Authors' Response to Short Comment #1

We thank the reviewers for their comments and the time they invested in this thoughtful review. We also appreciate them noting the quality of the literature survey and the innovative approach used to estimate in situ NO_2 vertical columns. We have addressed in detail the reviewers' comments below.

Regarding the reviewers comment, "First, the equation references in the text need updated (e.g. pg 837 line 13, pg 839 line 14), and you need to correct 1_10ˆ17 to 1E10ˆ17 on pg 838 line 13.", the authors have updated the equation references, and corrected the typographical error as follows:

"Boersma et al. (2009) applied Eq. (4) to correct CL NO_2 measurements at 8 cities in Israel (2006) during the OMI overpass time (13:45 LT)."

"The ΔSCD refers to the difference between the average concentration of a trace gas of interest (C) integrated along the average path length (L) traversed by photons prior to entering the spectrometer at elevation angle θ, $(\overline{CL})_\theta$ or SCD_θ, and the corresponding observation at an elevation angle of 90° within a measurement cycle, $(\overline{CL})_{90°}$ or $SCD_{90°}$, defined in Eq. (5) and (6)."

"Hourly averaged geometric NO_2 VCDs were determined by applying the single scattering approximation proposed by Hönninger et al. (2004) to MAX-DOAS NO_2 ΔSCDs. The NO_2 differential AMF (ΔAMF = ΔSCD/VCD) was calculated as shown in Eq. (7)..."

"With respect to NO_2, a retrieved ΔSCD of 1 x 10^{17} molec/cm^2..."

Regarding the reviewers comment, "In this analysis the authors do linear regressions of the data, though the abscissa uncertainty is quite large as seen in Figure 5. Therefore, this should be accounted for in your regression statistics (e.g. perform an orthogonal regression), which may be more beneficial to the reader. Can the authors update their statistics with this additional uncertainty accounted for?", the authors have provided both the linear regression and weighted orthogonal regression results based on using OMI DOMINO version 2.0 and MAX-DOAS NO_2 VCDs, as requested by another reviewer.

The authors have updated their discussion in Section 3.3 as follows:

"Figure 7 (Fig. 5 of the AMTD paper) *shows the linear regression results of OMI (DOMINO version 2.0) versus MAX-DOAS tropospheric NO_2 VCDs. A good agreement is seen between the measurement techniques, which have a Pearson R = 0.80. The slope presented in Fig. 7 derived using linear regression is 0.93 ± 0.11, or if weighted orthogonal distance regression is applied, this slope is 0.74 ± 0.16. These slopes are in agreement when their respective errors are considered, and in both cases the slope is not significantly different from 1. Of the 11 available comparison days, 8 OMI and MAX-DOAS measurements agree when the respective uncertainties of each measurement are considered. These results suggest both measurements represent a similar spatial region."*

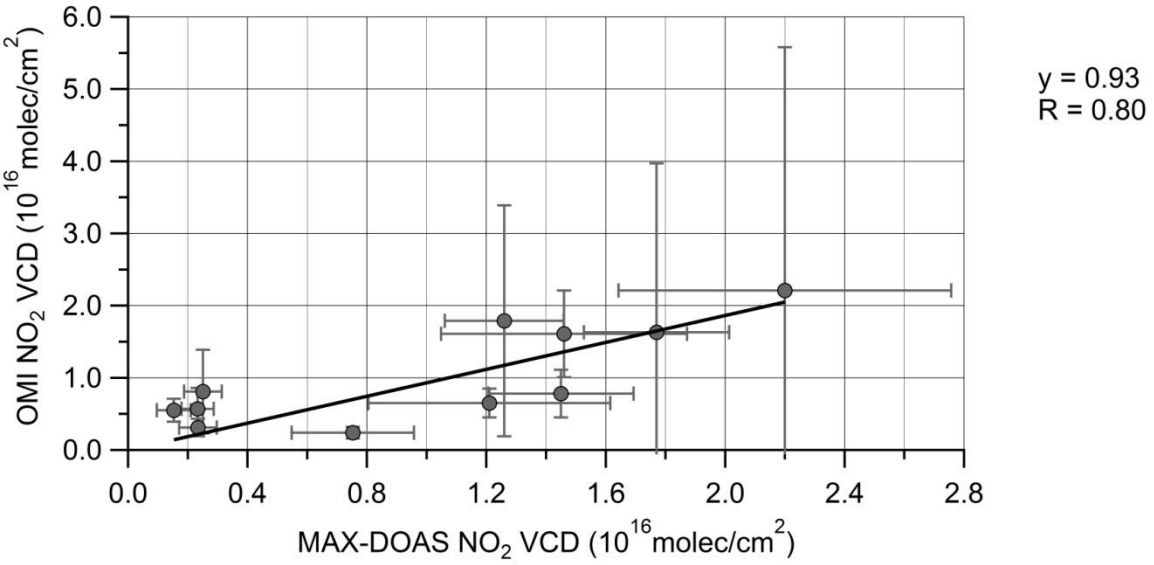

Figure 7. Linear regression of OMI versus MAX-DOAS tropospheric NO_2 VCD (n = 11).