Atmos. Chem. Phys. Discuss., 8, S8751–S8753, 2008 www.atmos-chem-phys-discuss.net/8/S8751/2008/ © Author(s) 2008. This work is distributed under the Creative Commons Attribute 3.0 License.



ACPD

8, S8751–S8753, 2008

Interactive Comment

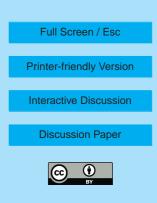
# Interactive comment on "Investigation of $NO_x$ emissions and $NO_x$ -related chemistry in East Asia using CMAQ-predicted and GOME-derived $NO_2$ columns" by K. M. Han et al.

### Anonymous Referee #1

Received and published: 4 November 2008

MS-NR: acpd-2008-0425 Title: Investigation of NOx emissions and NOx-related chemistry in East Asia using CMAQ-predicted and GOME-derived NO2 columns Authors: K. Han, C. Song, H. Ahn, C. Lee, A. Richter, J. Burrows, J. Kim, J. Woo, and J. Hong

This paper shows a kind of comparison of the GOME column NO2 and CMAQ column NO2 by using three different emission inventories (ACE-Asia, REAS and CAPSS), and then discuss the reason of systematic differences which did not explain yet. They focus the NOx-HOx-Isoprene chemistry and suggest the over-estimation of biogenic isoprene emission. This paper is well written and reaches the level of ACP paper criteria. I would like to recommend that this paper could be published only if the following critical



comments are clarified.

#### **Critical Comments**

Their major conclusion seems as follows: (1) China NOx bottom-up emission inventory is under-estimated at least 50%, and must be intensified. However, for summer time, GOME-NO2 and CMAQ-NO2 shows reasonable good agreement, but this is coming from the biogenic VOC (e.g. ISOP) over-estimation (causing the NO2 lifetime slower by HOx-NOx chain). (2) Soil NOx must be included especially summertime, (3) Korean NOx bottom-up emission inventory is over-estimated in ACE-Asia and REAS and must be replaced by CAPSS. Their finding seems consistent, however, I want to stress that their conclusions are all based on assumptions. I would like to strongly suggest that the authors must make a sensitivity study by including Soil NOx emission, by adjusting the biogenic VOC emission (say half), and China anthropogenic NOx emission (original and twice condition cases) for summer time simulation, and examine how the results are changed by this modification. This is a kind of key issue in order to accept the publication.

#### **General Comments**

The authors must refer the model intercomparison study by van Noiji et al (2006; Atmos. Chem. Phys., 6, 2943–2979). They compared a lot of global chemical transport models and also found that the China emission is under-estimated very much. I would like to suggest checking the biogenic VOC emission inventory used in that model inter-comparison may make the similar conclusions which the authors found.

**Minor Comments** 

p. 17309 line 17; North (A) must be North China (A)

p. 17313 line 17-23; CMAQ model is flexible for the choice of gas-chemistry and aerosol formation modules. The statement of "MONO-TERP" species

8, S8751–S8753, 2008

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

**Discussion Paper** 



in the version of CMAQ 4.3 seems miss-understanding to the reader, this is depend on the choice of CMAQ option by user.

p. 17318 lines 15-18; It would be very useful to include reason (or contribution of which sectors) of under-estimation of ACE-Asia and REAS inventory.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 17297, 2008.

## ACPD

8, S8751–S8753, 2008

Interactive Comment

Full Screen / Esc

**Printer-friendly Version** 

Interactive Discussion

**Discussion Paper** 

