



Supplement of

Satellite-based estimation of the impacts of summertime wildfires on PM_{2.5} concentration in the United States

Zhixin Xue et al.

Correspondence to: Sundar Christopher (sundar@nsstc.uah.edu)

The copyright of individual parts of the supplement might differ from the article licence.

GWR model in fire region

To assess the performance of the GWR model for high aerosol concentration regions, we tested the model for two conditions: 1) smoke region (smoke flag >0); 2) NW US region (bounded by 35~50°N and 105~130°W). The model performance for smoke region as shown in figure S1 increased the R from 0.913 (original GWR model for entire US) to 0.915 and the LOOCV R² remains the same. For NW US (Figure S2), the R has a slight decrease from 0.913 to 0.90 and the LOOCV R² also decrease from 0.89 to 0.87. The model performance for both cases has very little variances, which is the benefit of using GWR model to simulate spatial varied variables. The model itself already considered spatial variances, so the model performance at different regions should be the same. Therefore, inclusion of low aerosol concentration areas will not decrease the prediction accuracy for high values (fire regions).

GWR model in low fire activity year

Figure S2 shows the results for GWR fitting and validation during the 17-day period in 2011. Since there is nearly no large wildfire events during this period, we use population (POP) as a predictor instead of smoke flag, and the model structure for 2011 can be expressed as:

$$PM_{2.5i} = \beta_{0,i} + \beta_{1,i}AOD_i + \beta_{2,i}BLH_i + \beta_{3,i}T2M_i + \beta_{4,i}U10M_i + \beta_{5,i}RH_{sfci} + \beta_{6,i}SP_i \\ + \beta_{7,i}POP_i + \varepsilon_i$$

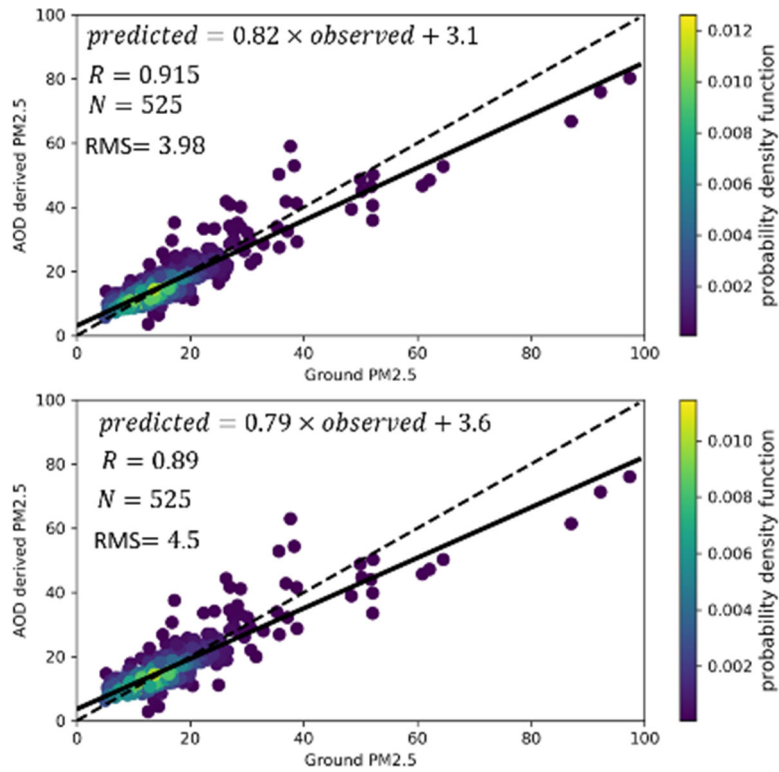


Figure S1. Results of model fitting and cross validation for GWR model for smoke regions (smoke flag >0) averaged from August 9th to August 25th, 2018. (a) GWR model fitting results (b) GWR model LOOCV results.

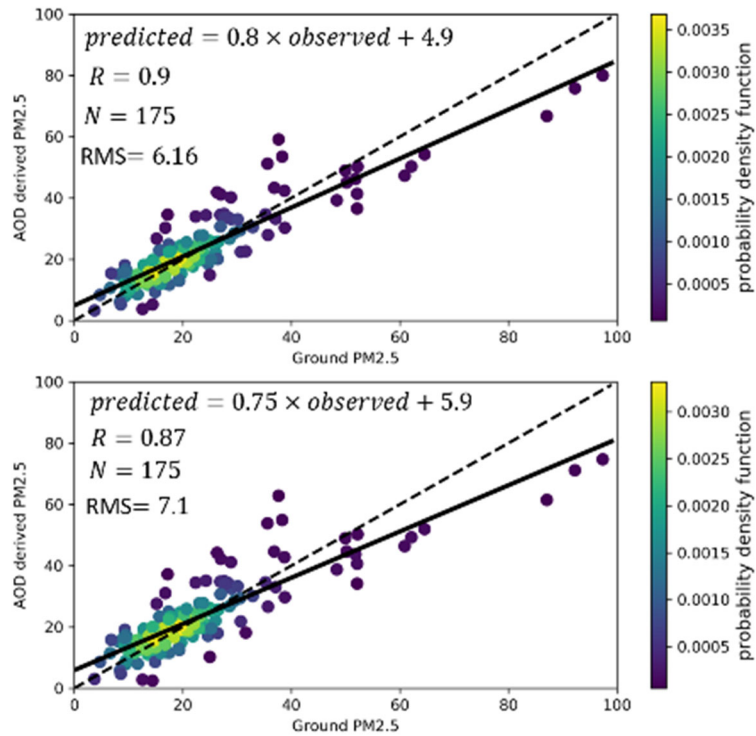


Figure S2. Results of model fitting and cross validation for GWR model for NW US regions (bounded by 35~50°N and 105~130°W) averaged from August 9th to August 25th, 2018. (a) GWR model fitting results (b) GWR model LOOCV results.

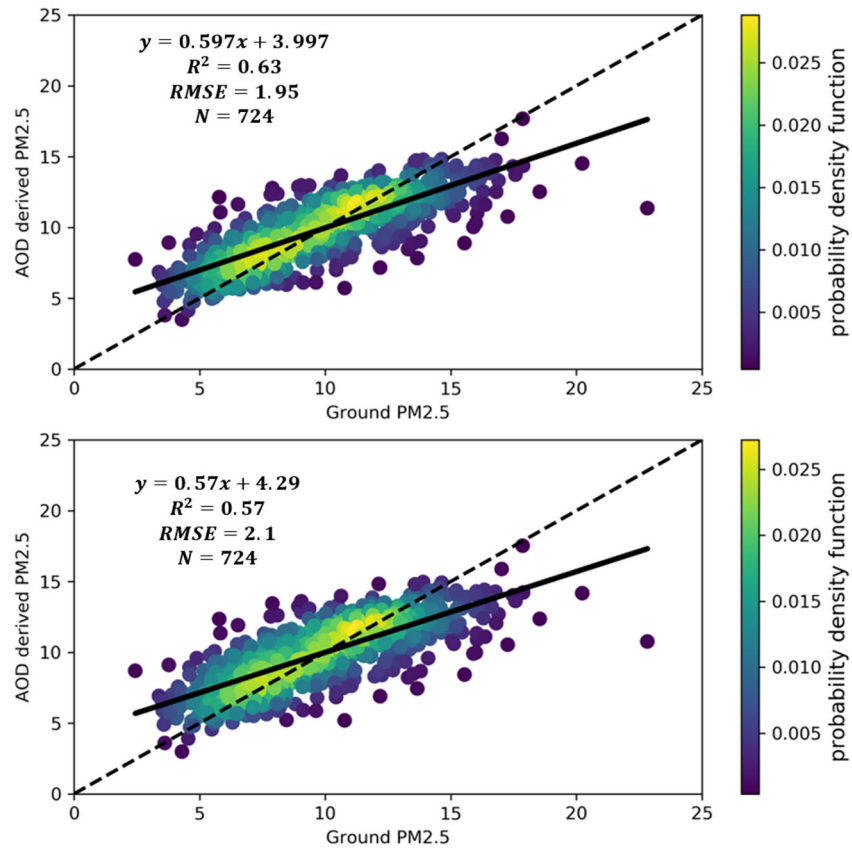


Figure S3. Model fitting and cross validation for GWR model for the entire US region averaged from August 9th to August 25th, 2011. (a) GWR model fitting results (b) GWR model LOOCV results.