

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2021-389

Anonymous Referee #2

Referee comment on "Soil-related developments of the Biome-BGCMuSo v6.2 terrestrial ecosystem model" by Dóra Hidy et al., Geosci. Model Dev. Discuss.,
<https://doi.org/10.5194/gmd-2021-389-RC2>, 2022

This manuscript presents a detailed description of several recent improvements in the Biome-BGCMuSo v6.2 model, including soil hydrology-related processes and carbon/nitrogen-related processes. Overall, this manuscript is easy to follow and these model improvements are worth publishing, which may provide reference for the development of relevant terrestrial biosphere models. However, some parts of the manuscript read more like a technical report than a research paper, and I would like to suggest modifying relevant parts (I point out some). Meanwhile, the authors may want to add other experiments to show the overall performance of the new model in simulating nitrogen-related variables (e.g., N₂O or N leaching). Please find my specific comments below.

Line 1-3: You may need to change the title of the manuscript, as the current one puts too much emphasis on crop model and may be confusing.

Line 37-39: You may need to revise this sentence since it reads more like a technical report than a research paper

Line 117: Maybe delete this sentence

Line 123: What management practices?

Line 235, Line 332, Line 337.....: You may need to change such expressions: "An important novelty"

Line 345-347: Did you consider the thickness of the residues in your model?

Line 369-370: How did you consider/calculate the distribution of root density?

Line 398: In this section, the effects of water scarcity stress on plant physiological processes have been considered, but, how did you consider the water logging effects? Excessive water in the soil could also significantly affect various plant/soil-related processes.

Line 481: Typically, plant nitrogen fixation process is controlled by many environmental factors, including soil moisture, substrate concentration, soil temperature, etc. You may want to incorporate the relevant N-fixation processes in the model to expand its application capabilities on the regional scale.

Line 527: I think you may want to use "then" instead of "than".

Line 528: Are the C:N ratios the same for different soil carbon pools? Dynamic or static?

Line 726: In addition to SOC, I would like to see the simulation performance of CO₂ flux and compare these simulations with flux-based observations.

Line 647: Since nitrogen cycle is a major improvement in your model, I suggest adding other experiments to show the simulation performance of nitrogen-related variables (e.g., N₂O, N loading, etc.).