General Comment:

In this paper, intercomparison study among the three different CTMs, participants in MICS-Asia III, is introduced for O_3 and NOx, using observed data in Tokyo and Beijing. As the reasons for the differences among predicted concentrations, chemical mechanism, heterogeneous renoxification reaction and vertical downward flux are highlighted in the discussion.

The manuscript is generally well written about the differences among predicted concentrations. However, more quantitative discussion based on a statistics analysis is recommended, because it seems that model intercomparison is the main purpose of this paper. In addition, more detailed information about observation and model's differences is necessary.

Specific Comments:

L65:

What is the difference between "mixing ratios of surface ozone" and "concentration of ozone" ? Both of "mixing ratio" and "concentration" are mixed in the manuscript.

L79-82:

Why the vertical structures are different among the three models, nevertheless the meteorological fields were derived from the same WRF output?

L87-88:

It is introduced that every model adopted MIX. However, the predicted O_3 seems to be affected if the ratio of NO/NO_2 in NOx emission and the speciation of VOCs emission were not unified in the model-ready emission input.

L91:

What is the reason for using two global models for the intercomparison study?

L105:

I guess CMAQv4.7.1 does not include AERO6. It may be up to AERO5.

L115-116:

Only monthly averaged diurnal variations are introduced for a model evaluation. A table of statistics for hourly comparison (including mean observation, mean simulation, normalized mean bias, correlation coefficient in different season and whole observation period) seems to be necessary, and the discussion should be more quantitative because model intercomparison is the main purpose of this paper.

L139-140:

More details about the observation conducted by IAP are necessary (e.g. monitoring equipment, height of IAP tower and its location).

L158-159:
Since information about the location of each site in Beijing are not introduced, it cannot be determined that the predicted results can be compared with the observation or not.

L237:
What is the definition of "net chemical production of O_3"? How did you calculate it? If it is just the difference from the concentration in the previous time, I guess transported O_3 is also included in the net chemical production.

L321:
Is "process analysis" also used for the calculation of "net chemical production of O_3"?

L322:
It is recommend to prove "the horizontal transport has been found to be nearly the same for the three models" in this manuscript.

L333:
I am afraid, but the discussion is unclear about a reason why only CMAQv5.0.2 reproduced largest downward fluxes of O_3.

L349-350:
Why could you conclude that "the difference in the model performance must be ascribed to the difference in transport processes"? Sorry, but discussion is unclear on it.

Fig. 2 (a):
Please modify "Mixing Raio" to "Mixing Ratio".

Fig. 5 (b):
Please modify "ppb/hr" to "ppbv/hr".

Fig. 7&8:
What is the difference between "mixing ratio" and "concentration"?