

Geosci. Model Dev. Discuss., referee comment RC1
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Comment on gmd-2021-292

Anonymous Referee #1

Referee comment on "Global evaluation of the Ecosystem Demography model (ED v3.0)"
by Lei Ma et al., Geosci. Model Dev. Discuss.,
<https://doi.org/10.5194/gmd-2021-292-RC1>, 2021

gmd-2021-292 Global evaluation of the Ecosystem Demography Model (ED v3.0).

Evaluation: Minor revision

The manuscript compared global evaluation of water and carbon fluxes, vegetation dynamics such as leaf area index and canopy height reasonably to a series of global observations shown in table 1. As a whole, the manuscript seems carefully prepared and concise, and is thus suitable for the publication in GMD. At present, The improved ED-v3.0 model is a potential used as one of benchmark models for evaluating globally ecosystem responses to the climatic variations in the future. Using the model simulations, the authors showed spatio-temporal variations in GPP and AGB that were comparable to global observations well, including the effects of eccentric atmosphere-oceanic events like El nino/La nina on terrestrial carbon productivity. However, I suppose, in Discussion and Conclusions, you need to somehow modify the manuscript to more clearly show the importance and advantage of use of four modifications that has been never handled into the previous developed ED model. In particularly, the discrepancy between the present model and observations for evaluating global annual evaporation shown might be related to a lack of unknown terrestrial hydrological processes. Additional simulations were no longer required, while more discussions are to be indicated if the application of other new submodules also derived realistic products compared to those from the original ED. The manuscript will be thus accepted after covered moderately with these minor revisions.

I will give several bullet points below.

Method

line245: Make clear net biome productivity (NBP) here, and delete this in line260.

Results

line 368-374: ED-evaluated annual evapotranspiration seems consistently smaller than FLUXCOM observations not only in dry regions you mentioned but across all the latitudinal ranges. Could you describe more detail what mechanisms regulated annual values in the model to explain the discrepancy between model and observational estimations.

Additionally, how did the new hydrology submodule incorporated operate for the annual estimation associating with evaporation from soil and canopy?

Or, Is this due to evaluations from Penman-Monteith big-leaf model? If so, for instance, Bonan et al.(2021) in *Agri.For.Meteorol* may help more discussion of the model work.

Discussion and Conclusions:

line 408-417: Make the discussion started first. Move the first paragraph to the late part of this chapter and arrange then.

line 457: Delete the first sentence.

line 459-465: The author stated here ED overestimated tree height in three particular regions like S.China, SE asia and SE Brazil. From Fig.17, the canopy height estimation from ED seems to be so smaller than observations over northern hemisphere, including the former two regions. Rather, ED-derived LAI from Fig.12 is larger over whole latitudes.

line 478-483: Move these to the top of this chapter and arrange then.

Other:

Figure 5: In (c) and (d), symbols and captions in legend are too small.