

Comment on essd-2022-110

Anonymous Referee #2

Referee comment on "Reconstructing 6-hourly PM_{2.5} datasets from 1960 to 2020 in China" by Junting Zhong et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-110-RC2>, 2022

This manuscript reconstructed site-based and gridded PM_{2.5} datasets at six-hour intervals from 1960 to 2020 using visibility, traditional meteorological factors, and other variables based on machine learning methods. These two datasets' quality was well evaluated using 10-fold CV, by-year CV, spatial CV, and independent validation and compared with other available datasets. It shows that the two PM_{2.5} datasets are more advantageous in long-term records and high temporal resolution, which would be of great value for evaluating long-term variations, radiative effects, and health impacts of PM_{2.5} in China. I suggest that this manuscript be published after addressing the following issues:

- There have been studies on the hourly PM₅ estimations based on AOD data from geostationary satellites, such as Himawari 8. However, it needs to be acknowledged that AOD from geostationary satellites is only available during the daytime and the sequence time is relatively short. I suggest adding related studies and pointing out their strengths and weaknesses in the Introduction Section. Also, relationships between PM_{2.5} and visibility together with other meteorological variables have been widely documented in previous studies but lacking in this manuscript, it's better to add relevant studies to make the content of this section more complete.
- It is mentioned in the manuscript that extracting spatial features can significantly improve the prediction accuracy of the model, but this is not verified in the manuscript. Adding some sensitivity experiments by setting two groups with/without extracted features will serve to demonstrate their impacts.
- In Section 3.3., the authors found the large biases among different public available PM₅ datasets and proposed to apply ensemble average to multi-datasets. I'm curious about whether the authors consider the specific approach to fusing different PM_{2.5} datasets and how to evaluate the accuracy of the fused dataset.
- The authors specify the spatial resolution of the input data for constructing grid points in the text, and the current grid resolution is 0.25°. Is it possible to further improve the resolution while ensuring accuracy?
- What is the duration for the hourly meteorological records mentioned in the manuscript (L139)? Did they start in 1960 or in recent years? Please point it out.
- Are the CV results in Fig. 2 hourly, 6-hourly, or daily? It's better to point out the time resolution in the title of Fig. 2.
- L423: The word "The" in "For by-year CV, The..." should be lowercase.
- L416: The verb be in "The site-based PM_{2.5} dataset are in the CSV format, and the

gridded dataset PM2.5 are..." should be singular.