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Greenhouse gas exchange of young rewetted swamp in northern Netherlands

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There are many initiatives to re-wet drained nature or former agricultural land. These young wetlands provide a natural habitat for a range of endangered species, while serving as a natural climate buffer by retaining water, regulating air temperature, and sequestering CO_2 from the atmosphere. However, wetlands may also emit CH_4, which has a global warming potential (GWP) of about 30. Thus, all carbon fluxes need to be quantified in order to assess if, from a climate perspective, CO_2 uptake outweighs CH_4 emission.

To assess the net effect of young wetlands on Greenhouse Gas exchange, we study the CO_2 and CH_4 fluxes of two recently rewetted areas near Groningen, the Netherlands. The fluxes are measured directly using the Eddy Covariance (EC) technique on a moveable station, alternating between the two sites. Meteorological observations are performed at these stations as well, along with other supportive measurements such as soil/water temperature. The alternating time gaps are filled by interpolation based on observed ecosystem responses. Footprint analysis provides insight into the role of various vegetation types inside these swamps. The resulting carbon budgets provide insight into GHG exchange over typically small temporal and spatial scales.

The study also examines the feasibility of these moveable stations, as they may reduce the relatively high research costs of EC measurements. The data from moveable stations is reliable if the data is regular, as the time gaps are filled by interpolation. At this stage, the timeseries is too short to draw any conclusions upon the reliability of the data. However, the moveable stations appear to be feasible from a practical point of view, as the station can be relocated relatively easy within the time span of a day.

The first results suggest both substantial CO_2 uptake and CH_4 emissions but a full year of data was not collected yet. Observed exchange compares well to similar studies previously performed.

Ultimately, annual budgets of the carbon exchange response will be correlated to weather conditions but also to hydrological measures such as water levels. This should allow extrapolation of the data, which may serve as a basis for policy makers to manage the carbon balance when re-

wetting nature to achieve net mitigation of greenhouse warming potential.