

Biogeosciences Discuss., referee comment RC2
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Well done, interesting, important study

Anonymous Referee #2

Referee comment on "Capturing functional strategies and compositional dynamics in vegetation demographic models" by Polly C. Buotte et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-54-RC2>, 2021

General comments

This manuscript describes an interesting study that attempts to efficiently parameterize the FATES vegetation demography model in novel ways. The authors start with extant trait observations which are filtered over a number of steps for parameter combinations that produce ecologically realistic forests in which the trait combinations conform to a priori expectations in relation to each other and driving data. This is highly interesting for reasons well described in the text, and I agree with Reviewer 1 about its importance for the broader field and the generally high quality of the presentation and text.

There are a few things that could be improved (see short list below). Specific spots in the text are occasionally awkward or not well integrated; a few of the figures should be tweaked or perhaps re-thought; and parts of the introduction and discussion could be tightened with little loss.

In summary, this is a really interesting approach to a hard problem that should be of wide interest to land modelers generally, and that provides a framework to build on for vegetation demographic models specifically. It needs only minor to moderate revisions before final publication.

Specific comments

- Lines 16-17: not sure this sentence ("Composition is...") is needed
- 53-61: this paragraph feels disconnected from rest of the introduction
- Figure 1: this is great—thank you. Extremely helpful in following a moderately complex analysis
- 125: "combines observations"
- 141-142: this (specified rank correlation) is unclear; expand a bit?
- Figure 2 is really cool. Hard to see light grey versus dark grey though
- Figure 3 caption: "green lines"?
- Figure 4: why aren't the canopy and understory outer rings grouped next to each other? I.e. blue canopy -> red canopy -> red understory -> blue understory as one goes around the outer circle
- 271: break into two sentences for readability and correct grammar
- 315-, 334-: well described and summarized
- 325: kind of circular...perhaps reword
- 345-349: this could be expanded. How onerous *was* the computational cost? In the future would multi-site, even complete landscape, workflows be better?
- 359-361: a critical point but could be expanded on; is it truly unrealistic, given realistic driving data?