

This paper applied the modified CMAQ model to investigate the source contribution of PM<sub>2.5</sub> in the nationwide lockdown due to the COVID-19 in the Yangtze River Delta region in China. By setting case 2 with reduced emission as input during the target period, the changes of source sectors of PM<sub>2.5</sub> were investigated, as well as the contribution of regional transport. The results showed how the contribution of location sources and regional transport changed in response to the local emission reduction and regional reduction, which are helpful to understand how regional emission reduction, quarantine measures, for example, impact the local PM<sub>2.5</sub> pollution and how to formula reduction policy for a more effective air quality improvement.

One of my confusions is the application of non-reactive tracer to scale the contribution of the specific source of primary PM<sub>2.5</sub> (PPM). 0.001% was given as the ratio of the emission rate of tracers to the total PPM emission rates. Maybe I missed some key points, but I am wondering that:

1. Does the emission rate of each tracer account for 0.001% of the source emission rate? Or do the emission rates of all the tracers added up together account for 0.001% of the emission rates of all the sources?
2. Was the scaling factor  $10^5$  applied for each of the sources? How the authors addressed the discrepancy between multiple sources in terms of the relative emission rate of tracers?
3. Was 0.001% a rounded assumption? If the real numbers were 0.0005% and 0.001%, both of which can be rounded to 0.001%, the scaling factors may differ by a factor of 2. I am confused so please explain.

Another concern is about the importance of revealing the change of relative contributions of regions due to the quarantine measures and its significance for future policymaking. In the discussion about the changes of regional contribution to local PM<sub>2.5</sub> concentration, the authors stated that the transportations of emissions were likely due to the north wind (or a key factor). If meteorology was the main reason for the change of relative contribution, what is the information the government can use when establishing the policy and adjusting the control measures? A greater reduction of emission in the regions that will contribute more to the YRD region? Please clarify the significance.

Below are several minor comments about the spelling, grammar, and others. Edits have been highlighted.

1. Line 35. "***In*** the Yangtze River Delta (YRD), one of the largest economic centers, ....". Missing *in*.
2. Line 40. Typo. "PM<sub>2.5</sub> is a ***complex*** mixture of ..., and its source apportionment ***is*** based on quantifying the contribution of different sources to all the components.
3. Line 45. "... that local emissions ***accounted*** for the highest fraction of PPM..."
4. Line 47. "..., and ***the*** remaining contributions ***were*** from industrial and residential sector..."

5. Line 51. "...to support the **formulation** of further reduction policy."
6. Line 53. "...anthropogenic activities **since** January 2020."
7. Line 58. ", and **the conclusions reported in the mentioned literature** cannot be used to..."
8. Line 68. "was modified **with** additional non-reactive tracers..."
9. Line 72. "Details **were** discussed in Hu et al. (2015)"
10. Line 103. "The model performance of meteorological parameters **including** temperature at 2 m..."
11. Line 105. Commas should be used instead of semicolons in this sentence.
12. Line 107. "**T2 predicted by the WRF model were slightly higher** than the observations..."
13. Line 144. "More **significant** decreases were found..."
14. Line 148. "...mainly due to **a greater reduction of** SO<sub>2</sub> from industries..."
15. Line 155-157. Sentences stated that the reduction of secondary components was greater than that of primary components, which indicated the important role of atmospheric reactions and meteorological conditions. I don't see any meteorological impact was mentioned in this paragraph so please explain why the meteorological condition was important in the discussion here.
16. Line 162-163. It might better to summary the main conclusion of this section in the last few sentences and state that the analysis provides a solid basis for the later source contribution analysis. The current statement sounds like the PM<sub>2.5</sub> component analysis is useless for the establishment of regional emission control policies.
17. Line 193. "...were the same in both cases **but** Case 2 had lower..."
18. Line 199-200. My understanding about the regional transport of PM<sub>2.5</sub> is mainly due to meteorology as stated in Line 196 and Line 224. So please explain why the limitation of commercial activities and traffics suppressed the dispersion of PM<sub>2.5</sub>.