

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2022-87

Anonymous Referee #2

Referee comment on "Developing a parsimonious canopy model (PCM v1.0) to predict forest gross primary productivity and leaf area index of deciduous broad-leaved forest" by Bahar Bahrami et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2022-87-RC2>, 2022

Bahrami and colleagues presented a manuscript describing the Parsimonious Canopy Model (PCM v1.0), that estimates gross primary productivity and leaf area index. The manuscript is well written (with some technical notes below) and, in my opinion, useful since the authors provides the code for the PCM in R.

I have two main concerns:

Please consider including in the title: "Developing a Parsimonious Canopy Model (PCM v1.0) to Predict Forest Gross Primary Productivity and Leaf Area Index on deciduous broad-leaved forest" or something that limits to the actual coverage of the study. Right now, the model only has been tested in this type of ecosystems (with good performance), and the actual title kind of oversells the coverage.

The phenology module. It is not clear if the phenology module estimates the start and end of the growing seasons using the warm-up period and then these values are used in the subsequent years. If so, this is a limitation of the model, since the SOS and EOS can be different over the years, influencing the carbon uptake period. At the end the annual sum might be correct/similar, however for incorrect reasons. This should be clearly stated in the limitation of the model, if it is the case.

General/Specific comments

Please check the use of the expression "e.g.", in the text it is used as "e.g.," with the comma, while in the abstract is not.

Please check over the text the use of "R²" in uppercase, it should be in lowercase since it is a 1:1 comparison.

Over the text, please use italics when referring to a parameter (i.e., coefficients/parameters from Table 3)

L146. Epsilon is in Eq. 3, not Eq. 4, please correct.

L217-218. Please check the references in this sentence.

L260. If $f_{SP} = f_{ST}$ (Eq 21), why not make it simple since Eq 18?

L288. It should be BIOME-BGC (check this all over the text), please check if this version also includes the MUSSO

L346-347. How is the PAR-PPFD conversion done?

L348-349. Does this mean that the phenology submodel parameters are fixed according to the warm-up year to the subsequent years? Are there implications for using this? Could the authors report the values of the start and end of the growing season for each year of simulation?

L476. Please check the references in this sentence.

L486. Please check this reference (Hirmas et al., 2018, Nature) for increasing the discussion on how soil parameters should not be fixed. I liked this!

Hirmas, D.R., Giménez, D., Nemes, A. *et al.* Climate-induced changes in continental-scale soil macroporosity may intensify water cycle. *Nature* **561**, 100–103 (2018).
<https://doi.org/10.1038/s41586-018-0463-x>

L503-504. "Therefore, corresponding parameters do not significantly influence the

modelled GPP". This sentence is ambiguous, since I cannot interpret to which parameters the authors are referring to (i.e., temperature stress or phenology).

L508. Please check how the references are used.

L571-583. This might be a good reference (Vargas et al) for the discussion of drought and Mediterranean ecosystems.

Vargas, R., Sonnentag, O., Abramowitz, G. *et al.* Drought Influences the Accuracy of Simulated Ecosystem Fluxes: A Model-Data Meta-analysis for Mediterranean Oak Woodlands. *Ecosystems* **16**, 749–764 (2013).
<https://doi.org/10.1007/s10021-013-9648-1>

In Tables 4-5, I recommend to the authors to report the linear regression coefficients (slope and intercept), not only RMSE and r^2 , so the reader can know the biases.