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Soil organic matter (SOM) dynamics: From microbial to pedon scale

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Understanding microbial role in SOM decomposition is important to disentangle different ways of SOM stabilization. There are fine scale models that can explain SOM stabilization due to microbial energy limitation by explicitly modeling microbial biomass and its activity. However, widely applied SOM dynamic models at pedon and larger scales (e.g. RothC, Century, Yasso, CASA, Q-model) neglect interactions between different SOM qualities due to microbial energy limitation.

In this study we make use of the quasi-steady state assumption to successively abstract from details of a microbial explicit model. By this we derive simpler models with fewer parameters that still capture the general dynamics at larger time scales. The models of different complexity are compared and evaluated for several scenarios of litter input. A simple one-parameter equation of microbial energy/substrate limitation is presented that is applicable at decadal time scale and straightforward to implement into other models of SOM dynamics.

http://www.biogeosciences-discuss.net/9/17167/2012/bgd-9-17167-2012.html