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Biogeosciences Discussions

Interactive comment on "Evaluation and improvement of the Community Land Model (CLM 4.0) in Oregon forests" *by* T. W. Hudiburg et al.

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Author Comment to Referee #1

We thank the referee for valuable comments and include our response to both the main comment and the technical comments below.

Reviewer comment: "My main suggestion is that the authors spend considerably more effort explaining what the implications of this work are. Are they suggesting that the only way to model the regional carbon balance correctly is to specify parameters at a relatively fine level of spatial (or in this case it is effectively increasing the PFT resolution, i.e. the number of PFTs represented) detail. This would make it difficult to impossible to use the model outside of regions with rich datasets such as the FIA dataset against

which the model could be calibrated. Or, are they simply trying to show the model is structurally sound, and that with appropriate parameters, the model can faithfully represent carbon stocks and NPP? Perhaps the suggestion is that PFT resolution needs to be increased. If that is a possible solution, then it would be good to get a perspective on what this would take. What would the practical modeling consequences be of going to a higher PFT resolution."

Response: The reviewer makes a good point and we agree more discussion of suggested model improvements and implications will improve the manuscript. We will add the following paragraph to a revision of the manuscript (section 4.4, final paragraph): "This study provides a benchmark for which model evaluation and subsequent development can be used in other regions where the observations are available. There is a great need for regional assessments using land surface models with sub-grid accuracy to inform land management and policy. In order for the scientific modeling community to help inform policy and land managers about the carbon cycle implications associated with land use change, models need to be able to capture the spatial and temporal landscape variability. For example in Oregon, the variability in NPP varies tenfold across the state, within the same plant functional type. Land management policy (specifically forest) is being developed and implemented without the use of process models that account for changing climate and environmental variables as well as land-use and management (e.g. harvest practices). Because CLM4 has the ability to account for these factors, it could be an especially useful tool for making predictions about land use and land cover change if model improvements were made to allow for variation within PFTs. Model structure need not substantially changed in order to do this, but simply allow for user-defined PFTs that can be scaled in quantity according to the region of interest. This would allow for less complex PFT structure in larger regions or in regions where calibration datasets are not available, but would not limit regional applications with rich datasets and more diversity. Additionally, a more dynamic PFT parameterization would also be more suitable for further development of the dynamic vegetation sub-model in CLM4. " Minor points

p.4: Thomas et al. reference is missing year of publication

Response: Fixed.

p. 7: Should read “calibrate the physiology parameters”

Response: Yes, thank you for pointing this out. p. 9: Combing should be combining

Response: Fixed.

Figure 5: Figure caption should state which version of the model is being analyzed for this plot

Response: We agree. We have changed to caption per the recommendation.

Interactive comment on Biogeosciences Discuss., 9, 12757, 2012.