



EGUsphere, referee comment RC1
<https://doi.org/10.5194/egusphere-2022-82-RC1>, 2022
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Comment on egusphere-2022-82

Anonymous Referee #1

Referee comment on "Evidence of localised Amazon rainforest dieback in CMIP6 models" by Isobel M. Parry et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-82-RC1>, 2022

In the manuscript "Evidence of Amazon rainforest dieback in CMIP6 models", Parry et al. examined the scope of forest dieback events based on CMIP6 simulations, and proposed an early warning signal to predict the occurrence of dieback. The paper updated our understanding of future forests dieback in Amazon using new model results. The introduction is well written, my reservation is about the lack of in-depth analysis in Results and Discussions, in particular:

- The current study shows where the abrupt shift likely to happen but less on how. I am looking for some mechanistic explanations on model difference in abrupt shift (AS) identification – some are concentrated, some scattered, some none? One explanation proposed is that the larger internal variability of model led to scattered distribution of AS, perhaps need to present data to show it? In addition, do we expect to see more/less abrupt shift at regions with larger internal variability at all? Any other potential reasons that can explain inter-model variation.
- The author demonstrated that diebacks happen at places where there are higher temperature sensitivity of seasonal temperature amplitude – which is further regarded as an early-warning signal (EWS). I am curious that how early could the EWS work, or do we really see higher predictive accuracy of dieback if we use EWS. I am curious whether the ESW is the precursor for the dieback or ESW is caused by the dieback due to climate-vegetation feedback?

Other comments:

1. the reason to use 1%. It has been argued it is idealized to use 1% CO₂ simulations, though it is not clear to me how that would be "ideal".

2. Other than dieback, the authors also present other combinations of AS and trendy changes. Though they are less common, I am wondering if the authors need to provide some mechanistic explanations...or I would suggest removing those as they might be distracting.

3. Is it possible the key piece of evidence supporting ESW (Fig. 4i) mostly come from one model - TaiESM1. The model has the largest number of valid samples for the analysis, but quite few other models - Samu-UNICO, EC-Earth3, does not such the effectiveness of the ESW. How robust it is if we bootstrap model, or normalize result by valid samples. It linked back to my first major concern that why models show different results.

L96. "many abrupt shifts" - perhaps provide a more quantitative statement.

Figure 3. y axis and caption, what is cVeg? Those are good examples. Is it possible to get a scatter plot of the timings of EWS and dieback for all pixels?

L115. Regional scale means "region average"?

L175. stufy - study?