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*Interactive comment on* "Air Quality Predictions using Measurement-Derived Organic Gaseous and Particle Emissions in a Petrochemical-Dominated Region" *by* Craig A. Stroud et al.

**Anonymous Referee #1**

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Summary: The technical work is valid and well-executed, but the manuscript needs focus and clarity. To summarize, the authors used observationally-derived emissions that were differently speciated than their typical approach. Increases (decreases) in emissions improved predicted peaks and sometimes the predicted means. And, primary organic aerosol emissions are often important in bias improvement. Given the scope and findings, the manuscript is too long and lacks relevant methodological specifics.

The paper could be shortened without losing important points. Despite already having 13 manuscript figures, in places the text relies heavily on the 15 supplemental figures. Often beginning a discussion point by referencing the supplement that a typical reader

will not see. The OA section seems particularly dense given what can be concluded.

The major update in this paper is the emissions, which are characterized throughout the results without much detail in the methods. In the methods, there PM facilities that are revised are mentioned, but no estimate of total changes is provided. Even with a companion paper, I would expect to see a summary. The paragraph on profiles is difficult to follow. Given the two changes, rates and speciation, a summary of changes by relevant species (TOLU, ALKA, AROM, POA) would be helpful. A summary here could help reduce the reliance on supplemental emission figures.

Recommend focusing the paper, removing over-reliance on supplement, removing some of the OA section, and improving clarity in the emission revision methods section.

Specific notes: title : recommend signaling the improvements in the title. abstract : has too many methodological details including a reference to an accompanying paper. ln 32-33 : not a clearly stated point, esp without having read the paper. ln 27-40 : appropriate for an abstract? ln 67,69 : use references instead of urls ln 121-124 : seems out of place here. ln 151 : consider using sections (151 Emissions, 211 Modeling, 225 Observations) ln 177-193 : nomenclature is inconsistent and confusing: between paragraphs and between the text and supplemental table. ln 179 : missing "(2)" after "and"? ln 187 : "other profiles" could include "integrated extraction and upgrading," but I am pretty sure you mean the base-case profiles. ln 260-264 : Bias as a function of magnitude is very important considering how your data is being used. It is not uncommon to have a few high points driving the relationship. In addition, the std error in slopes should be reported and used in your analysis. ln 276 : since you will apply a similar approach to AROM, you should discuss it here. ln 307 : are you referring specifically to the secondary peak? or are there other flyover data? ln 339 : Given the inherent uncertainty in this approach, did you perform analyses where you did not subtract peaks from AROM and instead lumped AROM and TOLU? ln 341,350,367,395,399,430,550 : These paragraphs begin by introducing patterns that a typical reader should not have to see. This over-reliance on the supplement is distracting and makes your paper hard

to read. In 455-457 : this statement is made using complex figures and then made clearly later in Figure 10. Figure 10 succinctly conveys what I believe you were trying to communicate with Figure 8 and 9. Consider removing 8/9 and associated discussion.

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