

## **RESPONSE to Anonymous Referee #2**

**We would like to thank Anonymous Referee #1 for his/her careful reading of our manuscript and the useful comments made for its improvement.**

### **REPLIES to Major comments**

1. The validation results are sometimes contradicting for the comparison with the Dobson and the Brewer measurements. Maybe the authors can add some discussion about which result is more reliable. The use of error bars or the discussion of the errors on the comparisons might also help the reader to interpret the significance of the results.

**A discussion on the differences between Dobson and Brewer instruments has been added to the text as well as relevant points in the discussion of the results.**

2. Substantial part of the paper handles the dependence of the cloud fraction and pressure. It would be useful to add this to the conclusion as point 5.

**Added to text as requested.**

### **REPLIES to Minor Comments**

Page 3024, line 22: The footprint size of 60 x 30 km depends on both wavelength window and on the observation state of SCIAMACHY. It is better to call this a typical footprint size for ozone observations.

**Amended as asked.**

Page 3025, line 9: The spectral range of OMI is 270-500 nm (not 380 nm).

**Amended as asked.**

Page 3025, Section 2.1.3: I miss here a discussion on the row anomaly of the OMI instrument and on the filtering of the anomaly in the OMI-TOMS data and the OMI- DOAS data. Is this the same for both algorithms ?

**Amended as asked.**

Page 3026, line 9: The second time the word "than" appears, seems a typo.

**Amended as asked.**

Page 3026: line 13: What is "near-to-real time" ? Is this not just "near-real time" ?

**Amended as asked.**

Page 3030: Line 2: Earlier it was discussed that the Bangkok station forms an outlier in the comparison. Is the Bangkok station still appearing in the data for Figure 2 and later Figures ? This might clearly affect the intercomparisons, especially Figure 3 and 4, but it is no longer discussed in the paper.

**As discussed in line 25, page 3028, the use of the Bangkok station is a common feature for all graphs. I have rephrased this bit to make it clearer.**

Page 3030: I miss a discussion about the error bars shown in Figure 2. It is not mentioned what they represent. Are they changing in time? Why are they so large for a few data points?

**The error bars shown represent the standard deviation of the mean of the daily values which are included in each monthly mean value. They are not constant in time and are larger for fewer data points, as expected. I have added a relevant comment in the text.**

Page 3031, line 9: The word "left" is redundant.

**Amended as asked.**

Page 3031, line 12-13: Why is this same equatorial belt not missing in Figure 1 for GOME-2. What data is shown in Figure 1 around the equator?

**The contours for Figure 1 were created using a 0.2 per annum radius in time and a 30 degrees radius in latitude which means that the data shown around the Equator there are "smoothed" data from the adjoining belts. The choice of the spatiotemporal filtering to create these contour plots was performed for visualization reasons alone. For Figure 3 there was no need to use such a large radius for latitude since there exist enough data for a presentable figure, hence we used a 0.08 per annum radius in time and a 10 degrees radius in latitude. As a result, we see the empty belt for GOME2.**

Page 2031, line 17-19: In the text the whole caption of Figure 4 is repeated. The same kind of repetition is done for several other Figures. I recommend to mention this information only in the captions.

**Amended as asked.**

Page 3031: line 24-26: The description of rows 3 and 4 of the Figure does not match the actual Figure itself.

**Amended as asked.**

Page 3034, line 1: Here, the Dobson stations are chosen for Figure 5. Why ? Because the Dobson stations are only in the NH, the results will be biased to this region.

**The Brewer stations cover on the NH, the Dobsons cover the SH as well, which was why they were chosen for Figure 5.**

Page 3034, line 1: How many data points are used to create Figure 5? I would like to suggest to show a density plot for this Figure.

**For the GOME2-GOME1 comparison, nearly 9000 points where used. For GOME2-OMI, around 33500, for GOME2-OMIDOAS around 33000 and for GOME2-SCIA around 16000. This information was added to the plots.**

Page 3042, last line of the caption: remove "left" Page 3043, last line of the caption: remove "left"

**Amended as asked.**

Page 3044, Figure 4: The Figures are very small in the printer-friendly version of AMTD. Please, make the font size larger. \_\_\_\_\_

**Amended as asked.**