Atmos. Chem. Phys. Discuss., 8, S5150–S5153, 2008
www.atmos-chem-phys-discuss.net/8/S5150/2008/


Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Validation of OMI tropospheric $NO_2$ column data usingMAX-DOAS measurements deep inside the North China Plain in June 2006" *by* H. Irie et al.

**H. Irie et al.**

Received and published: 22 July 2008

We thank the reviewer very much for reading our paper carefully and giving us valuable comments. Detailed responses to the comments are given below.

*Comment 1: Like reviewer 1, I also feel that the question of often referring to other papers without including the key information in the manuscript needs to be addressed. An explanation of the methods used will improve the manuscript.*

Reply: Following the reviewer's comment, we have added more descriptions about our methods (details of our radiative transfer model and vertical profile retrieval) in Section 2.1.

*Comment 2: The authors use measurements of NO2 from a chemiluminescence detector with a molybdenum converter to validate their MAX-DOAS NO2 VMRs, however, these types of instrument are also sensitive to interferences from NOy species which may result in an overestimation of the in situ concentrations. This needs to be addressed in the manuscript.*

Reply: We are worried that the reviewer had misunderstood the technique used for in-situ NO2 measurements. It is the chemiluminescence technique, but a LED-based photolytic converter was used to convert NO2 to NO selectively. Thus, we were able to determine NO2 concentration without a molybdenum converter. A molybdenum converter was used only for NOy measurements. Although we do not think that significant interferences have occurred even for our NOy measurements, statements about NOy measurements have been deleted to avoid readers' confusion.

*Comment 3: P8247, L3-4: This sentence is unclear. It reads as though only one 6-min zenith-sky measurement is made every 30 minutes, however, as a mirror was periodically inserted into the FOV of each telescope there should be five zenith spectrums, one for each viewing angle. The authors should clarify this.*

Reply: This sentence has been revised to "For each telescope, a 6-min zenith-sky measurement was made every 30 min."

*Comment 4: P8250-8251, Section 2.3: Please include a discussion of errors in the OMI retrieval of tropospheric NO2 columns.*

Reply: We have added a discussion of errors in OMI NO2.

*Comment 5: P8253, L14: The authors state that the mean MAX-DOAS VMRs at an altitude of 1626$\pm$500m a.s.l. have been used to compare against the in situ measurements, but it is not clear how they obtain this value. This should be clarified here.*

Reply: In the MAX-DOAS vertical profile retrieval, a VMR profile is represented with a vertical spacing of 1 km. The surface elevation for Tai'an is 126 m, so that the second



**ACPD**

8, S5150–S5153, 2008

1-km layer from the surface is between 1126 and 2126 m. This sentence has been revised to "The data plotted are the mean NO2 VMRs at 1-2 km above the surface (1626+/-500 m a.s.l.; Tai'an is at 126 m a.s.l.) for MAX-DOAS measurements ...) "

*Comment 6: P8253, L22-26: This sentence should be re-phrased and the interference from other nitrogen species to the in situ measurements should be addressed.*

Reply: As mentioned above, we do not think that significant interferences have occurred, because a LED-based photolytic converter was used for in situ NO2 measurements.

*Comment 7: P8255, L5-7: The authors state that they use a daily mean OMI tropospheric NO2 column to compare to the MAX-DOAS measurements. Previously, in the manuscript, OMI is said to only overpass once per day, therefore, the measurement cannot be representative as a daily mean. This sentence should be re-phrased.*

Reply: Done.

*Comment 8: In the comparison, are the MAX-DOAS NO2 columns daily means, or the closest coincidence in time? The authors should also state what altitude range they are using here for the comparison. Is it the total MAX-DOAS NO2 column?*

Reply: In Section 3.3 of the revised manuscript, we now state that "... is plotted together with MAX-DOAS tropospheric NO2 column data. MAX-DAS values were obtained by interpolating two values measured within 30 minutes before and after OMI measurements were made."

*Comment 9: P8255, L12-13: I suggest that the authors include the correlation coefficient here.*

Reply: Including the correlation coefficient for the coincident criterion of 0.3 degrees might be a good idea, but we afraid that the correlation coefficient (R = 0.12) is too low to discuss. On the other hand, we think that the correlation coefficient for 0.1 degrees (R = 0.98) is too high, presumably because the number of data available is small. So,



**ACPD**

8, S5150–S5153, 2008



we have decided not to make revision for this to avoid readers8217; confusion.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 8243, 2008.



**ACPD**

8, S5150–S5153, 2008

Interactive Comment