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Carbon balances of a cultivated and a non-used peatland in Western Siberia - What is the impact of climate and land-use change?

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Peatlands of Western Siberia store almost about a quarter of all terrestrial carbon fixed since the last ice age, and provide, if deteriorated, an important source of radiative forcing.
Due to climate change and recent socio-economic developments in Western Siberia agriculture is strongly progressing there. It can be expected that, in the long term, currently not used peatlands will be cultivated. This might lead to a degradation of the carbon stocks, which has an impact on global warming.
The exchange of carbon dioxide and methane between the surfaces of two different land-use types and the atmosphere has been studied in the Tyumen Oblast, Western Siberia, in 2013. Two eddy covariance measurement stations have been operated in parallel from end of March/ beginning of April until mid of October on a cultivated peatland (oat field) and an unused peatland meadow, respectively. The aim was to find out how their carbon balances differ and to give a recommendation for the future agricultural development in the region.
No directed methane fluxes were found on either sites because the water levels were rather low and the soil was only temporarily wet. The fluxes of carbon dioxide, however, showed very site specific patterns: The carbon dioxide fluxes over the oat field showed phases of clear emissions in spring after snow melt and in fall, as well as a phase of an uptake peak in summer. The fluxes over the meadow, however, were less structured and showed a rather constant uptake during the whole vegetation period. Though there were net carbon dioxide emissions in July, when the peat was partly burning. Balancing the whole measurement period the oat field was identified to be a clear carbon source (about 480 g CO_2 m-2 in 185 days), whereas the meadow served as a sink of carbon (about 95 g CO_2 m-2 in 177 days). The conversion from non-used peatland meadows to cultivated fields is therefore considered to have a positive effect on climate change. Long phases of bare soil were found to be the main reason for the large carbon dioxide emissions over the oat field. Consequently, in terms of agricultural intensification in Western Siberia it is recommended to increase the productivity on existing fields (there is still large capacity) rather than to extent the surface area, and to use intercrops.