

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2022-82

Anonymous Referee #2

Referee comment on "The impact of altering emission data precision on compression efficiency and accuracy of simulations of the community multiscale air quality model" by Michael S. Walters and David C. Wong, Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2022-82-RC2>, 2022

Review of Wong and Walter

In this paper, the authors assess the degradation in accuracy of the CMAQ model when they decrease input/output precision to save disk space. They do a number of tests to see how the model results change when precision is degraded. For the most part, they find very little change.

When I first got this review request, I was concerned that there would be very little to the paper. Reading a bit in, my thought changed to it could provide a bit of useful information. At the end, my real concern is that they really don't get in to the most interesting results.

First, fundamentally what they find is that the model results change very little, on average, when they reduce emissions and stored variable precision. This is a good result, but actually, it would be of great concern if that was not the case, and would indicate that what we know about air quality models is wrong. Why do I say this? There have been lots of studies of how changes in emissions impact results, and changing the inputs by

0.1% (less on average) should have virtually no impact. Good to see that is the case. It is also expected that the change in stored variable precision would also have little impact on average. Thus, their results are very much in line with expectations.

An interesting twist is that they also look at run time and find little difference, though there are some spikes. Those spikes are insufficiently explored.

One of their most interesting results is how changes in emissions precision had a radical result on the maximum. That result begs for more analysis.

A final comment is that not only did they not go far enough on both the run-time results and why the precision can have such large impacts, if even on isolated values, but answer the question, at what point do results really start to degrade?

Detailed comments:

Line 54: What is meant by the chemical transport model within CMAQ. Is not CMAQ a chemical transport model?

Line 61: "could"? Seems a bit weak.

Line 135: remove the comma after called.

In Table 1, add a footnote to state what AOX are. Table 2 does not do its job well. It does not say what the FX cases are.

Line 183: "Resultantly"? Awkward.

Given the small changes, most of the tables and figures are not needed (certainly the figures are not needed as there are no real observable changes).