

## ***Interactive comment on “Mechanisms controlling surface ozone over East Asia: a multiscale study coupling regional and global chemical transport models” by M. Lin et al.***

**O. Cooper (Editor)**

Owen.R.Cooper@noaa.gov

Received and published: 2 February 2009

Referee #1 could not submit his/her comments on-line so the Editor has posted them here. Please respond to these comments in the same manner as those from Referee #2 and the Editor.

This paper addresses the application of CMAQ to simulate ozone in East Asia. The paper title suggests that the focus is on the mechanisms controlling surface ozone in East Asia. However, as written the paper is focused on the sensitivity of CMAQ predictions to the various model settings. These sensitivities provide valuable information about ozone prediction in East Asia, but the results as presented and discussed do not

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provide insights or new information about mechanisms of ozone production. I suggest that the paper title reflect the prediction aspects. With such a focus I think it is a good contribution. If the focus is to remain on mechanisms, then I feel much more work is needed before publications.

In this paper the CMAQ model is driven by MM5 and with boundary conditions from the global model MOZART. This is a contemporary model set-up, and there are not many results presented yet for East Asia. The sensitivities studied include: model resolution; chemical module, and treatment of boundary conditions. These are important issues, as regional scale air quality modeling of ozone is of growing importance in East Asia, and many groups are beginning to build programs. They are making decisions about what models, what resolution and what research needs to be conducted to improve model performance for East Asia applications. The sensitivity results presented will be of interest to many and helpful in designing research plans.

The results presented are well documented and discussed. They include many of the most important components. Another important component not discussed in sufficient detail is dry deposition. There have been some studies of this in the east Asia context in the MICS-Asia papers.

Below are a few specific comments: 1) Focus on 2001 and comparison with 2001 data is good. The inclusion of data from other years is generally not relevant and does not add much to the discussion. 2) The discussion around the chemical mechanism results is generally good, and includes the issue related to the emissions inventory. The discussion also includes PAN. The generalization to CBiv is better for this problem (regional ozone) and SAPRAC for another, is not defensible. We need to know that there are differences, but we ultimately need to know which one is right or wrong for the right reasons. Since the simulation is 2001, they can compare their results to TRACE\_P aircraft data, which should provide some insights into how the predictions of PAN and other relevant species (OH, HO<sub>2</sub>, formaldehyde) compare.

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