Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-26-AC1, 2018

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Rapid and reliable assessment of methane impacts on climate" *by* Ilissa B. Ocko et al.

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Received and published: 23 July 2018

We sincerely appreciate the careful reviews and helpful suggestions provided by the Reviewers, and thank the Reviewers and the Editor for their time. We have made several changes to the manuscript in response to the comments that have considerably enhanced the manuscript.

Major changes to the paper include: analysis and discussion of unforced variability in AM3/CM3 expanded and moved to the beginning of the results section rather than the end; an additional control run simulation performed to isolate unforced variability in AM3, and the results added to the figure with the CM3 control run results; more emphasis on unforced variability as an additional reason why simplified models are

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Discussion paper

preferred tools for impacts of small changes; text modifications to caveat the difficulty in comparing simple model results with that from more complex models; inclusion of strategies to overcome the challenge of unforced variability; additional simulations performed using AM3 and CM3 to provide a different method for calculating the indirect (via chemistry) forcing and response due to historical methane changes; inclusion of reduced-complexity climate model options as alternatives to MAGICC; text modifications to reduce the impression that CM3 is "truth;" and addition of 14 new references.

In the attached supplemental document, we have responded point-by-point to comments (reviewer comments in blue, authors' responses in black), and have included the revisions in the text with and without tracked-changes.

Please also note the supplement to this comment:
https://www.atmos-chem-phys-discuss.net/acp-2018-26/acp-2018-26-AC1-supplement.pdf

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