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**Geoscientific
Model Development
Discussions**

Interactive comment on "Bergen earth system model (BCM-C): model description and regional climate-carbon cycle feedbacks assessment" *by* J. F. Tjiputra et al.

Anonymous Referee #1

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In general, this manuscript is clear, well-written and has no major flaws. The model presented seems like a valuable addition to the suite of comprehensive coupled climate-carbon models that have been developed over the past several years.

The writing is good, though I would encourage the authors to use the past tense when writing, and the active voice where possible. For example, the first two sentences of the abstract would be better written as: "We developed a complex earth system model by coupling terrestrial and oceanic carbon cycle components into the Bergen Climate Model. For this paper, we have generated two model simulations (one with ...) to study the large scale climate ... " and so on.

I believe the "E" in "Earth system model" should be capitalized whenever used.

The Model Description section seems somewhat brief, given that requirements of this journal. I understand that most model components are described elsewhere – but be sure to fully describe any differences in the implementation of the model components that are not described in these previous publications. Additionally, it may be helpful to include a section where you describe how this model differs from (or where it falls in) the suite of coupled climate-carbon cycle models that already exist. To what extent do model components overlap with other models? How "independent" is this model from others? For example, the LPJ model has been implemented in any least one or two other models, as has HAMOCC (this information can all be found I believe in the Friedlingstein 2006 paper). A section like this may help to clarify and understand the results and how they compare to other model (e.g. do other LPJ-based models give similar terrestrial carbon cycle results)?

On page 858 lines 16-18, the numbers given here for terrestrial carbon uptake do not seem to match the numbers shown in Figure 3c. Could you clarify?

Be careful of the terminology you use throughout. When referring to positive climate-carbon feedbacks, be sure that you are not including in this also the effect of negative concentration-carbon feedbacks, which do not involve climate change. For example, on page 858, lines 21-24, you infer a conclusion about the relative strength of terrestrial positive climate-carbon feedbacks based on the straight difference between the COU and UNC run. This is not necessarily correct, as the COU-UNC difference includes also different CO2 concentrations, and hence includes the effect of additional concentration-carbon feedbacks on top of the climate-carbon feedback (e.g. you may have both a very strong concentration-carbon and very strong climate-carbon feedback on the ocean side, which explains the small difference there). To isolate the effect of positive climate-carbon feedbacks, you would need to do the feedback analysis as in Friedlingstein's paper (which is partially done later in the paper). Where you have NOT done this, be sure to acknowledge the the COU-UNC difference includes BOTH positive climate-

carbon and negative concentration-carbon feedbacks (e.g. also on page 859, lines 18-20; page 863, lines 18-21; page 864, lines 11-12; and page 869, lines 20-26).

Equation 3: This is not quite the same (I think) as the gamma_land calculated by Friedlingstein 2006? Could you clarify to what extent this quantity is or is not different?

Interactive comment on Geosci. Model Dev. Discuss., 2, 845, 2009.