

The revised manuscript has addressed the reviewers' comments and provided additional analysis to improve the demonstration. Further comments and discussion to the revised manuscript is provided below:

Minor revision suggestions:

Fig. 6

Fig 6 shows the zonal averaged concentrations throughout the two-month period to illustrate how different plume rise models affect the spatial and vertical distribution of the studied atmospheric species, and species' fractional contribution in PM2.5.

The occurrence of wildfires in the US is quite sporadic. The zonal averaging is appropriate to highlight the dominant pattern of the fire activities in the US. What is the latitude range you've applied for the zonal averaging? Are you using a constant averaging range (from the west to the east) or a changing averaging range as the smoke dispersed?

Result analysis of Fig. 6 (Section 3.3)

Authors explained the roles of the observed/modeled plume height on AOD reasonably. Higher plume height will accelerate dilution near the source, as well as enhance the transportation to the downwind regions.

Fig. 3 shows that the modeled plume heights by B69 and S12 are quite close to each other for the four studied cases (different wind scenarios). In Fig. 6, the positive values of S12-B69 near 120° W above 6 km (Fig. 6n) seems to be mainly contributed by organic carbon (Fig. 6b). Given the primary fire emissions among three plume rise models are kept being the same and the plume height modeled by B69 and S12 are quite similar, this "positive-negative-positive" pattern in a bottom-up or top-down direction near 120° W can be also caused by varied sensitivity responses or modeling performances between B69 and S12 models to the fire cases in the zonal averaging region but not included in the fire case studies in the previous sections.

Line 336: "When comparing the CMAQ AOD to VIIRS AOD (Figures 7b-d), we applied VIIRS AOD saturation level (5) to CMAQ AOD results."

What does "saturation level (5)" here stand for?

Other revision suggestions:

Author affiliation information 1: space between "VA" and "22030".

Figure 10: Caption is in blue color.