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Biogeosciences
Discussions

Interactive comment on "The Jena Diversity-Dynamic Global Vegetation Model (JeDi-DGVM): a diverse approach to representing terrestrial biogeography and biogeochemistry based on plant functional trade-offs" *by* R. Pavlick et al.

Anonymous Referee #1

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This paper summarizes the Jena Diversity DGVM model which takes a unique approach to defining the diversity of plant functional types. The authors describe the model itself followed by the performance of this model within the Carbon Land Model Intercomparison Project (C-LAMP) framework.

The concept of self-adapting plant functional types which can trade off performance between traits to represent different plant growth strategies is compelling and should

have many interesting applications. Though the authors describe why this approach should capture unique dynamics, I was disappointed to find that no new insight into the earth system or demonstrations of the application of this model to new problems are described in this manuscript. They do mention some possible applications, but do not show any applications here. This manuscript would be improved by a direct demonstration of the unique capability of this model or its improved performance relative to other common models.

The authors describe the model thus: "JeDi-DGVM is a prototype meant to explore the potential utility of a trait-based func- tional trade-off approach for transitioning the state-of-the-art of global vegetation mod- elling beyond the limitations of a set of fixed PFTs" Please explore the potential utility of this approach for the readers! The Biodiversity section (4.1) does show a unique capability of JeDi-DGVM, but it is lost in the C-LAMP metrics description. More examples like this would greatly improve this manuscript.

Using the C-LAMP protocol the authors compare JeDi-DGVM to two other land models, both land surface models with non-dynamic vegetation. While using the C-LAMP framework shows the authors interest in validating the JeDi-DGVM against observations, the text of the manuscript is largely focused on the metric scores and the comparison of JeDi-DGVM with other land surface models. I suggest that the authors condense the description of C-LAMP results, or move some of it to supplementary material. Move the majority of the methods associated with the C-LAMP comparison to supplementary material. It is useful to include for validation, but not sufficient to demonstrate the ability of JeDi-DGVM.

I want to re-emphasize that I think the modeling approach described here is novel, unique, exciting and worth publishing. I hope that the authors can improve the manuscript to demonstrate the unique capabilities of this approach to clearly show it's merit.

Specific comments:

The authors mix the description and comparison of dynamic and non-dynamic global vegetation models throughout the manuscript. Non-dynamic land surface models do not allow the distribution of PFTs to change across the land surface. Models in this category include CASA', CN (the two models compared with JeDi-DGVM using the C-LAMP protocol), and many of the models in Friedlingstein et. al. 2006 CMIP4 intercomparison. Clarification of distinction between the two types of models is needed in the text.

pg 4652, line 3-6: The authors mention that competition for light may be required to accurately represent biomass in the Amazon forest. Further discussion on how light competition is or is not captured by the plant growth strategy approach would be helpful here. The text points to further discussion in seciton 5.3, but light was not addressed directly in that section. In one location or the other, further discussion would be helpful.

pg. 6456-7, section 5.3: This manuscript would benefit from further discussion, or clarified discussion, of the similarities and differences between the plant growth strategies approach and an approach representing direct competition between plant types/strategies (i.e. Ecosystem Demography or DIVE). In what way are the two approaches redundant and how do they vary?

Technical Comments:

pg 4629, line 11: see also a review by Levis 2010, Wiley Interdisciplinary Reviews: Climate Change

pg 4647 line 21, I would prefer if this line read "data-driven model estimates", as the Beer et al. global map of GPP estimates is derived from a statistical model and is not data.

pg 4650, line 26-28: This is disputed by Angert et al. 2004 and may not point out a deficiency in JeDi-DGVM.

pg 4651, line 3: "yr" should be spelled out

pg 4655, line 16: see also Loarie et al., 2009, Nature.

Interactive comment on Biogeosciences Discuss., 9, 4627, 2012.