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Methane release from a rewetted coastal fen in Northeast Germany

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Northern peatlands are an important component of the global carbon storage, to understand the present state of the carbon in our peatlands we studied the spatial and temporal variability of methane fluxes and the underlying processes, because these ecosystems are the biggest natural source of methane.
Recently flooded fen sites show a significant increase of CH4 emissions in their first years of rewetting. Thus, methane fluxes were measured in a rewetted coastal fend dominated by vascular plants at the Baltic Sea (Northeast Germany), which show high spatial and temporal variability. These emissions present a strong spatial variation over an order of magnitude (0 - 120 mg CH4 m^2h) of methane fluxes and was attributed most often to differences in water level and/or differences in soil. Also, vegetation differences were found to be an important driver of spatial variability.
At the temporal scale, the temperature dependency of methane fluxes has been established by a wealth of studies. However, longer term changes of methane fluxes have also been shown to be related to persistent water level changes with inherent vegetation transitions. The methane fluxes showed strong temporal variability at different scales: diurnal cycles, significant day-to-day variability, and seasonal variations.Highest methane fluxes were observed during summer and lowest fluxes during autumn and winter. The vegetation density together with temperature and length of day-light probably determined this seasonality.
In this study we investigate all aspects of CH4 release pathwaysin peatlands, in order to better understand the prognosis of this kind of environments.