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Interactive comment on “Regional-scale modeling of near-ground ozone in the Central East China, source attributions and an assessment of outflow to East Asia – The role of regional-scale transport during MTX2006” by J. Li et al.

Anonymous Referee #2

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This is an interesting paper which attempts to identify the origin of O₃ in East Asia using a technique in which O₃ in various provinces in eastern China and East Asia are tagged. The results do lend insight into the relative contributions of different regions to observed O₃ concentrations. Some of the observations that are presented to evaluate the model calculations have not been published previously and give valuable insight into the concentrations of O₃, CO, NO_x and BC at mountain sites in eastern China.

The paper uses the O₃ tagging technique (described in Wang et al., JGR, 1998 and Sudo and Akimoto, JGR, 2007) in which the intercontinental transport of O₃ produced

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in the boundary layer and free troposphere over continental regions is individually tracked. This technique counts O₃ that is produced in the boundary layer of country A from emissions from country A as O_{3A}. However, it also counts O₃ that is produced in the boundary layer of country A from emissions transported across the border from country B (ex. PAN and CO with lifetimes sufficient to be transported long distances) as O_{3A}. It does not count O₃ produced from emissions from country A after they leave country A as O_{3A} but rather assigns the O₃ produced in the other region to the other region.

In the earlier applications of the technique, the errors introduced by this approach are smaller than they are here because the distances between regions is larger. For example the distance between East Asia and North America is thousands of miles. However, the distance between the various regions here within eastern China can be tiny as many regions border each other directly. Eastern China itself is divided into nine regions with the rest of China divided into six regions and Korea, Japan each being separate regions. I am concerned that as a result the O₃ that is represented here as SSD (southern Shandong province), for example, actually includes O₃ formed from emissions from the surrounding regions and does not fully include the O₃ formed from the emissions from SSD itself. At present there is no discussion of the shortcomings of the tagging approach in the paper although the authors do mention the shortcomings of the sensitivity approach. At minimum, the implications and uncertainties associated with the tagging technique should be discussed in the paper. It would be helpful as well, space permitting, to compare the results of a single regions tagged O₃ values with those of a sensitivity run (say 20% reduction of O₃ precursors from SSD then multiplied by 5 to estimate the total contribution of SSD emissions to O₃ in the region and compare with the tagged SSD values).

The paper would benefit from careful editing by someone experienced with English grammar as in many places the intended meaning is difficult to surmise.

Detailed comments:

The legends and labels for the contours in the figures need to be larger to be legible.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 8, 13159, 2008.

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