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Quantifying the contribution of grassland and paludiculture to carbon fluxes from a single eddy covariance tower in a Dutch peatland

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Peatlands across the Netherlands have been drained or disturbed for several hundred years. The resulting oxidation of peat releases large amounts of carbon to the atmosphere which turns peatlands into a carbon source rather than a sink. Rewetting peatlands reduces, or stops, carbon losses by inhibiting peat mineralisation, and can even lead to carbon sequestration. The rewetting of natural peatlands frequently causes helophytisation, where tall helophytes, such as *Typha latifolia*, establish themselves. There is interest in paludiculture (i.e., growing crops such as *Typha* on submerged or extremely wet soils) as a way to reverse peatland degradation and sequester carbon, while possibly retaining some agricultural value. Uncertainties remain about the impact of rewetting and helophytisation of peatlands and how well the strategy will help the Netherlands achieve its commitments to reduce carbon emissions.

In this presentation, we compare the carbon budgets of a rewetted peatland covered with *Typha latifolia* to the surrounding grassland (*Lolium perenne*). The *Typha* field has an area of 3600 m^2 and is managed to optimise yield by having a water table above the surface, applications of fertiliser, and is harvested once per year. CO_2 and CH_4 fluxes were estimated using data collected by the eddy covariance (EC) method for close to two years at the experimental field site Zegveld in the west of the Netherlands. The EC tower is located at the interface of the contrasting land uses, such that the source of the flux is dependent on the wind direction. For each timestep, we estimate the relative contribution of the different land uses by using the flux footprint. Gap-filled carbon fluxes were obtained using flux-contribution mixing models and subsequently the carbon budgets for each land use were estimated. The results indicate an increased CO_2uptake, but larger CH_4 emissions, over the *Typha* plot compared to the grassland. This CH_4 flux significantly reduces the gain achieved by reducing oxidation through soil wetting.