Geoscientific Model Development Discussions

Geosci. Model Dev. Discuss., referee comment RC1
https://doi.org/10.5194/gmd-2022-72-RC1, 2022

Comment on gmd-2022-72

Anonymous Referee #1

Referee comment on "Modeling demographic-driven vegetation dynamics and ecosystem biogeochemical cycling in NASA GISS's Earth system model (ModelE-BiomeE v.1.0)" by Ensheng Weng et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2022-72-RC1, 2022

This manuscript by Weng et al reported a model improvement. I am happy to read it and know many great improvements. However, there are some unclear things that need improve before publication.

Line 47-49: this sentence is not necessary.

Line 86-99: should this paragraph be moved to model introduction section?

Line 213-214: how to determine soil moisture threshold is quite important. However, it is difficult to understand how to determine this threshold. the authors need introduce more about this.

Line 219: what is structural biomass? What are the parameters of αc, αz, θc and θz.

For Eq. (5), the most important thing is how to simulate D?

Line 231: is that correct to keep a minimum growth rate of stems? Why do the authors set the equation like this?

Line 232-235: it is difficult to understand how the authors simulate carbon allocation. Carbon allocation is quite hard to simulate indeed, and especially for demo-type model, the authors should pay more attention to impacts stand age on carbon allocation. Please refer the Xia et al. 2019.

Line 246 “Reproduction and Mortality”. They are very important and hard to simulate. I am happy to see the authors made great contributions.

Line 258: cannot understand “U-shape” curve?

Eq. (9) it will be better to introduce the basic principle.

Figure 2. it will be helpful to give name of each vegetation type in the figure caption. Did you include cropland?

Line 355: what do you mean “The interpolation of radiation”?

Figure 4. can you explain why there are sharp decreases of simulated height? I am also confused why the crown area index increased first and then decrease?

Figure 5. simulated LAI is not good enough, but I totally understand it is very hard task. You may discuss this issue, and especially point out how we should improve LAI simulations in the further studies.

Figure 7. how did the authors treat cropland? If the model scheme impacts this global comparison?

Figure 8. these results are surprised for me. I thought the model can simulate plant carbon better than soil carbon. But it seems that I am not correct. Would you like please to explain the reason for large uncertainties of plant carbon simulations?