

The manuscript presents a model that explicitly represents microbes and couples C-N cycles. The model has the potential to be applied in ESM to work on large scale. The model performs better than the traditional CLM in several aspects and provides new insights regarding to response of soil to N enrichment. However, there are still several aspects could be improved before it can be published.

Line 18: add “,” after biosphere

Line 30-33: The sentence is a little confusing, please rephrase it.

Line 33-34: grammar error

Line 45: what did you mean by “direct relationship between N and atmospheric C exchange”?

Line 52: for litter, as well as active, slow, and passive pools of Soil Organic Matter (SOM)

Line 53-62: There are a few microbial models, e.g. MEND, ORCHIMIC that may applied in global scale. What are the advantages and disadvantages of MIMICs compared to them?

Line 241-244: It is weird to classify the data using different standards for observation and model, as this will make the comparison not reasonable.

Line 244: For these sites, they do not have data below 50 or 100cm, or they have low C content below? The followed sentence is not clear, please rephrase.

Line 249: 15 gNm<sup>-2</sup>/yr

Line 251-252: How did you distinguish the responses of different processes and components? For the N uptake, there is competition from plants. Could you explain how this was modeled in the model? By the way, plant's uptake of N would have large effects on soil C:N, according to ORCHIMIC. MIMIC+ seems to have a much lower C:N in Fig. 3, I am wondering whether there is accumulation of N in the soil in your model?

In Fig 2, the modeled SOC by MIMIC+ seems to comparable to the observation in soil depth 0-30, 30-50, but there is overestimation in 50-100. Could you please explain? I suppose the author should have done some parameter optimization, so what caused this overestimation in deep soil?

Line 288: How is 84% mean? Is it SOC/(SOC+Litter)? What did you mean by “the protected pools”?

Line: 298-299: There should be some pre-conditions for this implication. At global scale, productivities in warm regions are larger than those in cold regions, while SOC are mainly stored in northern high latitude.

Line 365-369: suggest to add few sentences to discuss the responses if increase in plant production (also mean increased N uptake by the plants)

Line 395-408: as I mentioned above, should the lower C:N is because there is some N loss process missing? As you model provided reasonable C stock, but too low C:N, it means you have too much N accumulated in the soil.

The discussion part should be better organized. For example, 4.1 and 4.2 both have C pools. Maybe you can have more clear subsection tiles?

Section 4.5: what is the C:N set for fungi and bacteria? How many microbial groups are in the model? Could the too low C:N is due to the prescribed C:N value? The C:N for microbes should be variable, you may add one sentence to discuss this.