

EGU2020-18999

<https://doi.org/10.5194/egusphere-egu2020-18999>

EGU General Assembly 2020

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## Does soil disturbance result in soil carbon losses? – A case study on bioturbation effects of wild boar

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Soil disturbance and disruption is assumed to enhance mineralisation and cause losses of soil organic carbon. Therefore, no tillage is promoted as soil carbon sequestration measure. However, the experimental evidence of enhanced carbon turnover due to soil disturbance is rare. We investigated soil disturbance in forest ecosystems with simulated bioturbation of wild boar. Wild boar are effective at mixing and grubbing in the soil and wild boar populations are increasing dramatically in many parts of the world. In a six-year field study, we investigated the effect of wild boar bioturbation on the stocks and stability of soil organic carbon in two forest areas at 23 plots. The organic layer and mineral soil down to 15 cm depth were sampled in the disturbed plots and adjacent undisturbed reference plots.

No significant changes in soil organic carbon stocks were detected in the bioturbation plots compared with non-disturbed reference plots. However, around 50% of forest floor carbon was transferred with bioturbation to mineral soil carbon and the stock of stabilised mineral-associated carbon increased by 28%. Thus, a large proportion of the labile carbon in the forest floor was transformed into more stable carbon. Carbon saturation of mineral surfaces was not detected, but carbon loading per unit mineral surface increased by on average 66% due to bioturbation. This indicates that mineral forest soils have non-used capacity to stabilise and store more carbon.

Our results indicate that soil disturbance and bioturbation alone does not affect soil carbon turnover and stocks, but only change the distribution of carbon in the soil profile. This is in line with results from no-tillage experiments. The prevailing effect is a redistribution of carbon in the soil profile with no changes in total soil carbon stocks. We discuss these findings in the light of soils as potential sinks for carbon.