

## **Responses in red.**

### **6/22/22: Comments to the author:**

Thank you for your consideration of the referees' comments. I believe the comments have generally been adequately addressed and I am prepared to accept the manuscript subject to consideration of the following minor/technical points.

In response to referee 2's comment about sensitivity to background values, please add a sentence to the manuscript stating that a range of background CO and PM2.5 values were investigated and found to have minor impacts on the results.

### **Added a sentence at line 171.**

Line 16: Please add the word "threshold" after "ratio."

### **I substituted "threshold" for "ratio." here as I think it reads better and is clearer.**

Table 3: Please fix the formatting of the table to have units all on one line.

### **Done.**

Please check the numbers in lines 134-136, 140-141, and Table 3 as these are inconsistent with each other. For instance, line 134 states 220 days with PM2.5/CO > 30 whereas table 3 states 198. Line 135 says 72 days with PM2.5/CO > 30 do not have a positive HMS smoke indication, whereas line 141 says 60 days.

### **Thank you for identifying this issue. The problem came from inconsistencies in how days were counted (e.g. above or below 29.999, 30.000 or 30.999). To be consistent throughout the manuscript, I use a threshold of 30.0. This is now clearly stated and the values are updated in Table 3.**

Lines 231-232: Based on the analysis presented earlier, it seems that the satellite data perhaps has both false positives and negatives. From line 140-141, 53 days with HMS smoke but a PM2.5/CO ratio < 30 and 60 days with a ratio > 30 but no HMS smoke. Please clarify

### **Yes. This is now discussed at line 137-140 and 238-239.**

Lines 233-234: I don't follow how the conclusion of no false positives for smoke identification was reached. I would think that would necessitate measurements of smoke specific tracers. Please elaborate on this conclusion.

**Agreed. I have removed the statement about false positives here.**

Figure 2: Please fix the legend on the bottom panel such that the black points are  $PM_{2.5}/CO < 30$ .

**Done.**

Figures 3 & 4: Please include units on the y-axis labels. I also recommend changing the ordering of the graphs such that the lines for the  $R_{smoke}$  and  $R_{urban}$  values are drawn on top of the observation points. It is difficult to see how the Monte Carlo simulation represents the data at low  $PM_{2.5}$  concentrations. Please also consider using a color other than black for the observation data since the black Monte Carlo simulation results are difficult to see on top of the black dots.

**On both plots, I have changed the color of one line for better clarity. I did my best to make the lines visible at the low end, but there is very high density of points there.**

Figure 5: Please change the x-axis label to  $PM_{2.5}/CO$  and include units.

**Done.**