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Biogeosciences Discussions

Interactive comment on "Role of vegetation change in future climate under the A1B scenario and a climate stabilisation scenario, using the HadCM3C earth system model" *by* P. Falloon et al.

Anonymous Referee #2

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This study investigates the potential influence of vegetation dynamics in the context of future climate change, using a global climate model. The paper analyses simulations under two different future scenarios: A1B and a 2C stabilization scenario. Overall, vegetation dynamics is found to have a modest impact on the global mean climate, although the impact can be important at the regional scale. The impact is even less pronounced for the stabilization scenario compared to the A1B scenario.

Major comments:

The main deficiency of this study is that the authors totally elude the question of model evaluation and do not discuss the possible limitations of their modeling approach.

There are reasons to doubt about the ability of current DGVMs to simulate future vegetation changes. For instance, TRIFFID has huge difficulties in reproducing the present day distribution of natural vegetation (see figure 2 in Cramer et al., GCB, 2001). In addition, there are also biases in the modeled climate that might confuse the simulated ecosystem response. A typical bias in climate model is a too dry climate over the Amazon, which might artificially accelerate forest loss. These are just examples, but a discussion of these limitations and model uncertainties is essential in order to make a useful interpretation of the model results in terms of vegetation changes. I want to insist on that point because vegetation dynamics is a relatively new issue in climate models and therefore the question of model credibility/uncertainties needs to be addressed in priority. A comparison of the simulated present-day vegetation (over the historical part of the simulation) with observations would be necessary in my view to make the reader aware about the potential model deficiencies and how these can affect the future projections.

Overall the paper is very lengthy and it is relatively hard to follow because there is not clear thread throughout the text. The introduction is quite long and could be shortened by removing section 1.3 which is not very useful because its content can be already incorporated in section 1.1 and 1.2. The result section describes mainly global maps but a lot of the information could be condensed as e.g. bar plots (while still keeping maps in appendix).

Specific Comments:

How are vegetation distribution and carbon pools initialized in 1860 (in A1B-INTVEG. Can it affect the results?

Why does figure 1 show the RCP scenarios? Is it useful for the discussion? If not it should be removed.

Why does the discussion start with a comparison between ECHAM5-MPI-OM and the IPCC models? Is it really the main point here?

Are you sure that the radiative forcing for a doubling of CO2 is the most relevant parameter to compare? Isn't Climate sensitivity a more relevant parameter (and more variable across models)?

Interactive comment on Biogeosciences Discuss., 9, 7601, 2012.