

Interactive comment on “Evaluating wildfire emissions projection methods in comparisons of simulated and observed air quality” by Uma Shankar et al.

Anonymous Referee #3

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The manuscript discussed the model evaluation of wildfire emissions air quality estimates with observations and compared two different approaches with traditionally used NEI emissions inventory in the PGM modeling. The manuscript is in the scope of the ACP. The novelty of this manuscript is evaluating the dynamical and statistical down scaling approaches that estimates the wild fire emissions. However the manuscript need to address few major comments and strengthen their findings with some more clarifications. Should also consider reorganizing the results such that it is easy for the reader to follow and understand.

Major Comments:

C1

1) The author used dynamical and statistical approaches to estimate wildfire emissions, a brief discussion of how these wildfire emissions vary when compared to NEI will be useful to understand the differences in the emissions among three approaches. Comment on the uncertainty in wildfire emissions estimates from all three approaches. 2) It is important to mention how the dynamical and statistical meteorological variables performed when compared with meteorological observations. Discussing this is critical to understand the uncertainties/differences among these two approaches. 3) Some of the information presented is irrelevant to the manuscript key focus, so worth moving them to supplementary doc or removing them (mentioned in specific comments)

Specific Comments:

Pg 1 Line 30: How does these compensating errors differ among these three approaches? Or were they same among all three approaches? Include a brief comment.

Pg 3 Lines 8 -22: This paragraph can be trimmed as the main focus of this study is wild fire emissions model performance evaluation. It is not necessary to explain the approach used in Prestemon et al., 2016 here again.

Pg 3 Line 32: Specify the meteorological variables explicitly here to educate the reader what variables are considered to calculate AAB estimates.

Pg 4 Line 20: Based on the small differences seen between the approaches in the results can the authors comment or tie these differences to the methodology used to estimate wild fire emissions in the three approaches.

Pg 4 Line 30: Looks like the authors used old version of CMAQ model. With the latest updates in recent versions does any of these results or model predictions change significantly? Can the authors include one or two sentences about that here.

Pg 5 Line 5: The manuscript did not provide the spatial plots of the emission totals from these three approaches, including spatial plots will help readers understand how these three emission inventories differ spatially in the modeling domain.

C2

Pg 7 Line 13 and 14: The authors mentioned that they made several updates to the tool since the initial distribution. Are there any significant updates that the modeling community should know? If so please specify them here.

Pg 7 Line 30: The authors used Boylan and Russell (2006) performance goals and criteria, but did not consider recent Emery et al., 2017 performance criteria and goals, is there any specific reason? It is important to compare with most recent criteria, update the manuscript to include Emery et al., 2017 criteria and goals.

Pg 8 Line 4: Since Fig 2 is not showing any differences between three approaches, suggest moving it to supplementary information.

Pg 8 Line 30: Why these four sites had some of the largest differences, explain it here.

Pg 10 Line 12: Explain it here why there is better agreement between dynamical and NEI than statistical and NEI.

Pg 14 Line 18: Discuss why the errors and bias for OC are comparably high at rural sites than urban sites.

Pg 19 Line 29: Can larger AAB estimates in statistical approach be considered as one of the uncertainty/limitation with this approach?

Pg 20 Line 27: The authors did not clearly point out superior candidate for estimating wild fire emissions but it is worth commenting on it.

Table 2 and 3 : Better to include even NEI benchmark results in the tables

Figure 3, 4, 8,9 : The statistical metrics box font should be increased, not clearly visible.

Figure 8, 9: Explicitly mention what top, middle, bottom panels refer to.

References:

Emery, C., Liu, Z., Russell, A. G., Odman, M. T., Yarwood, G., & Kumar, N. (2017). Recommendations on statistics and benchmarks to assess photochemical model per-

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formance. *Journal of the Air & Waste Management Association*, 67(5), 582-598.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2018-1296>, 2019.

C4