

Reply to RC2:

Thank you for taking the time to review our draft manuscript. The authors appreciate the reviewer's suggestions and will address each of them.

The reviewer notes that the version of WRF indicated in the draft is ten years old. The authors thank the reviewer for catching this detail - we made a mistake when preparing the draft, and the version of WRF that was used is WRFv4.2.1 (far less old). We will make this correction in the text. The authors also appreciate the reviewer's suggestion for adding a meteorological evaluation, and we have prepared a Supplemental Information document that includes a table of meteorological evaluation.

The authors also thank the reviewer for suggesting inclusion of transportation-related activity data in a Supplemental Information document. We have included these data in graphical format in the Supplemental document for interested readers.

The reviewer also points out areas where our paper seemingly does not align with recent work by Parker et al (2022). Parker et al (2022) is cited in the draft manuscript reviewed by this reviewer, however, the authors acknowledge that we can do more to further compare/contrast the approaches used in these two papers. This will be included in the Discussion section. The differences in results are believed due to subtle differences in spatial scale: our results are presented as basin-averages over the whole SoCAB, while the final sentence in Parker's abstract (pointed out by the reviewer) explores results on sub-basin scales. Figure 10 in Parker et al shows their map of base case O₃ minus COVID-adjusted O₃ (both modeled). Spatially, the majority of the study area in their figure shows a decrease in O₃, and a small region in LA county shows an increase in O₃. On average over the SoCAB, our results appear to be in good agreement. We will make additions to the Discussion section to address these points. The reviewer also brings up Parker's conclusion that parts of the SoCAB were still VOC-sensitive. It should be noted that Parker's basis for this conclusion is outcome-based (i.e. did O₃ drop in response to NO_x reductions?) rather than process-based (i.e. did the indicators for O₃ sensitivity change?). It should be noted that, at the chemical process level, there are numerous scenarios where O₃ chemistry may "flip" from VOC-sensitive to NO_x-sensitive while still producing an increase in O₃ due to non-linearities in chemistry alone, (especially when dealing with airmasses that are near the chemical transition point!) Therefore, Parker's observation that O₃ increased in some areas while NO_x emissions dropped is not a solid indicator of the underlying chemical regime (*especially* given that the SoCAB is near the chemical transition point!). Our paper presents observation-based evidence that the underlying chemical regime indeed flipped - though we do note in our Discussion section that this may not yield even results over the entire air basin, and that while the basin as a whole is expected to see O₃ improvements as NO_x is decreased, select areas may see O₃ increases in the coming years.

We hope that these additions are satisfactory for the reviewer! Thank you again for taking the time to review our paper.