Interactive comment on “ORCHIMIC (v1.0), a microbe-driven model for soil organic matter decomposition designed for large-scale applications” by Ye Huang et al.

Anonymous Referee #1

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The authors integrated the state-of-the-art knowledge into a microbe-enabled soil C-N model (ORCHIMIC) with four microbial functional groups and a dynamic enzyme production approach. I acknowledge the authors for a comprehensive comparison of their results to literature and observations in terms of parameter values and pool sizes. To my understanding, the "dynamic enzyme production mechanism" is a vital improvement over existing models. Thus I would like the authors, if possible, to address this feature in a separate sub-section in "Discussion". My second suggestion is to show the simulated C:N ratios in major organic matter and microbial pools (you may include them as supplementary information) as ORCHIMIC is a C-N coupled model. One more suggestion for this paper is to use simple notations in most of the equations. For example, you may use the notation \((F(T))\) for the temperature functions in Eqs. (20-24) and add one more equation for \(F(T)\) as you did for Eq. (15-19). In addition, it is negotiable whether it is appropriate to specifically address "large-scale applications" in the title, as it was only tested with lab-incubation data in this paper, although it is known that ORCHIMIC may be coupled to large-scale models. Other minor comments:

Abstract: Page 1, Line 32: I think "the model" refers to the ORCHIMIC model, please explicitly use the model name.

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