

Does peatland restoration make a difference to the millennial scale carbon balance?

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Millennial peatland carbon balance is of crucial importance to assess the past and future forcing of peatlands carbon sequestration on climate. However drainage and exploitation of peatlands over the last and current centuries greatly affect the carbon balance of 25% of the global peatlands (Parish et al. 2008). Moreover, the impact of drainage is likely to remain for unforeseeable time, modifying the hydrology and the ecology of peatlands.

The aim of this study is to assess the influence on the long-term carbon balance of restoration practices over abandonment on vacuum-extracted peatlands. We modified the Holocene Peat Model (Frolking et al. 2010) to simulate peat extraction as well as different post-extraction management strategies: abandonment, drainage blocking and restoration.

Simulation results enable the comparison of the response of the system to different management strategies. The carbon balance is estimated for the millennia following extraction for different management strategies and different climate conditions. The difference between restoration practices and abandonment allows the assessment of the net carbon gain associated with restoration.

Although it is expected that successful restoration practices are beneficial to the carbon budget of the ecosystem, it will take millennia to restore what has been extracted. In cases where the site is left abandoned, it is estimated that peat would degrade within centuries. The management strategies and the duration of the period of latency between extraction and restoration are key factors controlling the magnitude of the future carbon loss or gain of a peatland.