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A modelling approach to find stable and reliable soil organic carbon values for further regionalization.

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Soil organic matter (SOM) and carbon (SOC) might be the most important components to describe soil fertility of agricultural used soils. It is sensitive to temporal and spatial changes due to varying weather conditions, uneven crops and soil management practices and still struggles with providing reliable delineation of spatial variability. Soil organic carbon, furthermore, is an essential initial parameter for dynamic modelling, understanding e.g. carbon and nitrogen processes. Alas it requires cost and time intensive field and laboratory work to attain and using this information. The objective of this study is to assess an approach that reduces efforts of laboratory and field analyses by using method to find stable initial soil organic carbon values for further soil process modelling and regionalization on field scale.

The demand of strategies, technics and tools to improve reliable soil organic carbon high resolution maps and additionally reducing cost constraints is hence still facing an increasing attention of scientific research. Although, it is nowadays a widely used practice, combining effective sampling schemes with geophysical sensing techniques, to describe within-field variability of soil organic carbon, it is still challenging large uncertainties, even at field scale in both, science and agriculture. Therefore, an analytical and modelling approach might facilitate and improve this strategy on small and large field scale.

This study will show a method, how to find reliable steady state values of soil organic carbon at particular points, using the approved soil process model CANDY (Franko et al. 1995). It is focusing on an iterative algorithm of adjusting the key driving components: soil physical properties, meteorological data and management information, for which we quantified the input and the losses of soil carbon (manure, crop residues, other organic inputs, decomposition, leaching). Furthermore, this approach can be combined with geophysical observation data, such as Electrical Resistivity Tomography (ERT) or Electromagnetic Tomography (EM38), to assist delineation of spatial distribution of soil C on larger scale. The calibration parameter values were derived from the Schäfertal research catchment area, located north of the small in the lower eastern Harz Mountains of central Germany.