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Comment

Interactive comment on “Transpacific transport of Benzo[a]pyrene emitted from Asia: importance of warm conveyor belt and interannual variations” by Y. Zhang et al.

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We thank Dr. Galarneau for the valuable comments.

We agree that it's complex to numerical model reactive compounds such as BaP. Due to the scarcity of monitoring data, not only spatially but also temporally, especially the lack of long time measurements with high temporal resolution, it's hard to constrain the BaP model in this study. Here we compare our model results with 6 sites located at the both sides of the Pacific Ocean, with only 2 at the North America (CPO and MBO). The correlation coefficients are much lower for these two sites for at least two reasons:

1. The influence of local emissions. As only Asian emissions are included in the model,

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so the model results are not necessarily the same with the observations. The discrepancy between the model and observation at these two sites are also largely contributed by the local PAH emissions over North America. On the other hand, when the model shows the Asian source dominates (e.g. May 2002 at CPO), the model resembles extremely well the observations ($r=0.98$). Actually, this high correlation coefficient gives us the largest confidence that our model can well capture the episodic transpacific transport of BaP.

2. The local terrain at CPO and MBO. Both the CPO and MBO sites are mountain sites with elevations of 480 m and 2700 m above sea level, respectively. A coarse global model with a resolution of 1x1 can barely resolve the local flow pattern associated with the complex terrain, especially over the MBO site (which is higher). However, as the lack of other more representative (e.g. with less heterogeneity in vicinity) monitoring results in North America, the comparison with this site is still adopted to give readers a general taste of how the model behave at complex terrains.

Therefore, as a paper focusing on the large scale influence of Asian BaP emissions on North America, it's acceptable to use this model for the later calculations and discussions even though it generally fails when local emission and small-scale circulation dominate. To emphasize this point, the last sentence of the 1st paragraph in page 10 is modified as "Nevertheless, the overall agreement between the model and the observations at CPO when Asian source dominates provides an acceptable validation of the model when it is used to quantitatively assess the large scale transpacific transport of PAHs emitted from Asia".

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