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# Modeling of decomposition activity and priming effect in soil using the versatile index of microbial physiological state

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The implementation of microbial biomass in soil organic matter (SOM) models is still unresolved issue. The approaches using explicit description of microbial biomass (decomposer) interaction with SOM usually cannot be easily verified by means of experimental estimating of total microbial biomass dynamics. Standard experimental methods, such as fumigation extraction or direct microscopic count, does not represent microbial activity (Blagodatskaya and Kuzyakov, 2013), which is essential for the control of decomposition rate. More advanced approaches, explicitly simulating intracellular metabolic activity (Resat et al., 2012) and e.g. production and turnover of extracellular enzymes (Lawrence et al., 2009) are prohibitively complex for the field and larger scales, which are most often under demand for SOM modelling. One possible parsimonious solution is an application of index of microbial physiological state (r), which describes the adaptive variation of the cell composition and metabolic activity by one variable (Panikov, 1995). This variable (r) can reflect the microbial response to the availability of carbon and nitrogen and shift of microbial biomass between active and dormant state (Blagodatsky and Richter, 1998), but also can be used for the description of the effect of external factors, such as temperature and moisture, on microbial activity. This approach is extremely useful for the description of priming effect (Blagodatsky et al., 2010) and the influence of substrate availability and external factors on the size and dynamics of priming. Distinguishing of these two types of driving forces for priming is crucial for modelling of SOM dynamics and steady-state stocks of different SOM pools. I will present the analysis of model response on combination of limiting factors presented as functions controlling the change of microbial physiological state and size of priming effect. Alternatively, the direct effect of the same factors on decomposition rate and priming will be investigated and compared with newly suggested approach.

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