

Interactive comment on “Investigation of NO_x emissions and NO_x-related chemistry in East Asia using CMAQ-predicted and GOME-derived NO₂ columns” by K. M. Han et al.

Anonymous Referee #1

Received and published: 4 November 2008

MS-NR: acpd-2008-0425 Title: Investigation of NO_x emissions and NO_x-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 NO_x-HO_x-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

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comments are clarified.

Critical Comments

Their major conclusion seems as follows: (1) China NO_x 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 HO_x-NO_x chain). (2) Soil NO_x must be included especially summertime, (3) Korean NO_x 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 NO_x emission, by adjusting the biogenic VOC emission (say half), and China anthropogenic NO_x 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

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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.

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