

Interactive comment on “Observations of SO₂ and NO₂ by mobile DOAS in the Guangzhou Eastern Area during the Asian Games 2010” by F. C. Wu et al.

Anonymous Referee #3

Received and published: 16 April 2013

The manuscript titled “Observations of SO₂ and NO₂ by mobile DOAS in the Guangzhou Eastern Area during the Asian Games 2010” by Wu et al., presents mobile DOAS and MAX-DOAS observations of NO₂ and SO₂ during the Asian Games and Asian Paralympics Games in November – December 2010 in the Guangzhou Eastern Area, China. This manuscript outlines application of passive DOAS measurement techniques for pollution fluxes estimates during the Asian Games 2010. The scope of the paper is appropriate for AMT.

I recommend publication of this article after authors address points outlined below.

1. Specific comments

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As mobile DOAS instrument is introduced here for the first time, much more detailed description of the instrumental setup and data analysis is needed, specifically:

What is aperture of the instrument?

What is the length of the optical fiber?

Explain what does “stable temperature” mean?

Was detector cooled, and to what temperature?

What is the power source for the instrument?

What are the best and nominal detection limits?

Spectral retrieval:

Were trace gas references convoluted using instrumental function?

For SO₂ retrieval – HCHO absorptions are also present in the 310–324 nm range, why HCHO absorption cross section was not included in the retrieval? Similarly, for NO₂ retrieval – HONO and HCHO absorptions are also present in the evaluation range, why these absorption cross sections were not included in the retrieval?

Radiative Transfer Calculations:

How are aerosol parameters used for mobile DOAS data differ from ones used for OMI?

Were sensitivity studies performed?

Other comments/suggestions:

In my opinion it is insufficient to report daily averaged values for SO₂ and NO₂. NO₂ has a very strong diurnal cycle. In my opinion, discussion on photochemical production of NO₂ is recommended.

I recommend expanding Figure 4 to show measured SO₂ and NO₂ VCDs along tran-

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sects as well as daily averages. Combine Figures 4 and 5. Present the data by date and time of day, not spectrum number.

P 266, paragraph 2: Indicate light path length and viewing direction for the LP-DOAS instrument.

P 267, paragraph 2: Indicate viewing direction of the MAX-DOAS instrument.

P 270, section 2.4.2: Discussion errors for the emissions calculations are missing.

P 275, paragraph 1: can you compare your estimates with the emissions inventories?

Figure 1 – please display viewing directions for MAX-DOAS and LP-DOAS instruments. Include scales for the maps.

Figure 6 is impossible to read, please enlarge.

Figure 8 – what is the time of day for the shown NO₂ VCD?

Figure 13 – consider plotting NO₂ and SO₂ emissions on different scales. Mark Phase 1 through Phase 5 on the figure.

Figures 14 and 16 – consider reducing number of trajectories shown and combining the two figures.

2. Technical corrections:

Expand the Introduction with NO_x – O₃ interactions.

P 263, line 29 and P 275, line 23: replace “transportation” with “transport”.

P 264, line 7: replace “models” with “modeling efforts” or “modeling studies”.

P 264, line 9: insert “;” between “(Wang et al., 2008)” and “or used bottom-up approach”

P 265, line 7: replaced “MAX-DOAS data at a fixed location” with “data from stationary MAX-DOAS”.

P 266, line 13: replace “sunlight that enters the spectrometer through an optical fiber”

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with “sunlight which is sent to the spectrometer by an optical fiber”.

P 267, lines 8-10: consider rewriting this sentence. For example: “MAX-DOAS telescope is equipped with a stepper motor, therefore allowing for pointing at different elevation viewing angles. During our measurements, scattered sunlight was collected sequentially from 5, 10, 20, 30, and 90 degrees elevation viewing angles.

P 275, line 25: replace “hosed” with “hosted”.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 261, 2013.