

The effect of photo-exposure on peat decomposition and carbon cycling

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Several recent studies have indicated that photodegradation, enhancement of decomposition rate caused by exposure to light and particularly UV light, may play an important role in plant residue and soil organic matter decomposition. So far most work on photodegradation has focussed on semi-arid areas, but a modelling study has indicated that photodegradation could potentially play a role also in higher latitudes. Peat may become exposed to sunshine through erosion or use for cultivation or harvesting. The exposure could prime the peat for enhanced decomposition, and potentially explain the patchy nature of peat decomposition.

In this study, peats from typical micro-environments were collected in May at Mukrhino research station in Western Siberia (60°54' N, 68°42' E), 26 km west of the town of Khanty-Mansiysk. The peat was then dried and weighed and put in bags, both transparent and shaded controls. The bags were exposed to sunshine during the summer at the site. After collection in August, the peat was incubated with water (at field capacity and submerged) and CO₂ and CH₄ evolution measured. The results indicate that exposure to sunshine increases subsequent peat decomposition at field capacity, the effect for submerged peat is less clear. No methane emission was recorded. This indicates that the effect of exposing peat to sunshine for example during management or erosion could increase carbon loss. Further work focusses on how photo-exposure changes peat chemically to make it more degradable.