

# ***Interactive comment on “CLASSIC v1.0: the open-source community successor to the Canadian Land Surface Scheme (CLASS) and the Canadian Terrestrial Ecosystem Model (CTEM) – Part 2: Global Benchmarking” by Christian Seiler et al.***

## **Anonymous Referee #2**

Received and published: 26 February 2021

Overall assessment:

The manuscript submitted by Christian Seiler and coworkers present the evaluation of the open-source community land-surface model CLASSIC v1.0. A wide range of variables related to energy, water and carbon cycle are compared against observation-based, either site- or global-gridded, data.

An extensive evaluation and huge work have been carried out and are presented here

with a high degree of clarity. The manuscript is very well organized and written, and a large and useful selection of figures and tables support this work. This manuscript is of strong interest, not only as an overview of the strengths and weaknesses of one specific model, CLASSIC, but also as a guide for the long but necessary land-surface model evaluation exercise. I detail here minor corrections and feedbacks to be considered, and I warmly recommend this manuscript for publication in GMD.

Corrections and feedbacks:

In the section 2.1 presenting the model tools, CLASSIC is among others presented as a dynamic vegetation model. However, in this work and generally, it is not clear to me if the vegetation distribution is indeed calculated “dynamically” by the model, depending in particular on temperature and CO<sub>2</sub> conditions, or prescribed based on land map forcings. Could the authors clarify this point in the manuscript ? For a generally understanding as well: is nitrogen cycle included in this model ?

Correction page 4, line 114: a “c” is missing in “The protocol consists of a spin up”.

Correction page 17, line 493: replace “most” by “more” in “the positive biases are most evident in the NH extratropics rather than in the tropics”.

The authors underline both in the Abstract and in the Conclusion that “Our results will serve as a baseline for guiding and monitoring future CLASSIC development.” Regarding the development monitoring, this manuscript is indeed a good guide for future other evaluation steps. Yet nothing is said regarding future developments to be carried out in CLASSIC, in terms of improvement of already existing development or in terms of implementing new developments. Could you be more specific on this point ? Are there any weaknesses in CLASSIC that you suspect, or any characteristics known regarding the model responses to environmental conditions that this evaluation demonstrate they should be improved in the code ?

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Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2020-294>,

2020.

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