



Quantitative evaluation of soil functions: application to the data of the German Agricultural Soil Inventory

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The quantitative evaluation of the impact of agricultural management and climate change on soil functions is prerequisite for developing sustainable soil management. Soil functions are integral properties emerging from complex process interactions. They cannot be measured directly so that we need to rely on evaluation schemes based on indicators.

Vogel et al. (2019) developed a scheme to quantitatively evaluate soil functions which distinguishes between a soil's potential and its actual state. They defined a soil's potential to provide a soil function to be the maximum a soil can offer based on its inherent properties and site conditions while assuming that all soil properties that can be affected by soil management are in some optimum state within the limits of good agricultural practice. In contrast, a soil's state is evaluated based on its manageable soil attributes. It can be applied to describe the room for improvement.

In this presentation, we apply the evaluation scheme by Vogel et al. (2019) at the scale of Germany using the data from the German Agricultural Soil Inventory (Jacobs et al., 2018; Poeplau et al., 2020). We use the data from more than 2200 soil profiles from arable sites and calculate indicators for potentials and actual states for the production function, the carbon storage function and the water storage function. For all functions, results show characteristic patterns which can be related to climatic and soil conditions but also provide evidence about the influence of agricultural management on soil functions. The results of this study may be used to analyze synergies and trade-offs between the various soil functions and to develop options for more sustainable soil management.

References:

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