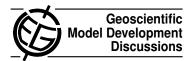
Geosci. Model Dev. Discuss., 3, C872–C874, 2011 www.geosci-model-dev-discuss.net/3/C872/2011/ © Author(s) 2011. This work is distributed under the Creative Commons Attribute 3.0 License.



## Interactive comment on "GEOCLIM reloaded (v 1.0): a new coupled earth system model for past climate change" by S. Arndt et al.

## **Anonymous Referee #2**

Received and published: 15 March 2011

Arndt et al. present a new version of the coupled Earth system model GEOCLIM. They linked the GEOCLIM reloaded to a temporally and spatially resolved model of the global ocean circulation. The ocean model is further coupled to a diagenetic model.

The manuscript begins with a detailed description of important equations and parameterizations for each module and then discusses the model performance by comparing present-day simulations with observational-based and modeled oceanic estimates. The text is clearly written and well organized. The evaluation is well constructed. As such, this manuscript is a very welcome contribution and certainly merits publication in Geoscientific Model Development. I am eager to see first simulations with the GEO-CLIM reloaded for the past climate and I think that the model has clearly the potential to perform calculations that will lead to scientifically important results. However, prior

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to its publication I would like to see a few minor revisions to the manuscript addressing the points below.

- (i) The authors point out on p.2116 that computational cost renders a direct coupling of the atmospheric module FOAM with GEOCLIM reloaded infeasible. On p.2115, the authors say that the atmospheric module FOAM is a parallelized version of CCM2. The authors should add a paragraph about model performance in terms of computational costs. How does the performance of this climate model compare with other comparable models? Can the entire model run on a single-CPU and/or in a parallelized version? I think the computational costs may be a critical point for other potential users and this journal is the right place to discuss and clarify that. The authors may include a table in the model section with some benchmark tests.
- (ii) I would like to see the source code of the present model to be put on a open-access server to get even more transparency.
- (iii) I do not understand why the authors compare their model output with bottle data from WOCE Hydrographic Program. What is the advantage over using the gridded quality-controlled WOA01/05 or GLODAP?
- (iv) I have a question regarding the length of the simulation until steady-state is reached. How long does it take (in model years) to reach 'quasi' equilibrium for the atmospheric module as well as the coupled continent/ocean/sediment system in the performed present-day model simulations?
- (v) The authors point out that the model is mainly capable to deal with very long-term simulations for the past climate. However, all of their model-data comparison is focused on present-day observations. Please add why the focus is on the present-day, and/or change the introduction accordingly.

Technical points: There are quite a few typing errors which should be fixed before publication process. Here is a incomplete list:

- p.2111 I.6 ...2008 and references therein)
- p.2115 l.16, l.19, l.26: why is there a C after degree?
- p.2124 I.1 change 'parametes' to 'parameters'
- p.2124 I.16 correct reference of Sarmiento.
- p.2125 l.4 change 'consitions' to 'conditions'
- p.2126 I.25 change 'inetgration' to 'integration'
- p.2128 I.14 change 'hundereds' to 'hundreds'
- p.2132 I.5 delete 'the'
- p. 2137 equation 53: shouldn't it be 660?
- p.2143: include e.g. in front of Gnanadesikan. Many other biogeochemical model estimates have been published so far. You even point that out in Table 9.
- p. 2146 delete 'from with global observations'
- p. 2146: I.22 change 'Figure6' to Figure 6
- p.2149 l.20 change 'resluts' to 'results'
- p.2160 I.28 change 'productivitz' to 'productivity'
- p.278: Fig1. Shouldn't it be GEOCLIM reloaded instead of GEOCLIM?
- Table 8: Change 'Redfieled' to 'Redfield'

Interactive comment on Geosci. Model Dev. Discuss., 3, 2109, 2010.

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