Geosci. Model Dev. Discuss., 5, C1079–C1081, 2012
www.geosci-model-dev-discuss.net/5/C1079/2012/

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.

Anonymous Referee #2

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.

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"

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.