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Comment on amt-2021-64

Anonymous Referee #1

Referee comment on "Estimation of PM_{2.5} concentration in China using linear hybrid machine learning model" by Zhihao Song et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-64-RC1>, 2021

The submitted article develops a method to estimate PM_{2.5} values over China using a linear combination of three machine learning model. The innovative of this approach is the method to have an ensemble PM_{2.5} data from multiple machine learning model outputs. The research method is solid, and the results are convincing. However, there are several caveats in the paper:

- The background of the research does not cover all of the most recent machine learning produced PM_{2.5} products over China and provide convincing reason of why this approach is superior to the rest products. The big advantage of using AHI is the high temporal data (sub-hourly), however, the results section does not reflect this advantage.
- The most contribution of this study is the linear hybrid ML model. However, the paper does not explain details of this procedure. For example, why using linear combination, and how are the coefficients are determined? Instead of a simple regression, complexed error evaluations of individual ML PM_{2.5} data may provide insights on a better way of combining these model outputs.
- The parameter impotency is listed but no further explanation of parameter selection is mentioned.
- Bias analysis as functions of other influence factors is needed to better understand the uncertainties in PM_{2.5} product.