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Geoscientific Model Development Discussions

Interactive comment on "Development of a grid-independent GEOS-chem chemical transport model as an atmospheric chemistry module for Earth System Models" *by* M. S. Long et al.

Anonymous Referee #1

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General Comments:

This is an interesting account of technical issues relating to the adoption of a CTM in an ESM context. It provides background and reassurance for scientists and programmers, particularly those with little prevous experience of CTMs in this context, who might be contemplating such work or who may wish to gain an overview some of the fundamental technical issues involved.

Specific Comments:

It would be useful to outline details of QA procedures involved in ensuring that the "state-of-science" and other developments mentioned are safe and fit for purpose in terms of scientific and technical perfromance. For example:

p.7507, lines 19-29: The document refers to quick and efficient implementation of new developments. It would be useful to outline what quality assurance methods are employed to prevent new developments being taken up before they are proved beneficial and/or safe. (e.g. any automated testing? "Benchamarking" may mean different things to different people, so it would be helpful if this were briefly clarified in terms of how scientifically valid model evolution is ensured as well as technical performance.)

pp7508, lines 13-15: This seems to suggest new developments are immediately adopted without any QA. Presumably tha impression is incorrect in which case it would be useful to discuss such procedures.

It would be interesting, if possible, to comment in more detail, in the context of the abstract and the main document on the expected scalability and performance beyond the range of processors actually tested.

Individual Issues:

p.7510, line 18: Use of the term "leverage" seems rather flowery. Words with more obviously understandable meaning such as "use", "adopt" or "employ" would aid clarity.

p.7511, line 7: It seems unclear unclear what "hooks" are in this context. Are these additional interface or wrapper routines or some sort of trigger mechanism?

p.7511, line 10: Re the sentence: "They can remain invisible to the scientfic programmer." To what end? i.e. When would that be desirable and how is it acheived?

p.7512, lines 3-8: It would help the document flow to establish this as a standard working practise earlier in the document. (See earlier specific comments about QA.)

p.7512, line 21: Missing word? Existing wording seems to imply that initialization is

performed at the beginning of each time step. That seems unlikely. Should this say "at the beginning of the first time step" or at the "start of the run" or something similar?

p.7514, line 2: Use of the term: "Scalability simulations" for clarity of meaning. Earth system simulations have been run using different resource configurations in order to establish scalability, so the term "scalability tests" or "scalability analysis" would seem more appropriate. i.e. scalability itself is not being simulated.

p.7515, line 8: Suggest the use of "Wall-clock time", "elapsed time" or two separate words "wall time" rather than "walltime".

p.7515, line 19: Suggest rewording to avoid the suggestion that scaling efficiency has truly been demonstrated for ANY number of cores.

p.7515, line 22: The word "other" is in quotes. The reason for this is unclear. Would it help to provide general examples of the scalabaility, performance and code structure characteristics of the important elements of these "other" components as compared with the chemistry module?

Interactive comment on Geosci. Model Dev. Discuss., 7, 7505, 2014.