

## ***Interactive comment on “Integrating microbial physiology and physiochemical principles in soils with the Microbial-MIneral Carbon Stabilization (MIMICS) model” by W. R. Wieder et al.***

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We appreciate the constructive suggestions made by Drs. Jones, Sierra, and Allison in response to our discussions paper. We are excited that their comments generally asked for more information, especially relating to model dynamics at larger scales and in global change scenarios. We present a revised manuscript that addresses these suggestions, but stress that our aim with this paper was to thoroughly document the theoretical underpinnings that generated the model assumptions and structure that are applied in MIMICS. Broader consideration of model dynamics, especially in non-steady state simulation and at global scales is planned for subsequent manuscripts. Specific

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responses to reviewer suggestions follow.

Rev. 1, Dr. Chris Jones We completely agree with Dr. Jones' excitement about exploring the non-steady state dynamics of a model like MIMICS, but emphasize these questions are highlighted in manuscripts that are in preparation. The topic was also a focus of our recent publication (Wieder et al. 2013). Since MIMICS is based on the same broad model structure we don't expect the fundamental response to temperature would be markedly different with the model presented here. We have added a paragraph to the end of the discussion that unpacks some of the inherent differences in traditional and microbial explicit models (see lines 561-581 of the revised manuscript). This discussion broadly contrasts model assumptions, structures, parameterization, and their response to environmental change. We highlight key uncertainties and try to present a balanced argument that's informative, without being overly speculative.

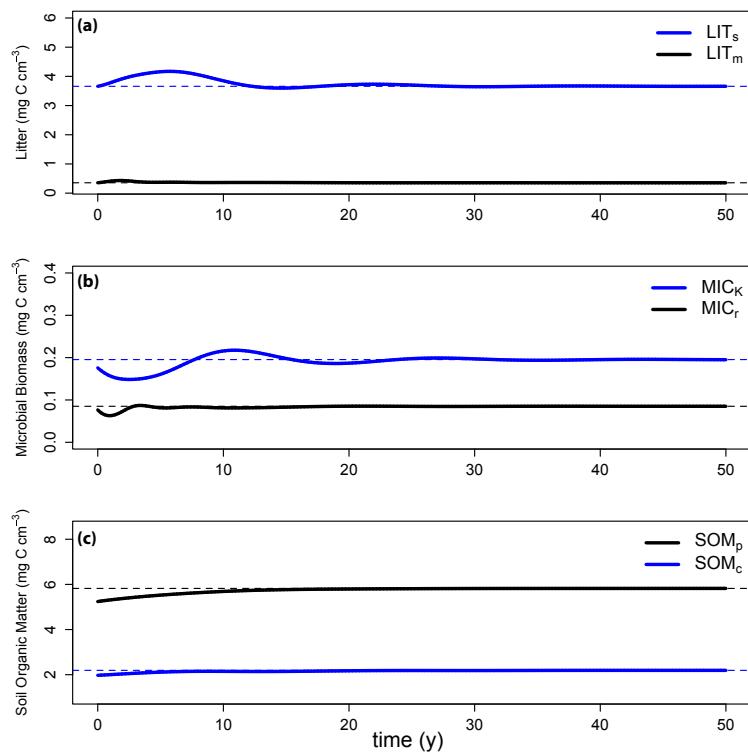
We address Dr. Jones' minor queries about microbial biomass pool size, soil moisture, and model complexity in lines 348, 175, and 593, respectively. See also new Fig. 5. We also more directly acknowledge the need to consider soil moisture (line 622).

-references: Wieder WR, Bonan GB, Allison SD (2013) Global soil carbon projections are improved by modelling microbial processes. *Nature Clim. Change*, 3, 909-912.

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**Fig. 1.** Figure 5. Temporal response of (a) litter, (b) microbial biomass, and (c) soil C pools to a 10% reduction of steady state MIC and SOM pools at time zero of the experiment (solid lines).

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