

# ***Interactive comment on “A new method (M<sup>3</sup>Fusion-v1) for combining observations and multiple model output for an improved estimate of the global surface ozone distribution” by Kai-Lan Chang et al.***

## **Anonymous Referee #1**

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This manuscript presents a new statistical method for combining observations of surface ozone with model outputs. The manuscript is clearly written and the method is well described. The fused data set represents a significant output that could be useful to analyze the relevance of ozone to health impacts.

The manuscript is nearly ready for publication, but I have several questions and editorial suggestions for the authors, listed below.

1. I suggest to combine Section 2.2 and Section 2.3 into one. Section 2.3 describes the

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implementation details but ends up repeating concepts already described in Section 2.2, resulting in poor readability.

2. To create the interpolated field from ozone observations the authors used a Bayesian approach that allows for the quantification of the uncertainty in the gap-filled product.

2.1. Can the authors comment on why they choose not to account for the sampling uncertainty, even though it could be easily estimated from the posterior?

2.2 For example, creating an ensemble of weights (and therefore an ensemble of fused data sets) could be used to explore the impact of poor observational sampling on the fused data set compared to the multi-model mean.

3. In order to compare both the interpolated observations and each models, and the multi-model mean with the fused dataset, I suggest to also plot the empirical variograms, to quantify the differences in the spatial structure.

4. Line 27, page 6: cite the R core development team.

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Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2018-183>, 2018.

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