Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC1
https://doi.org/10.5194/acp-2021-855-RC1, 2021

Comment on acp-2021-855

Anonymous Referee #1

Referee comment on "Two-way coupled meteorology and air quality models in Asia: a systematic review and meta-analysis of impacts of aerosol feedbacks on meteorology and air quality" by Chao Gao et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-855-RC1, 2021

General Comments:

The paper does a thorough job of reviewing the studies involving coupled Met-AQ modeling with aerosol feedback effects, but it does not provide summary of the methods used to represent ARI and ACI or any assessment of the realism of the different models. It seems important to explain various the methods used to represent ARI and ACI and give some information on their accuracy.

The paper is very long, and I found it very difficult to read through the seemingly endless recitation of statistics that have very wide ranges without any explanation for the different results. The variety of modeling techniques, domains, resolutions, data assimilation, ICs and BCs, emissions, etc, should be considered in these comparisons. Why such wide ranges of results? Perhaps investigate the extremes to find out and maybe exclude studies with serious issues.

The paper needs thorough editorial review and correction

Specific Comments:

Lines 103-108: This sentence is confusing. Are those names of 5 models in the parentheses?

Lines 145-146: This is misleading. While the current versions of WRF is 4.3 and CMAQ

5.3.2, these were not the version used by Wong et al 2012. Those were WRFv3.0 and CMAQv4.7.1.

Lines 410-413: I don't understand this sentence. What is accounting for 80% of what? Please clarify.

Lines 428-432: This sentence is too long and complicated to follow. For example, "enhanced (reduced) radiative forcing at the TOA". The bit in parentheses generally refers to the opposite effect on something. What that something is, is not clear here. Is it reduced atmospheric stability and all the things in the parentheses?

Lines 493-496: this sentence does not make sense.

Line 498: "prohibited" is not the right word. Suppressed might be better.

Line 545: CA is use here as carbonaceous aerosols and further back as central Asia.

Line 617-621: This sentence seems self-contradictory. Please clarify.

Line 639: Pool should be Poor.

Line 684-686: This sentence is badly worded.

Figure 3: Why are there so many more samples for PSI than for ARI and no-ARI?

Lines 734-735: It seems from Figure 3 that RH2 has 2 but the SH2 has 6 not 1 PSI with ARI/no-ARI.

Line 742: should be *that* rather than *the*

Line 747: Figure 3 say 9 and 10 PSI with ARI/no-ARI, not 5.

Section 5.1.2: I think this analysis needs more explanation. Were these different studies of different lengths where the PSI were grouped according temporal scale? Is daily scale, PSI simulations that only lasted one day? I don't see the significance of this analysis.

Section 5.1.3: This section is also of questionable value. The meteorological performance of these models is more related to the physics options, FDDA, initial and boundary conditions, resolution, domain, time period, etc, of the WRF setup than whether it is WRF-Chem or WRF-CMAQ. The meteorology performance is due to WRF not Chem or CMAQ parts.

Line 974: When reporting daily results are these day and night together?

Lines 1018-1020: This sentence is unclear. Which effect increased (decreased)?

Lines 1020-1022: Again, doesn't make sense. Trying to say too much in single sentences.

Lines 1056: what increase (decrease)?

Lines 1079-1081: Way too many parentheses constructs. Can't follow.

Line 1108: severe rather than server?