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Soil organic matter change – analysis on a regional scale of Austria

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Soil organic matter (SOM) is an important resource in agriculture. It influences soil fertility, erosion processes and prevents soil degradation. However, SOM is strongly affected by climate change, soil conditions and management alterations.
The presented study analyzes SOM changes in Austria on a regional scale in the “Marchfeld” and the “Muehlviertel”. For quantification these SOM changes the model CCB (Candy Carbon Balance) was used.
Based on a 1 square kilometer raster, the impact of specific site conditions on SOM are determined to characterize the study areas. Used as a main indicator for these conditions is the biologic active time (BAT). BAT describes the biologic activity for carbon cycling in top soils depending on soil and climatic conditions. High values of BAT indicate fast SOM reproduction rates. Hence, BAT changes over last years signpost the risk of SOM loss and can be used as an on-farm decision tool.
The change of risks of SOM loss due to climate change is assessed by model results. Therefore, three climate scenarios are used to compute reproduction rates of SOM. “High risk-regions” can be identified for policy consulting. Different climate scenarios can help to develop best case and worst case results.
First results show that the region “Marchfeld” had a higher change in BAT during last 2 decades comparing to the “Muehlviertel”. A higher risk of SOM loosing is evident. Nevertheless, future scenarios predict a higher change of BAT for the “Muehlviertel”. Apparently, the sensitivity of “Marchfeld” sites regard to climate change has been higher in the past and most BAT changes took place until now.
With this method an evaluation of farm management in regard to SOM reproduction and recommendation of crop rotations for the future are possible. In conclusion, the aim of the project is a tool box for farmers and policy makers to evaluate present and future agricultural management. An examination of additional regions in Austria is planned.