Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-212

Anonymous Referee #1

Referee comment on "Impacts of condensable particulate matter on atmospheric organic aerosols and fine particulate matter ($PM_{2.5}$) in China" by Mengying Li et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-212-RC1, 2022

Li et al. constructed an emission inventory for condensable particulate matter for China and evaluated its impact on the simulation of organic aerosol and PM2.5. The study provides useful information on how CPM emissions (which are conventionally not measured in emission studies) affect ambient concentrations. However, I find the paper difficult to follow mainly because the method descriptions are not well organized. For example, the authors did not explicitly state their operational definitions for OA, POA, SOA, FPM, CPM, OMlsi, OM(C*<100), SVOC, and their relationships, which cause confusion. For example, I am confused about whether CPM emissions are accounted for as only primary emissions or also as secondary emissions in the emission inventory? And whether this inventory assumes that all CPM are organic? Whether E_OA include E_OMlsi (Eq.1-3) or do they represent non-overlapping components? Clearly describing what the authors actually did and meant would definitely help assess the scientific value of this study.

Minor comments

Line 76 ambiguous meaning of "negative impact". Change to "negative radiative forcing".

Line 98: unclear what is "inapplicability of parameter localizations". Do you mean there is a lack of local emission factors?

Line 109: "totally" -> "completely"

Line 134: the ambiguous expression "more than 50% of organic composition were measured in CPM". Please rephrase.

Line 148: "largely" -> "greatly" or "substantially"

Table S3 should list the measurement methods that these studies used.

Line 172 & Line 188-193: Please explain what is the difference between OA(CPM) and OM_lsi(CPM). Do you consider OA(CPM)-OM_lsi(CPM) as POA(CPM)?

Line 196: what is the relative importance of stationary combustion vs. vehicles?

Line 216-217 & 270-273: what are the bases of these scaling factors? I thought you already derived emissions based on Eq.1-3. Why do you need to scale with respect to POA emissions?

Line 318-319: C*<=100 or C*<=10? Also state the unit of C*.

Line 322: The OA emissions reported here are for what geographical region?

Section 3.2. These evaluations are not relevant and are just distractive. I'd suggest removing the section or putting it in the supplementary material.

Line 369-372. Use "episode" instead of "process".

Section 3.3. How do the observations distinguish POA and SOA? Their operational definition should be introduced, as sometimes it is not so straightforward to compare to simulations.

Line 461-462: Why do you think it is more likely due to meteorological factors, rather than that your emissions are still underestimated and that there are still missing SOA pathways?

Figure 1. Explain in the caption what the color shading represents