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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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This discussion paper clearly states its goal “to simulate transpacific transport of benzo[a]pyrene emitted from Asia”. Estimated Asian BaP emissions are used to drive a numerical model (Can-METOP) to examine the hypothesis that trans-Pacific transport contributes to BaP concentrations in western North America.

Numerical modelling of reactive compounds such as BaP is complex. The validity of such modelling is normally verified by comparing model output to measurements within the model’s spatiotemporal domain. If the model does not adequately represent measured concentrations, it has not passed a test necessary to its use as a valid

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analysis tool.

PAHs are difficult to measure in the atmosphere in comparison to criteria air contaminants. Due to the resulting expense, PAH measurements tend to be sparsely distributed in both space and time. This discussion paper compares model output to measurements at six locations, of which only two are potential receptors for trans-Pacific transport from Asia.

The model performance is middling at the four sites on the Asian side of the Pacific. Reported correlation coefficients ( $r$ ) between modelled and measured values range from 0.37 to 0.80 for three of the latter sites and no value is reported for the fourth. At the two potential receptor sites in North America, measured concentrations are not well-simulated by the model as evidenced by extremely poor correlation coefficients ( $r = 0.03$  and  $0.09$ ).

In section 2.4, the authors note the poor performance of the model at the trans-Pacific receptor sites but go on to state, "Nevertheless, the overall agreement between the model and the observations provides a good insight into the validation of the model when it is used to quantitatively assess the transpacific transport of PAHs emitted from Asia."

The latter statement is not supported by the data presented in the paper, especially when considering the sites outside the Asian source region. The modelled and measured concentrations in the trans-Pacific transport receptor region do not agree, demonstrating a lack of model skill in predicting concentrations after long-range transport. As a result, the model has not passed the most basic of tests necessary to validate its use as a tool for examining the potential trans-Pacific transport of BaP from Asian sources.

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