Answers to R1 reviewers' comments (Manuscript ACP-2022-776)

Report #1

Anonymous referee #2

The authors have responded adequately to almost all of my concerns, and I concur that further extensions would dilute the paper without necessarily increasing its impact or utility. I in particular appreciate the new text on limitations which I think goes a long way to helping ensure that the manuscript. However, I do have two remaining issues which I believe should be addressed prior to publication.

Answer
The authors are grateful to the reviewer for the positive comments about version R1 and the useful recommendations.

First, the description of the effect of climate change on air quality (the so-called "climate penalty") is somewhat misleading. The effect of climate on surface ozone is complex, and the implication that it will inevitably result in an increase in surface ozone (lines 337-340) is incorrect. Jacob and Winner (2009) is cited but said study finds that the effect of climate change on ozone is mixed, rather than purely increasing ozone. More recent reviews, such as Fiore et al. (2015), provide elegant explorations of the complex relationship between climate change and ozone. I recommend that the authors revise their description of the effects of climate change on air quality to reflect this nuanced issue more accurately.

Answer
We have revised Section 4 (new lines 339 – 357) to better reflect the complexity (and related uncertainties) of the interaction between climate and air pollution including examples and citing relevant bibliography as suggested by the reviewer.

Finally, the current code and data availability statements are very weak. I would urge the authors to make their code and data publicly available as recommended under the standards of open science (e.g. FAIR principles). This would dramatically improve both the reach and the reproducibility of the work.

Citation: Fiore, A. M., Naik, V., and Leibensperger, E. M.: Air quality and climate connections, J. Air Waste Manag. Assoc., 2015.

Answer
We have now added public links to the FASST model code in Github and the dataset was published in the Zenodo repository. We have also made a small correction to Figure 1 in order to align the terminology with the dataset.

Report #2

Anonymous referee #1

For final publication, the manuscript should be
accepted as is