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# The effect of land use intensity on soil organic carbon stocks of European croplands

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Croplands cover about one third of Europe and are assumed to be the biggest source of greenhouse gas emissions of the European biosphere with the degradation of soil organic carbon (SOC) being a major contributor of this source. Soil carbon stocks of croplands are subjected to ranges of natural and anthropogenic influences that control the release or uptake of $CO_2$. The separation of drivers is essential for assessing recent and prospective GHG mitigation potentials by cropland management.
Within the last decades the management of European croplands is characterized by an ongoing intensification. The increasing influence of the global market on farmers' decision and the establishment of industrialized farming practise in Europe had significant impact on the shift of crop rotations during the last decades.
Due to the high spatial variability and the dominating fraction of slowly degradable carbon it needs at least decades to detect changes while agricultural management is characterized by short term system interventions. Long term observations representing time intervals of decades to hundreds of years are therefore essential to make reliable suggestions about the sensitivity of soil carbon turnover against external impacts because the temporal scale of these experiments corresponds to the temporal scale of soil C turnover.
A data set of about 32 European long-term experiments (380 variants) was used to quantify the uncertainty of the RothC soil carbon model. The parameters of the model were adapted to represent the sensitivity of SOC on weather conditions and crop types found in the data set by applying an Monte Carlo Markov Chain algorithm.
Integrated in a GIS environment the modified model was used to run scenarios that vary in terms of climate conditions and crop rotations within the time period 1970-2010 on a European scale. Regionalized sensitivities of SOC on natural drivers and crop rotations will be presented.