Supplemental Material

Weather and Forecasting
Nowcasting Applications of Geostationary Satellite Hourly Surface PM2.5 Data
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Supplement to “Nowcasting Applications of Geostationary Satellite Hourly Surface PM$_{2.5}$ Data”

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This supplement has four figures relevant to the main manuscript.

Figure S1 shows the hourly data percentage coverage of PM$_{2.5}$ estimates from ABI AOD derived from the two years of hourly ePM$_{2.5}$ data, i.e. 2020-2021. There is a diurnal pattern in the coverage, which may be caused by the geometry, surface reflectance, meteorology condition, satellite overlapping of GOES-16 and GOES-17, etc.

Figure S2 shows the mean number of hours that used to calculate the daytime mean ePM$_{2.5}$. Most of the areas have 5-7 hours contributed to the daytime mean. In the western US, such as southeastern CA, NV, AZ, etc., some areas have only 1-2 hours, which is because those areas are bright surface most of the time and therefore there are very few AOD retrievals.

Figure S3 is the comparison of 10-fold cross validation of PM$_{2.5}$ estimates using ABI AOD only and using both ABI AOD and Earth Polychromatic Imaging Camera (EPIC) aerosol layer height (ALH). The results show that the addition of ALH in the GWR algorithm does not improve the performance of ePM$_{2.5}$.

Figure S4 shows the number of days that are USG+ in the year 2020 and 2021 derived from daily ePM$_{2.5}$. Comparing to those derived from daily ePM$_{2.5}$ (Figure 8 in the paper), the number of USG+ days are much fewer in the western US where the smoke events happen often.
Figure S1. Hourly data percentage coverage of PM2.5 estimates from ABI AOD.

Figure S2. Mean number of hours that contains ePM2.5 for daytime mean ePM2.5.
Figure S3. 10-fold cross validation of PM2.5 estimates using AOD only (left figure) and AOD and aerosol layer height (ALH) (right figure). AOD is from ABI and ALH is from EPIC retrieval. The time period is Aug-Sep, 2020 and the region is western CONUS.

Figure S4. Number of Unhealthy for Sensitive Groups or higher (USG+, daily ePM$_{2.5}$ > 35 µg/m$^3$) days for 2020 (left) and 2021 (right).

Reference