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Geoscientific
Model Development
Discussions

Interactive comment on "The Norwegian Earth System Model, NorESM1-M – Part 1: Description and basic evaluation" *by* M. Bentsen et al.

Anonymous Referee #2

Received and published: 18 December 2012

Interactive comment on "The Norwegian Earth System Model, NorESM1-M – Part 1: Description and basic evaluation" by M. Bentsen et al.

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December 18 2012

This paper documents the new Norwegian Earth System Model, NorESM1-M, by providing a detailed description of the various model components, as well as presenting an evaluation of physical climate aspects and biases in the model. Overall, the description and synthesis is presented in a clear, methodical manner and the paper is easy to follow. A few suggestions and comments follow, but I recommend this paper for publication in GMD with only minor revisions.

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Specific comments

The term "Earth System Model" is currently being used to describe a wide range of models (e.g. EMICS). As defined for the CMIP5 experimental design, Earth System Models (ESMs) are defined as having a closed carbon cycle (Taylor et al., 2012). It may be worth noting this distinction in the title (e.g. Part 1 – Description and basic evaluation of the physical climate).

The authors note that NorESM1-M differs from CCSM4 by inclusion of advanced schemes for chemistry/aerosol/cloud/radiation interactions, as well as using an isopycnal ocean. In a comparison of two ESMs which are identical except for the ocean component (depth-based versus isopycnal), Dunne et al., (2012) found that the ESM with an isopycnal ocean has a shallower and less-ventilated thermocline, weaker ENSO, and shallower mixing and mode water formation. While detailed analysis/comparison to CCSM4 may not be possible here, consider adding a few comments on the strengths and weakness of using an isopycnal ocean versus a depth-based ocean model, and what aspects of physical climate were improved as a result.

Minor comments and suggestions

Page 2848, lines 1-2: suggest changing "which both were also used" to "which were both also used".

Page 2848, line 7: insert "of" between "resolution" and "1.9o" and change "times" to "by".

Page 2848, line 10: insert "that" between "double" and "of".

Page 2848, line 25: consider citing IPCC AR4 estimate of change in indirect radiative forcing.

Page 2848, line 26: consider changing "Much thanks" to "Due".

Page 2887, line 17: change "refereed" to "referred"

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Some of the figures (e.g. Figs 3, 4, 5, 6, 7, 8, 9, 13, 14, 15, 19, 25, 26) could benefit from the addition of short labels/titles at the top of the panels to visually aid the reader without reference to figure caption.

Figures 5 and 6: As noted by referee #1, these figures could be merged. Additionally, since all the figures use the same vertical scale, consider using only once color bar e.g. at the bottom of the figures.

Figure 7: consider shifting so that longitudes start at 180W.

Figure 19: consider using one color bar as vertical scale is the same for both panels.

References

Dunne, J. P., et al., 2012: GFDL's ESM2 global coupled climate-carbon Earth System Models Part I: Physical formulation and baseline simulation characteristics. Journal of Climate, doi:10.1175/JCLI-D-11-00560.1.

Taylor, Karl E., Ronald J. Stouffer, Gerald A. Meehl, 2012: An Overview of CMIP5 and the Experiment Design. Bull. Amer. Meteor. Soc., 93, 485Â£498. doi:10.1175/BAMS-D-11-00094.1.

Interactive comment on Geosci. Model Dev. Discuss., 5, 2843, 2012.