Geoscientific

Model Development

Discussions

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comment

Interactive comment on "The Radiative Forcing Model Intercomparison Project (RFMIP): Experimental Protocol for CMIP6" *by* Robert Pincus et al.

Robert Pincus et al.

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Dear Gerry -

Thanks for providing the CMIP panel's perspective on our manuscript. Some points below.

The relationship to AerChemMIP is mentioned in passing a couple of times ... but perhaps a bit more can be said of the connections between RFMIP and AerChemMIP. ...

We agree and have added more information. They will compute forcing the same way in most instances and have a complimentary approach to aerosols. We can't find the

text you reference on page 7 but assume you meant page 5, which we've added to:

"The complimentary Aerosols Chemistry Model Intercomparison Project (AerChemMIP, Collins et al. 2016) ERF simulations adopts the same radiative forcing calculation methodology as RFMIP for Tier 1 experiments. AerChemMIP deliberately targets interactive chemistry models and extends RFMIP to allow the community to further decompose present day aerosol and non-CO2 forcings into a larger set of forcings caused by different sets of precursor emissions."

There is the impression in the community that it is too difficult to compute radiative forcing because the traditional definition was for net radiation at top of troposphere with stratospheric adjustment. In RFMIP it is mentioned more than once (e.g. P. 1, line 19; P. 5, line 11; P. 5, line 31) that ERF is now simply the net radiative imbalance at the top of atmosphere (unless we're misinterpreting something). If this is a correct impression, this indeed makes computing ERF much easier, and it may be worth noting this as a significant new aspect of comparing radiative forcing among models. If this is an incorrect impression, it would be worth clarification.

Thanks for pointing this out. We've amplified this point on on page 1:

"Rapid adjustments are generalizations of (and replace) the stratospheric adjustment (Hansen et al., 1997) that has historically been used to account for the impact of rapid stratospheric equilibration on top-of-atmosphere radiation fluxes. Accurate diagnosis of ERF requires custom model integrations . . . The diagnosis of ERF from such simulations is simplified, however, because the ERF is diagnosed from changes in top-of-atmosphere radiation."

Please update "Eyring, 2015" to "Eyring, 2016"

We have updated the citation.

2. P. 9, line 27: Readers may be a bit confused by the aerosol protocols. Do the tier 1 aerosol-only experiments allow both prognostic and concentration-driven formulations

that may exist in the various models? Understandably the desire for use of a common aerosol concentration data set (MACv2-SP) is spelled out, but what if groups use prognostic aerosols and want to run aerosol-only experiments? Do they not then participate in RFMIP?

Groups must indeed use the MACv2-SP aerosol formulation to participate in the SpAer component of RFMIP, though they may participate in the other components with any aerosol description. We have clarified the text to make this point more clearly.

3. P. 11, line 2: The warming hole has been shown to have subsided after about 2000, with evidence given to support the idea of remotely-forced atmospheric circulation-driven processes being mostly responsible . . .

We decided not to cite this paper as it diminishes the motivation for participating in RFMIP-SpAer.

4. P. 11, line 4: Another recent paper that could be mentioned here is Smith et al (2016, . . . doi:10.1038/NCLIMATE3058)

We added this citation.

5. Table 1: the experiment "RFMIP-ERF-LU" has "present-day greenhouse gases" in the description column, but shouldn't it be "present-day land use"?

Ah, yes, thanks for catching that.

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