Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-273

Anonymous Referee #1

Referee comment on "Continuous mapping of fine particulate matter ($PM_{2.5}$) air quality in East Asia at daily 6□ × □6□km^2 resolution by application of a random forest algorithm to 2011–2019 GOCI geostationary satellite data" by Drew C. Pendergrass et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-273-RC1, 2021

The authors try to create continuous daily PM maps from the GOCI satellite in East Ais. They only applied the well-known RF model, and I didn't see much innovation and surprise in terms of method or conclusions. In addition, we did not see any discussion and validation in AOD gap filling, which significantly reduced the reliability of follow-up work. The authors also ignored many key factors in modeling. Below are my comments and hope they are useful for improving the paper.

Specific comments:

Introduction:

Random forest is a well-known and widely used machine learning model. Please summarize the related studies on PM2.5 predictions using the RF model.

Also, the authors are suggested to summarize recent studies on PM2.5 estimates from different geostationary satellites (e.g., GOCI, Himawari-8) since you focus on East Asia.

Data and methods

Line 91: 8x?

Line 93-95: how about the accuracy of GOCI AOD in your study domain?

Line 122: Why not use the ERA5 reanalysis at a higher resolution of 0.1 degrees?

Line 125: Several main meteorological (e.g., precipitation) and land-related variables (e.g., NDVI, DEM, …) are neglected.

In addition, the authors did not consider any humanistic factors (e.g., population, emissions) that have a large influence on PM2.5 in East Asia.

Results and discussion:

First, the authors need to show and discuss the accuracy of gap-filled AODs to ensure that they are reliable to be used for PM2.5 estimation in the next stage.

Figure 3: I am supervised that the maximum value of daily PM2.5 only is 250 μg m-3 since it can be easy to exceed > 600 μg m-3 in heavily polluted conditions in East Asia.

Figure 5: The authors are suggested to compare and discuss their results with previous studies. Are they consistent or different?

In addition, I also suggest adding an annual PM2.5 map for each year in your study domain.

Figure 6: How do your derived PM maps compare with the surface network in the other two countries?

Figure 7: Similarly, how about PM2.5 changes in the other two countries? Please show and discuss the results.