

General comments

In the original version of this manuscript, Seo and Kim presented the results of a study designed to assess the relative and interactive effects of simulating fire and dynamic vegetation on carbon and water cycling in the Community Land Model. One especially interesting finding was that fire seems to increase net ecosystem productivity, but only when dynamic vegetation is turned off. Many of the other results were not very novel, but were appropriate for Geoscientific Model Development because they add evidence supporting existing findings, and could help to interpret future CLM experiments.

The authors have done a good job of responding to reviewer comments and the revised version of the manuscript is much improved. There is still room for improvement, especially with regard to the handling of vegetation distributions in the model runs, but I recommend that this manuscript be *accepted pending minor revisions*.

Specific comments

There still needs to be clarification about how land use and vegetation were handled. Below is a version of Table 1 containing suggested corrections/improvements in **bold**.

	BGC for year 1850	BGC for 20th cent.	BGConly	BGC-DV
Time	—	1901–2000	200 yr	200 yr
Climate forcing (CRU-NCEP)	Repeated 1901–1920	1901–2000	Repeated for five times 1961–2000	Repeated for five times 1961–2000
[CO ₂]	1850	1901–2000	2000	2000
Biogeog. shifts?	No	Yes	No	Yes
Initial veg.	No	From BGC year 1850	From BGC for 20th century	No
Initial soil	No	From BGC year 1850	From BGC for 20th century	From BGC for 20th century
PFTs	15 natural + 2 crop	15 natural + 2 crop	15 natural + 2 crop	15 natural
Fire	On	On	On (BGConly-F) Off (BGConly-N)	On (BGC-DV-F) Off (BGC-DV-NF)

- The “land use” row should be clarified. Based on how the authors filled it in, the row name should be “PFTs.” Then the boxes should be filled with “15 natural + 2 crop” for all except the box for BGC-DV, which would have “15 natural”.
- Since the “BGC for year 1850” run had no initial vegetation and no dynamic vegetation, the PFT distribution map must have come from somewhere. Where? The only explanation I see in the text is that “Initial conditions for the year 1850 equilibrium state were provided

by NCAR,” but that doesn’t answer the question. Presumably this run uses the Satellite Phenology option, which should be noted, since there is a paragraph spent explaining that option.

- Did the “BGC for 20th century” run use dynamic vegetation or not? There is no information about this run given in the main text, which is of course a problem. Looking at Table 1, it appears that dynamic vegetation was used (Biogeography shifts: Yes), but then later the authors state (as they also do in their reply to the other reviewer) that BGConly-F is “derived from observations”. Since the initial vegetation for BGConly-F is derived from the “BGC for 20th century” run, that would seem to indicate that the latter did NOT use dynamic vegetation. I can see two ways that these two pieces of information could be reconciled:
 - If the 20th century run used an external, time-varying PFT distribution—in which case that should be noted and cited.
 - If the 20th century run used dynamic vegetation, but then the BGConly run used a set PFT distribution map from MODIS—in which case, (a) that map should be noted and cited, (b) the authors need to reconcile this with the “Initial vegetation: From BGC for 20th century” box under “BGConly” in Table 1, and (c) the authors need to explain what happened to the vegetation at the time of transition (whether it disappeared from the system entirely or was killed and left to decompose).

Other comments:

- LL148–150: This sentence should indicate whether the vegetation previously in the system was (a) killed and left to decompose or (b) removed from the system entirely in a non-C-conserving way.
- LL293–294: This sentence does not make sense in the context of this paragraph. It should be moved to the end of the previous paragraph.

Technical corrections

- L98: “BGD-DV” should be “BGC-DV”.
- L136: “Figure 1” should be “Table 1”.
- LL192–193: “in comparison to all three GFED datasets” should be deleted.
- L194: Quotation mark should be deleted.