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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A multi-model comparison of meteorological drivers of surface ozone over Europe" *by* Noelia Otero et al.

Anonymous Referee #4

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Otero et al. evaluate the ability of a suite of state-of-the-art regional air quality models in their ability to reproduce the observed relationship between meteorological variables and surface ozone over Europe. They use a multiple linear regression approach, harnessing their previous experience using MLR from an observation-only standpoint. Their results are very relevant given the simulations for CMIP6 are beginning, providing context for future simulations based on how well models represent the ozone-meteorology relationship in present day. Although some of their results are mostly speculative, I understand that it is difficult to fully diagnose the potential issues within each model without further sensitivity simulations. I would also like to see a more quantitative discussion of the results, as the paper in its current form is much more qualitative. The paper is well written but requires minor revision prior to publication in

Printer-friendly version

Discussion paper

ACP.

General comments:

The introduction is quite long and contains information that is not highly relevant to the paper, which seems, at least in part, due to some excessive self-citation. I suggest trimming some of the more basic background details as well as some reorganization for clarity. For example, paragraphs 2-5 could be condensed into a single “how meteorology affects AQ” paragraph.

Although general numbers can be gleaned from the figures, the results are very lacking in the amount of quantitative statistics portrayed in the main text. Much of the discussion is very surface level and doesn’t really provide the reader with new information other than the models are different from one another and observations. In the entire results section, there are only five or six specific numbers quoted. Obviously numbers shouldn’t just be reported for the sake of reporting, but I’m certain the reader could benefit from more.

It would be helpful if the authors could put some of the results in the context of the differences between the models; i.e., “model A,B, and C may show X due to their representation of Y”. This may require a bit of digging into the additional model diagnostics (e.g., biogenic emission rates) but it would help to provide some additional insight.

Specific comments:

Page 2, lines 84-85: referred *TO* as *THE* climate penalty

Page 2, line 89: remove “the”, *concluded that climate change*

Page 3, lines 116-117: “meteorological dependence. . .” this sentence is oddly worded

Page 3, lines 118-119: Here and elsewhere, when describing metorological relationships with ozone, it should be worded “the ozone–relative humidity relationship” or “the relationship between ozone and relative humidity”

Page 3, lines 126-127: The statement about wind speed is abrupt and out of place.

Page 4, lines 186-187: Which studies?

Page 4, line 196: Mid-Atlantic U.S. states?

Page 5, line 217: influence *ON* MDA8 O3

Page 5, line 217 and elsewhere: Curious, but why not use subscripts for O3?

Table 1: This could be expanded so the reader does not have to refer elsewhere.

Page 8, line 415: *MDA8*

Page 9, lines 433-435: The sentence: "Models show discrepancies. . ." is extremely vague.

Page 10, line 485: the phrase "that, in general show lower values of R2 in JAS than in AMJ" is unnecessary since "with the exception" implies the reverse of what was said previously.

Page 10, line 486: No need to say "certain regions such as", just say which ones.

Page 11, line 518: Please elaborate on "non-local processes".

Page 12, line 595: due to *THE* effect

Page 14, lines 656-659: Please elaborate, are you saying that thunderstorms are not represented well? What part of the meteorological-chemistry relationship?

Page 14, lines 660-662: Sentence is awkwardly worded, also provide a reference if you say "the documented" anything.

Page 15, line 723: *processes*

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