

Interactive comment on “Quantifying pollution inflow and outflow over East Asia through coupling regional and global models” by M. Lin et al.

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The overall contents are well presented. The author has demonstrated the advantages of using finer resolution models (i.e., WRF-CMAQ) on the issue of long-range transport studies. However, a few places may need some touch ups and improvements.

1) The title of the paper “Quantifying pollution inflow and outflow over East Asia through coupling regional and global models” may not represent well the contents of the paper. I realized that the author has coupled MOZARD with CMAQ (using MOZARD as the boundary conditions for CMAQ) to study the inflow and outflow over East Asia. However, the major focus of the paper have been on the advantages of WRF-CMAQ over

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MOZARD for the March episode along with the Asia outflow results from those simulations. Very little or near nothing on the discussion of the coupled model. The “coupling term” has seems mislead to the audience.

2) Pg. 129, line 15. The argument of “O₃ production tends to be in the NO_x-limited regime in MOZART” is wrong. The author has used the reason “Total emissions of NO_x are 15% lower in MOZART, which leads to a relatively higher VOC/NO_x ratio in the global model.” Although NO_x is 15% lower, however, that does not translated to “NO_x limited regime in MOZART”. According to the Table 1, the calculated VOC/NO_x ratios in both MOZART and CMAQ are similar. It should be noted that most of East Asia studies have shown the East Asia is more VOC limited. Therefore, such writing is confusing. Unless, the author has more data or analyzes to support such argument. Otherwise, this writing is not justified.

3) Figure 7 at Pg. 150. It is unreasonable to use 20% perturbation with a factor of 5 to represent a full impact from Europe to East Asia since the nature of non-linearity in O₃ chemistry. Some researchers (Wu et al. and Akimoto et al. . . Can't remember which year) have shown the O₃ remained in linear relationship when 20% to 35% foreign reduction (i.e., NO_x) is imposed. I believed that the linear relationship between O₃ and NO_x will not maintain when 100% of European emissions reduction is used. If the author want to continue to use the factor of 5 as the 100% of EU enhancement to East Asia, he/she should first demonstrate such technique is a good approximation or able o find some papers to support his/her argument. If the author can not prove that, this approximation should not be accepted since it is not scientifically sound. Therefore, this result could most likely be a wrong representation of the output result and may lead to over exaggerate the contribution of European enhancement to East Asia.

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