

Geosci. Model Dev. Discuss., referee comment RC1
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Comment on gmd-2021-370

Jeffrey Johnson (Referee)

Referee comment on "Chemistry Across Multiple Phases (CAMP) version 1.0: an integrated multiphase chemistry model" by Matthew L. Dawson et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-370-RC1>, 2021

This is a very nice piece of work that demonstrates how improving the organization of logic and data structures can bring several practical benefits to model development in atmospheric chemistry. It's self contained and uses language familiar to domain scientists, while adopting software development approaches that have not yet become the norm in this community. In particular, it presents a nice solution to the very difficult problem of coupling independently-developed models, in terms that can be applied outside of its particular scientific area.

Here are some suggestions for the authors to consider that I believe might improve the paper:

Line 126: Instead of "Every object belongs to a class", consider "Every variable has a type, and the type of an object is its class. A class specifies..." Consider also breaking up this paragraph to emphasize the explanation of objects/classes and to highlight the examples.

Line 127: Regarding class hierarchies: the term hierarchy is used to describe a great many things. If you want to discuss polymorphism, consider this explanation or something like it: "Unlike other variables, objects have behaviors implemented by their functions. For example, chemical reactions can be classified into Arrhenius and Troe types that share a common interface but have different implementations. This classification can be accomplished using a "base class" that defines the interface, and "subclasses" that implement different ways of satisfying it. So a Reaction base class could have Arrhenius and Troe subclasses that calculate reaction rates in their respective ways." Thereafter, you can refer to a subclass w.r.t. a base class for clarity. E.g. "Parameter subclasses" instead of "Parameter-extending classes".

Line 155: worth citing a link to CAMP's documentation here?

Table 2: the equations for aqueous reversible reactions and for Henry's Law should each have a "K" after the 298 in the argument to the exp function.

Line 243: Is it worth providing a reference or link that describes the JSON format and/or its use in software (ideally in a scientific context)?

Figure 6: This is a very instructive figure. However, its orientation is a bit awkward for reading. To me, it seems like flipping it by 180 degrees might be better, if it doesn't go against journal guidance.

Line 315: Consider, for clarity: "as determined by the aerosol scheme's representation."

Line 329: Consider providing a link to a description of GitHub Actions, since it's mentioned in a couple of places.

Figure 8: the text in the legends for the plots does not display using two PDF renderers on my system.