Review #2. Paludel *et al* “Savanna ecosystem structure and productivity along a rainfall gradient: the role of competition and stress tolerance mediated by plant functional traits”

General comments

This manuscript presents an excellent new modelling tool: the authors re-defined the plant functional types of a well-established global vegetation model, LPJ-GUESS, to adapt it to the Australian biome, thus basically obtaining a new version of this model. They did it based on large datasets of Australian plant traits and calibrated it with tower data. I think this effort is commendable and worth publishing, and the resulting model will be of great use.
However, I have some major concern about the paper, which are somewhat similar to the comments raised by reviewer #1.
The authors are trying to present this effort as directed towards answering a research question related to the driver of the transition of Australian vegetation from Eucaliptus to C4-grass dominated savannas in the South. In my opinion, they did not answer to any specific new research question, as it seems to me that most results are just reasonable model outcomes.
Possible solutions to this issue that come to my mind are i) rephraming the paper as a new-model description ii) performing model experiments to answer clearer research questions.

- If choosing i): the validation against flux tower data is very good; however, a validation of model outcomes in terms of functional type distribution, LAI etc is lacking and should be added if possible.
- If choosing ii): I completely agree with the other reviewer that the effect of fire should be taken into account explicitly, given these are well-known to be fire ecosystems. In this respect, I would add the remark that post-fire response traits, such as resprouting (not currently mentioned in the section describing traits) should be included in the definition of plant functional types in Australia (see e.g. Harrison et al 2021, Kelley et al. 2014, Venesky et al 2019).
  Furthermore, given the focus the authors put on disentangling the importance of rainfall gradients in these Australian woodlands and savannas, I would highly recomment reading Holdo and Nippert 2023 excellent New Phytologist review on the subject.

Specific comments and technical corrections

- The abstract lines ‘*We hypothesise that biotic competition and abiotic stress exhibit opposing patterns along the NATT rainfall gradient and aim to disentangle these effects on vegetation structure and productivity. Using a trait-based dynamic vegetation model, we simulated vegetation responses to varying*

competition and stress along the NATT.' I did not see how and where this hypothesis was tested given the model-centered approach

- Fig. 1. Caption is not complete, what is the map of Australia showing? If it's vegetation types, as the middle panel: why the state borders change the types of biomes so dramatically? I would also indicate more clearly which part of Australia you are studying, which seems the only relevant info one wants to have from the map.
  Some fonts are too small, e.g. the names of the flux towers
- l. 234 variable**s**
- l. 264 ciclying? (without re-)
- l. 285 is
- l. 413 tree**s**

References

Harrison, S. P., I. C. Prentice, K. J. Bloomfield, N. Dong, M. Forkel, M. Forrest, R. K. Ningthoujam, et al. 2021. Understanding and modelling wildfire regimes: an ecological perspective. Environ- mental Research Letters 16:125008.

Holdo and Nippert New Phytologist (2023) 237: 1966–1979 doi: 10.1111/nph.18648

Kelley, D., S. P. Harrison, and I. Prentice. 2014. Improved simulation of fire–vegetation interactions in the land surface processes and exchanges dynamic global vegetation model (LPX-Mv1). Geoscientific Model Development 7:2411–2433.

Venevsky, S., Y. Le Page, J. M. Pereira, and C. Wu. 2019. Analysis fire patterns and drivers with a global SEVER-FIRE v1. 0 model incor- porated into dynamic global vegetation model and satellite and on- ground observations. Geoscientific Model Development 12:89–110.