

Interactive comment on “SHIMMER (1.0): a novel mathematical model for microbial and biogeochemical dynamics in glacier forefield ecosystems” by J. A. Bradley et al.

Anonymous Referee #2

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This manuscript presents a model for the development of microbial communities and biogeochemical dynamics in forefield ecosystems. The focus of the model on the early development of primary successions makes it interesting and of potential application to other early successional environments. I think this is an important contribution and recommend publication after some minor issues are addressed.

-Although I found the split of the microbial community between different groups of autotrophs and heterotrophs interesting, I'm also concerned that this approach leads to a high degree of complexity due to the nonlinearities of the system of ODEs. The provided figures seem to indicate that the model converges to a steady-state, but it's this steady=state unique? Is it possible to obtain multiple steady-states? Given the non-

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linearities in the model I would expect possible bifurcations. Have you looked at this aspect?

-Similarly, due to the nonlinearities in the model, the output variables tend to oscillate. Are these oscillations realistic? Can you say something about what parameters may lead to these oscillations? It may be useful to look at the analyses in Manzoni & Porporato (2007, *Soil Biol Biochem* 39: 1542) and Wang et al. (20014, *Biogeosciences* 11: 1817).

-In general, this manuscript is too long. I think you can do a favor to the reader by removing unnecessary parts from all sections. Even the abstract is too long. Section 6 can be easily merge into two or three paragraphs without losing much content.

-Although the authors mention that the source code is available upon request, it'd be much better if the code is available in a public repository. Would it be possible to upload the source code to GitHub or other public repository?

-Page 6152: Are DIN and EPS previously defined?

-Page 6176, line 6. pattern.

Interactive comment on Geosci. Model Dev. Discuss., 8, 6143, 2015.

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