IASI-B (red) on 7 September 2013 above the city of Madrid.

"*The comparison between IASI-A and IASI-B O_3 products retrieved with FORLI is not straightforward since the pixels are not co-localized in time and space. The two MetOp satellites are on the same orbit with a 180° shift, therefore there are numerous common observations between two consecutive tracks. However there is a ~50 min temporal shift between both instruments (one satellite might be before or after the other), thus the observations are never simultaneous. In addition, the geometry of the observations is different and generally off-nadir with opposite angles, so the location of the observation between the two instruments varies and thus the pixels are not geographically co-localized. Moreover each IASI O3 measurement is associated with a cloud flag (see Section 2), so one observation seen at a certain location with IASI-A might be contaminated by clouds and filtered out in the retrievals processing, while it might not be the case with IASI-B.* ***To overcome these challenges and to be able to compare the two instruments over the same basis, the intercomparison of IASI-A and IASI-B TOC retrievals from FORLI is performed on monthly averaged data, over a 1°x1° grid.***"

1.1 You state that some differences could be due to low numbers of IASI pixels being averaged – do these differences go away when you restrict comparisons to include only grid-cells with better sampling?

The analysis of IASI-A and IASI-B TOC daily time series over some areas characterized by larger differences show a gap in IASI-B data for some time periods. As an example, Fig. R2 show the time series of daily IASI-A and IASI-B TOC averaged over the black rectangle located on the latitude/time contour plot. We clearly see a gap in IASI-B data between 10 and 15 March 2014, which is probably due to a problem related to IASI-B instrument during this period. So the larger differences are not due to a lower sampling but to the fact that for some days we take into account IASI-A data while there was no IASI-B data available. We changed the sentence by:
"*The larger differences observed in March 2014 around 60°N is related to missing IASI-B data during several days probably due to a temporary problem related to the IASI-B instrument*."

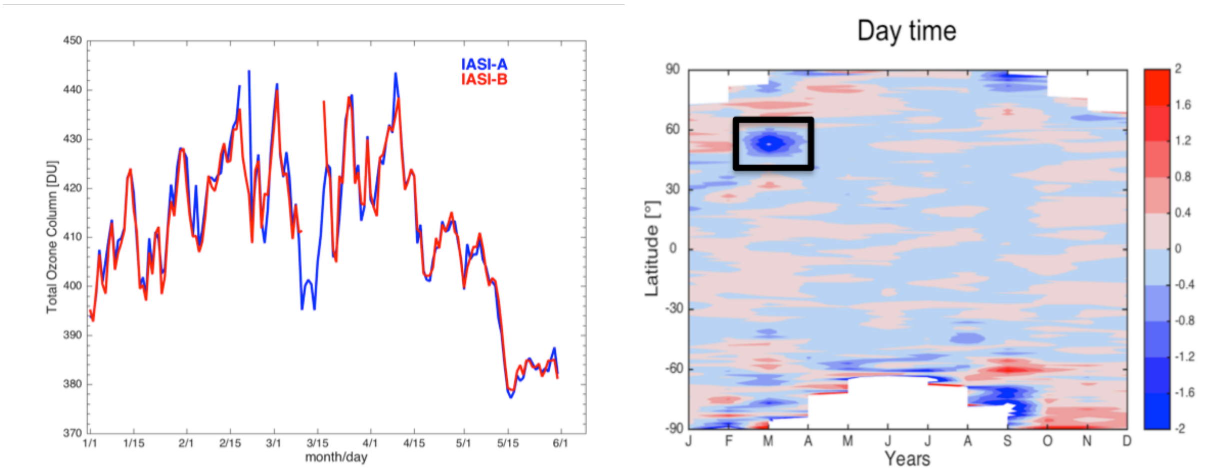

Figure R2: The left panel illustrates the daily time series of IASI-A and IASI-B TOC averaged over the black rectangle displayed in the latitude/time contour plot shown on the right panel.

1.2 You also mention sampling air masses at different local times. What are the typical differences in local times for each grid-point – are the times different enough that significant changes in ozone would be expected? Is there a reason that you would you expect sampling differences like these to affect mean differences between the datasets (as opposed to just affecting the standard deviation)?

We made the analysis clearer for this section. In fact, what we attempted to explain is that for each of the instruments, we have more overpasses over the poles as the following figure shows:

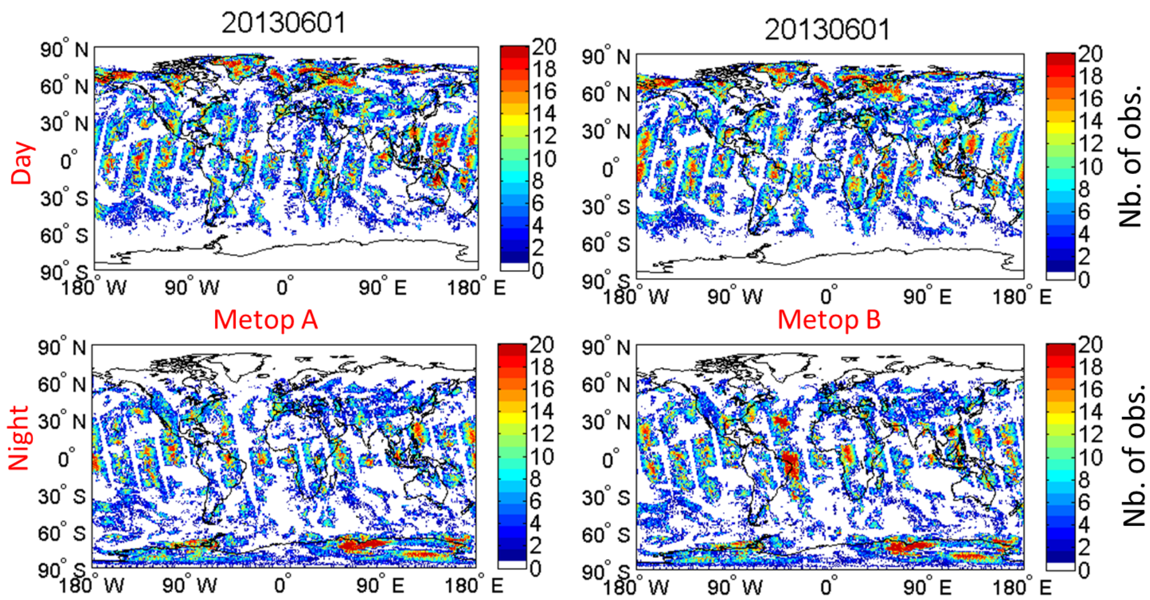

Figure R3: Number of IASI O_3 observations per day (upper panel) and night (lower panel), for MetOp-A (left) and MetOp-B (right), over a 1°x1° grid.

The figure shows the number of observations for each grid cell during one example day. The high number of observations over the equator comes from the almost-clear sky conditions, allowing us to keep most of the IASI spectra after the cloud filtering. Over the poles on the other hand, the high number of observation comes from the numerous overpasses that each of the instruments accomplishes (even after the cloud-filtering). MetOp, with its polar orbit, makes 14 revolutions per day, and therefore will pass by the poles on each revolution. This means that during the morning or evening orbit, one grid cell over the poles might have different observations at different times, and therefore will sample different air masses at different times of the day, hence the larger standard deviation (see Fig. R4), which could explain the larger differences too.

To make this clearer we added the following (changes in bold):
"In polar regions, a possible reason for the larger differences is the combination of the overlap by consecutive orbits with different time and thus, different meteorological conditions. **MetOp, with its polar orbit, makes 14 revolutions per day, and will therefore pass by the poles on each revolution. This will lead to a larger number of observations over the poles each day at different times for the same grid cell. The variability in O_3 is therefore much larger leading to both larger differences between the instruments and larger standard deviation (not shown).**"

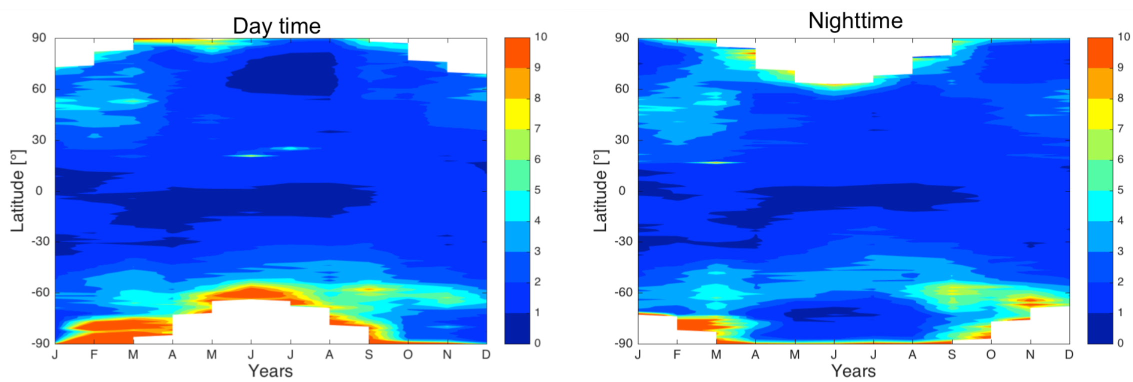

Figure R4: Contour representation of the standard deviation (in percent) of the relative differences between IASI-A and IASI-B total ozone column retrieved using FORLI as a function of latitude and time for the year 2014 for daytime data (left) and nighttime data (right).

1.3 You also mention that this could be due to differences in azimuthal angles. What do you mean by azimuthal angles and why would azimuthal angles affect agreement between the datasets?

What we actually meant is “scanning angle”. Figure R5 illustrating the two IASI instrument opposite scanning angles leading to different sampling of IASI-A and IASI-B. This reason is already mentioned p. 8 l. 12-14 (new manuscript), so we removed this part of sentence.

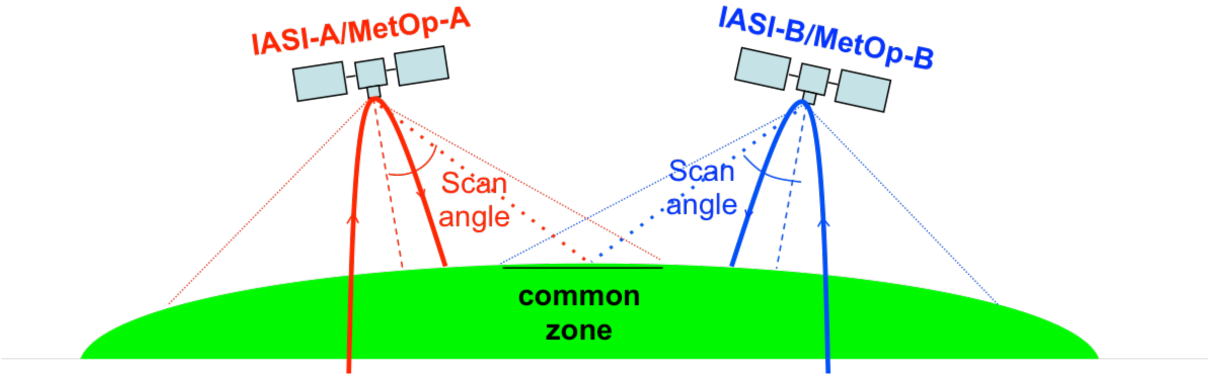

Figure R5: Illustration of IASI-A and IASI-B opposite scanning angles.

1.4 In the conclusion (Page 13, line 13) you mention differences in “observation geometry” – what do you mean by this?

As explained in response to specific comment 1.3, IASI-A and IASI-B are flying 180° apart. So when they scan the same area it is with opposite angles, and the sounded air masses differ. The difference in observation geometry is explained p. 8 l. 12-14 in the new manuscript (see response to specific comment 1):

“In addition, the geometry of the observations is different and generally off-nadir with opposite angles, so the location of the observation between the two instruments varies and thus the pixels are not geographically co-localized”

2. Page 6, line 31: Delete the sentence starting with “This section shows and excellent agreement…”. This information is repeated in the conclusion, and doesn’t fully summarize the content of this section, given the much larger differences in the profiles at some latitudes.

As suggested by the referee, we removed this sentence.

3. Page 7, line 19: Were the gridded data averaged onto grids daily or monthly or something else?

The data were averaged onto monthly 1°x1° grids. We specified it in the manuscript (p. 10 l. 18-19).

4. Page 8, line 21: How were statistics in Table 1 calculated? E.g., were the maps averaged seasonally (as shown in Fig. 7) and then correlations calculated spatially across grid locations within a latitude band? Or were daily maps averaged within latitude bands and then correlations calculated over time for each latitude band? Or something else?
The maps were averaged seasonally as shown in Fig. 7 and then correlations calculated spatially across grid locations within a latitude band. We detailed it in the new manuscript (p. 11 l. 26-27).

5. Page 8, line 30:
5.1 When you say "extent of ozone depletion", do you just mean TOCs in the ozone hole?
We changed the sentence as follow:
"This suggests that IASI underestimates the extent of O_3 depletion ***(i.e. the TOCs in the ozone hole)*** *with respect to GOME-2A."*

5.2 What if IASI was used to estimate relative differences in ozone?
IASI is able to reproduce qualitatively the spatio-temporal variability of TOCs. However it is difficult to accurately estimate the relative differences in ozone. We added the following sentence in the updated manuscript (p. 13 l. 8-10):
"One has to be careful to the fact that although IASI is able to reproduce the spatio-temporal variability of TOCs, it remains difficult to accurately estimate the Antarctic ozone loss and the size of the ozone hole from IASI data because of large biases in the region."

6. Page 9, line 12: Could you add a reference for the statement about the accuracy of Brewers?

We added the following reference :
Kerr, J. B., New methodology for deriving total ozone and other atmospheric variables from Brewer spectrophotometer direct sun spectra, J. Geophys. Res., 107(D23), 4731, doi:10.1029/2001JD001227, 2002.

7. Page 9, line 15: When you say, "All IASI TOCs meeting the above criteria were then averaged." What was the averaging period? Was this on a daily basis?

As explained in the manuscript, the Dobson/Brewer data consists of daily total ozone value, so there is only one Brewer/Dobson measurement per day. For each Brewer/Dobson measurement, we averaged all IASI data located within 50 km search radius with respect to the geolocation of the ground-based measurement. In order to make the sentence clearer, we specified that the average is performed for each ground-based measurement :
"*All IASI TOCs meeting the above criteria were then averaged* ***for each ground-based measurement***."

8. Page 9, line 16: Is it necessary to both list the Brewer/Dobson station locations in a table and include the figure in the main text? Or could the table be removed or move into an appendix or supplementary material?

As suggested by the referee, we moved Table 2 into an appendix.

9. Page 9, line 21: Why were IASI-B comparisons restricted to colocations with IASI-A? Were similar colocation requirements applied for other IASI-B comparisons (e.g., Figure 7, Figure 11, Figure 14)?
We restricted IASI-B comparisons to co-locations with IASI-A in order to ensure consistency in the product validation and intercomparison of the different products. Similar co-location requirements were also applied for the SAOZ/IASI-B comparisons. We added a sentence for both the Brewer/Dobson and SAOZ comparisons. This co-location requirements were not applied for GOME-2 comparison since data are averaged on a 1°x1° grid. As suggested by Referee #2, Fig.14 has been removed.

10. Page 9, line 24: How exactly were these relative differences calculated? Were the data averaged daily within the latitude bands, then daily relative differences calculated, then means calculated across

all available days? Or were relative differences calculated for each comparison (for various latitudes/days) and then a mean calculated from this?

It is the latter. For each daily measurement a relative difference is calculated. All those relative differences were then separated into latitudinal bins and the mean of those is calculated, as per typical procedure. We added the sentence to make clearer the way these mean relative differences were calculated:

"*For each daily ground-based measurement a relative difference is calculated as 100 x (IASI – GROUND-BASED) / GROUND-BASED. All those relative differences are then separated into latitudinal bins and the mean of those is calculated*."

11. Page 10, line 13: What is the typical uncertainty in SAOZ measurements?

The SAOZ precision is 4.7%, while the SAOZ total accuracy is 5.9% (Hendrick et al., 2011). We added this sentence in the updated manuscript (p. 15 l. 18).

12. Page 10, line 15: Are the IASI nighttime/daytime measurements within the 300 km radius averaged daily for comparison with each SAOZ measurement?

Sunrise (sunset) SAOZ measurements are compared to co-located daytime (nighttime) IASI daily data averaged in a 300 km diameter semi- circular area located to the East (West) of the ground-based station. We made this clearer by adding this sentence in the updated manuscript (p. 15 l. 20-22).

13. Page 10, line 20: The relative difference is defined here, but not in previous subsections.

We added the definition of the relative difference in Section 3, and subsections 4.1 and 4.2.

14. Page 10, line 22:

14.1Why is the RMS presented in Fig. 11 but other figures use standard deviation or have no errorbars?

As we do not refer to the RMS in the text, we removed the values presented in Fig. 11. Also we included the standard deviation in Figure 10.

14.2 What do you mean when you use the term “noise”? Is this the RMS?

Actually, the term "noise" refers to the standard deviation. In order to make the sentence clearer, we changed it by:

"*Compared to SAOZ, the IASI TOCs are biased by 2-4% (1-2% monthly mean averaged standard deviation) in the tropics and mid-latitudes, and this value is increasing to about 7±3% at the polar circle, and to 15-20±15% at higher latitude (not shown).*"

15. Could the larger RMS values also be due to more systematic variations in the differences between the datasets or are the residuals random?

The larger RMS values at increasing latitudes are due to systematic seasonal variations in the difference between the data sets.

16. Page 11, line 1: Throughout this section and following sections, altitudes above 25 km are described as the “upper stratosphere”. I generally think of these altitudes as the middle stratosphere. Could you change your terminology and definitions of the partial column ranges throughout the paper to prevent this sort of confusion?

We agree with the referee and changed "upper stratosphere" to "middle stratosphere".

17. Page 12, line 8: Should the smoothing account for the problems with the vertical sampling and a priori described here?

Ozone profiles are provided with a fixed number of vertical levels. Over the tropics, the number of levels in the UTLS is low. The smoothing of the ozonesondes will therefore interpolate the ozonesondes observations (which are more numerous) over the IASI altitudes, and therefore will lead to lower quality smoothing. To avoid confusing the reader with these technical details, we chose to remove this sentence.

18. Page 12, line 9: Based on Fig. 13, it looks like the positive bias in the stratosphere begins at different altitudes depending on the latitude, and is not just above 25 km. At high latitudes, the positive bias appears at lower altitudes (in the lower stratosphere and UTLS?), and at low latitudes the bias appears at somewhat higher altitudes (also near the tropopause?). Therefore, based on these figures, it looks like the high bias in the TOCs could be related to biases in the lower/middle stratosphere as well.

We agree with the referee that the positive bias in the stratosphere begins at different altitudes depending on the latitude. We removed this sentence and the updated text is as follow (p. 19 l. 21-23): *"This suggests that the positive bias found for the TOC (c.f. Section 4) could be related to biases in middle stratosphere where most of* O_3 *is located."*

19. Page 12, line 12: Did you include requirements that ozonesondes measure up to a certain altitude/pressure level in order to be included in the comparisons (particularly for the 25-3 hPa range)? Are the ozonesonde partial columns for the 25-3 hPa range missing data at higher altitudes? If so, do you expect this to cause a significant low bias n the ozonesonde partial columns for 25-3 hPa or have you corrected them somehow?

Actually ozonesonde profiles are available up to ~30 km (~10 hPa), which implies that the 10-3 hPa range have missing ozonesonde data. This could lead to a bias in the ozone 25-3 hPa partial column. In order to avoid any additional bias related to missing ozonesonde data, in the updated manuscript, we analyze the 25-10 hPa column.

20. Page 12, line 13: When considering R, did you check what the variability is like in the troposphere for each of these latitude ranges? E.g., if the variability in ozone is pretty low, R might be smaller just because there isn't as much variation for each dataset to capture. Did you also check the scatter plots to make sure R was based on a good relationship and not just a couple points that lead to higher R values?

Figure R6 shows the scatter plots between IASI and smoothed sonde tropospheric column (surface-300 hPa) for each latitude band. Although that R is based on a good relation ship and not just a couple of points that lead to higher R values, the variability is relatively low in the Southern mid-latitudes (probably due to the lower number of co-location), which could lead to the lower R-values found. So we removed this sentence.

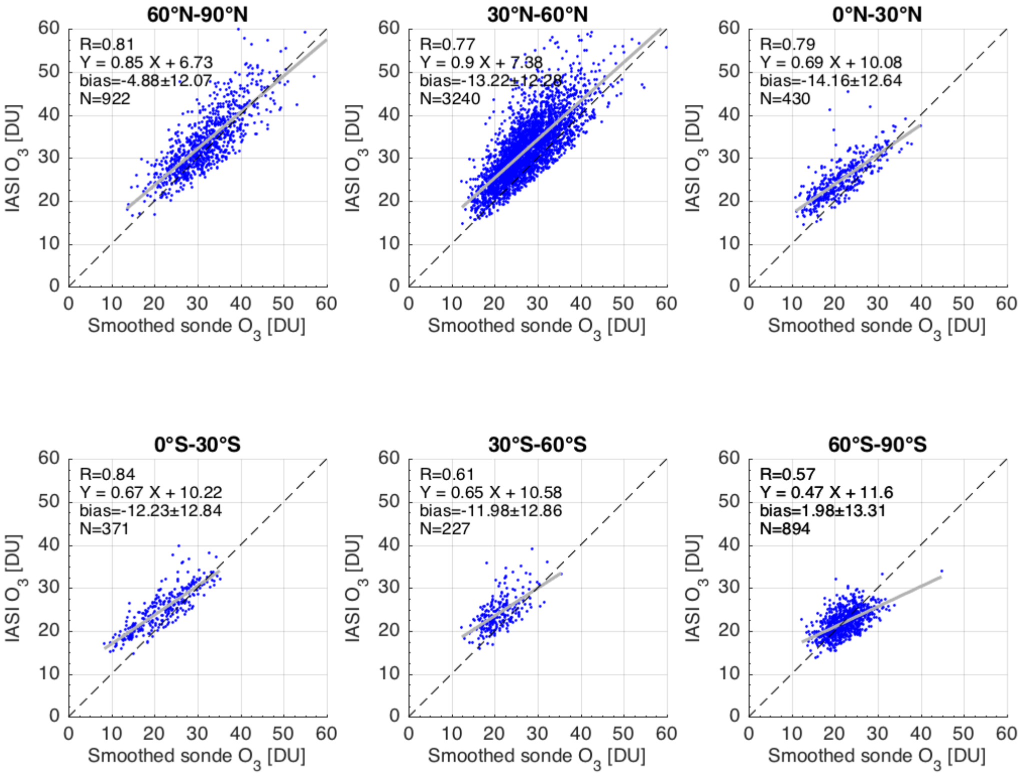

Figure R6: scatter plots between IASI and smoothed sonde O_3 tropospheric column (Surface-300 hPa) for each latitude band.

21. Page 12, line 28: I don't understand the discussion starting here – please clarify the following. (1) What altitudes are you referring to when discussing diurnal variation? I thought this was relevant only at very high altitudes (~50 km), but the text seems to imply that this is in the troposphere. Please provide more information/references to demonstrate that this is relevant on the 50 minute timescale that is mentioned. (2) When you refer to differences being more pronounced in summer than in winter, what latitudes/altitudes are you referring to? Are you suggesting that IASI-A and IASI-B are more different from each other in the summer than the winter or that IASI is more different from the sondes in the summer than the winter?

As suggested by Referee #2, Fig.14 has been replaced by time series between IASI and sonde data and thus, this discussion related to Fig. 14 has been removed in the updated manuscript.

22. Page 14, line 23: Do you have any idea which of the changes to the retrieval method for v20151001 most-contributed to the decrease in the biases above 25 km?

As described in Section 6, in the new version of FORLI-O3 (v20151001) look-up tables were recalculated to cover a larger spectral range (960 – 1105 cm^{-1}) using the HITRAN 2012 spectroscopic database (Rothman et al., 2013) instead of the HITRAN 2004 database (Rothman et al., 2005) and correcting numerical implementation, especially with regard to the LUTs at higher altitude. To make this clearer, we added the following sentence in the manuscript (p. 22 l. 14-16) :

"*This is mainly due to the use of updated look-up tables calculated over an extended spectral range, with corrections of numerical implementation, especially with regard to the LUTs at higher altitude*."

23. Page 15, line 16: Here, differences are attributed to brightness temperatures, but in the next bullet point (page 15, line 22), the a priori profile is mentioned. Is there a reason that these different factors are pointed out in the context of these specific comparisons at these latitudes/altitudes?

To make it clearer, we added a bullet explaining the different reasons for the larger differences at some latitudes (high)/altitudes (UTLS):
"The larger differences found at high latitudes are attributed to reduced IASI sensitivity associated with high latitudes (low brightness temperature) and the temperature profiles used in FORLI that are less reliable in Antarctica. The larger bias found in the UTLS, also found with other TIR sounders (e.g. Nassar et al., 2008; Worden et al., 2007), is not fully understood but some possible explanations are the limited IASI vertical resolution, spectroscopic uncertainties on ozone line or the use of inadequate a priori information. Further investigations on the retrievals processing need to be performed."

MINOR/TECHNICAL COMMENTS:
Throughout the text, there are some awkwardly worded sentences and minor grammatical mistakes. As there are too many of these to list, I have not corrected them. They do not affect comprehension of the text in any way.

Abstract: Define all acronyms (e.g., TOC)
Done

Page 3, define TIR (check elsewhere for acronym definitions)
TIR was already defined in Page 2 line 29, so it does not need to be defined in Page 3.

Page 3, line 10: Is this bias positive for all the values reported here? Specify.
Yes, this is a positive bias for all the values reported here. As suggested by the referee we specified it :
"*These papers report that the comparisons between IASI and UV instruments show a **positive** bias **from IASI** for the total column ranging from ~3% (Brewer/Dobson) to ~6% (GOME-2A) on the global scale.*"

Page 5, line 24: What is the uncertainty here? Is this output as part of the retrievals?
The uncertainty refers to the total error on the ozone profile retrieved from FORLI, which is estimated statistically in the retrieval algorithm. We specified it in the updated manuscript (p. 7 l. 17).

Page 6, line 1: Where does the "specification" come from? Is this as GSCICS specification? Please clarify.
The specification were defined the Centre National d'Etudes Spatiales (CNES). We updated the sentence as follows:
"*An excellent consistency between both sensors has been demonstrated, with radiometric biases lower or equal to 0.1 K and spectral biases lower than 1 ppm, which is compliant with the specification of 0.5 K and 2 ppm, respectively, **defined by the Centre National d'Etudes Spatiales (CNES)** (see IASI quarterly performance reports here: https://iasi.cnes.fr/fr/IASI/Fr/lien1_car_instr.htm).*"

Page 14, line 22: Replace "no improvement is found" with "no significant differences are observed"?
As suggested by Referee #2, we changed it by : "*No significant changes are found in the troposphere.*"

Table 1: some of the table columns read R2, should this be R?
Yes it should be R and has been corrected.

Figure 10 caption: This figure includes the line "For the period March 2013 onwards, only the common co-locations between the two satellites are shown." Similar information should be added to captions of other figures where applicable to help clarify the analysis methods (e.g., Fig. 9).
We added this information to captions of Figure 9 (Figure 10 in the new manuscript) and Figure 11 (Figure 12 in the new manuscript).

Figure 15, caption: Mention that this is averaged globally

Done. The caption has been changed to (change in bold):

"***Global*** *daily mean relative differences (in percent) between FORLI v20140922 and FORLI v20151001 total ozone columns for daytime (blue) and nigthtime (red) IASI measurements for 12 days in 2011 (on the 15th of each month). The relative difference is calculated as :100 x (v20140922 – v20151001) / v20151001*."

References

Hendrick, F., Pommereau, J.-P., Goutail, F., Evans, R. D., Ionov, D., Pazmino, A., Kyrö, E., Held, G., Eriksen, P., Dorokhov, V., Gil, M., and Van Roozendael, M.: NDACC/SAOZ UV-visible total ozone measurements: improved retrieval and comparison with correlative ground-based and satellite observations, Atmos. Chem. Phys., 11, 5975-5995, doi:10.5194/acp-11-5975-2011, 2011.

Rothman, L.S., Jacquemart, D., Barbe, A., Benner, D.C., Birk, M., Brown, L.R., Carleer, M.R., Chackerian, C., Jr., Chance, K., Coudert, L.H., Dana, V., Devi, V.M., Flaud, J.M., Gamache, R.R., Goldman, A., Hartmann, J.M., Jucks, K.W., Maki, A.G., Mandin, J.Y., Massie, S.T., Orphal, J., Perrin, A., Rinsland, C.P., Smith, M.A.H., Tennyson, J., Tolchenov, R.N., Vander Auwera, J., Varanasi, P., and Wagner, G.: The HITRAN2004 molecular spectroscopic database, J. Quant. Spectrosc. Ra., 96, 139-204, doi: 10.1016/j.jqsrt.2004.10.008, 2005.

Rothman, L., Gordon, I., Babikov, Y., Barbe, A., Benner, D. C., Bernath, P., Birk, M., Bizzocchi, L., Boudon, V., Brown, L., Campargue, A., Chance, K., Cohen, E., Coudert, L., Devi, V., Drouin, B., Fayt, A., Flaud, J.-M., Gamache, R., Harrison, J., Hartmann, J.-M., Hill, C., Hodges, J., Jacquemart, D., Jolly, A., Lamouroux, J., Roy, R. L., Li, G., Long, D., Lyulin, O., Mackie, C., Massie, S., Mikhailenko, S., Müller, H., Naumenko, O., Nikitin, A., Orphal, J., Perevalov, V., Perrin, A., Polovtseva, E., Richard, C., Smith, M., Starikova, E., Sung, K., Tashkun, S., Tennyson, J., Toon, G., Tyuterev, V., and Wagner, G.: The HITRAN2012 molecular spectroscopic database, J. Quant. Spectrosc. Ra., 130, 4–50, doi: 10.1016/j.jqsrt.2013.07.002, 2013.