

BayCEER Kolloquium

Lectures in Ecology and
Environmental Research

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12:15 in H6, GEO



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It's the little things that count - how microbial dynamics affect soil functions at the pedon scale

Mechanistic simulation models are essential tools for predicting soil functions such as nutrient cycling, water filtering and storage, productivity, and carbon storage as well as the complex interactions between these functions. Most soil functions are driven or affected by soil microorganisms. Yet, biological processes are often neglected in soil function models or only implicitly considered in form of unspecific, effective rate parameters. This can be explained by the high complexity of the soil ecosystem with its spatial and temporal dynamic and heterogeneous environment.

We integrated different microbial processes and feedbacks into our systemic soil model BODIUM (König et al., 2023) and tested the sensitivity of soil functions to these microbial aspects at the scale of soil profiles. This includes flexible C:N ratios, carbon use efficiency, nitrogen fixation, feedback with root exudation, and the dynamics of different functional groups such as fungi and bacteria. In this talk, I will present some of the results and discuss the high relevance of microbial processes for soil functions at the field scale, but also what further model improvements regarding process description are needed. Additionally, I will give some insights how our model can be used as a decision support tool for farmers.

