

## ***Interactive comment on “Long term NO<sub>2</sub> measurements in Hong Kong using LED based Long Path Differential Optical Absorption Spectroscopy” by K. L. Chan et al.***

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Responses to comments of Referee #2

Many thanks to the reviewer for the helpful comments. Below we present our response to each of these comments.

1) Comment(s): Regarding the error bars in the NO<sub>2</sub> concentration time series plots (Figs. 8-9), it is stated on Page 6620, lines 14-16 that the error of the LP-DOAS measurements are ignored because it is smaller than 1%. Since monthly and annual means of LP-DOAS NO<sub>2</sub> concentration are shown, it would be also interesting to plot and dis-

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cuss their natural variability (1-sigma standard deviation).

Response: The  $1\sigma$  variability of the LP-DOAS and OMI data of the comparison to the OMI is added to figure 8 as gray regions. However, we did not include the  $1\sigma$  variability of the weekly cycle analysis in figure 9 for the following reasons: NO<sub>2</sub> concentrations have a large natural variability with a strong seasonal dependence. Concentrations are in general higher in winter and lower in summer, due to different meteorology, photolysis rates as well as diurnal variations. This results on average in large standard deviations (about 40% of the values), but they are more or less constant throughout the week (see figure attached), so we decided not to show the variability on the plot.

2) Comment(s): Page 6619, line 14: Is there a reference for the DOASIS software? If not, please include a short description of it.

Response: A reference and a web link of the software DOASIS are added on page 4, lines 82-83 of the revised manuscript.

3) Comment(s): Pages 6626 and 6627: Regarding the discrepancy between OMI and LP-DOAS NO<sub>2</sub> concentrations, it would be useful to make a sensitivity study using different NO<sub>2</sub> vertical profiles for the conversion of the OMI tropospheric columns to ground level concentrations and investigate the impact on the agreement between OMI and LP-DOAS.

Response: We compared different NO<sub>2</sub> vertical profiles in different seasons and found about 10% lower conversion factor in winter (December, January and February) and about 15% higher conversion factor in summer (June, July and August), which are within the errors of OMI measurements. However, using the OMI a-priori profile for conversion would results a 53% lower conversion factor. The different could be explained by the fact that the OMI a-priori profile is from 1996 and the NO<sub>x</sub> emission over China nearly doubled from 2000 to 2006. Thus, the profile shape might change significantly and affect the conversion. The discussion is now added on page 14, lines 263-275 of the revised manuscript.

4) Comment(s): Page 6620, line 14: measurment -> measurement, Page 6626, line 7: 50vkm -> 50 km

Response: Three spelling mistakes have been corrected on page 6620, line 14, page 6627, line 22 and page 6626, line 7 of the discussion paper.

Please also note the supplement to this comment:

<http://www.atmos-meas-tech-discuss.net/4/C2810/2012/amtd-4-C2810-2012-supplement.pdf>

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 6615, 2011.

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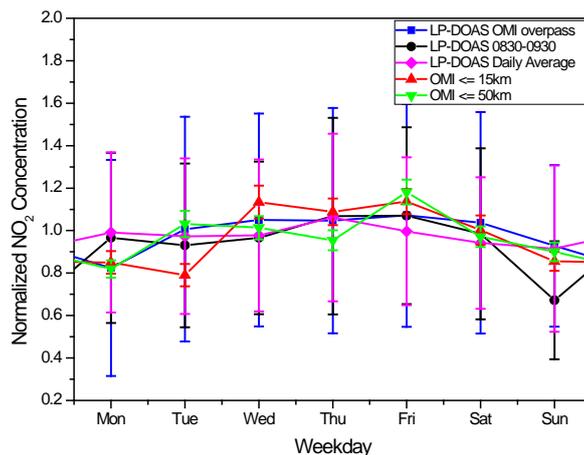


Fig 1: Mean weekly cycle of  $\text{NO}_2$  measured by LP-DOAS, OMI and EPD. LP-DOAS data are temporal averages around OMI overpass time (blue curve), around the morning rush hour (black curve) and daily averages (magenta curves), OMI data are spatial averages within 15 km (red curve) and 50 km (green curve). The error bars of the LP-DOAS data indicate the 1 sigma variability of the LP-DOAS  $\text{NO}_2$  measurements, while the error bars of the OMI data represent the 1 sigma uncertainties of the OMI measurements.

Fig. 1.

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