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Role of plant-mediated gas transport in CH_4 emissions from *Phragmites*-dominated peatlands

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A large part of the methane (CH_4) produced in peatlands is directly oxidized and the extent of its oxidation depends on the gas transport pathway. In wetland ecosystems, CH_4 can be transported from the soil to the atmosphere via diffusion, ebullition and via aerenchyma of roots and stems of vascular plants. Compared to other wetland plants, the very common species *Phragmites australis* (Common reed) appears to have a high ability to transport gases between the soil and atmosphere. The gas exchange within *Phragmites* plants takes place via convective flow through the culm, which is believed to be achieved by a humidity-induced pressure gradient and is more than 5-times as efficient as diffusion. By this mechanism, CH_4 surpasses the upper (oxic) soil layers and therefore oxidation of CH_4 may well be reduced. On the other hand, transport of oxygen in *Phragmites* plants tends to enhance O_2concentration in the rhizosphere, which will foster CH_4oxidation in deeper soil layers. It is therefore unknown whether humidity-induced convection leads to higher or lower overall CH_4 emission in *Phragmites*, which is essential to understand their role in the emissions from these very common peatland types.

To investigate whether this internal gas transport mechanism of reed promotes or reduces CH_4 fluxes to the atmosphere, we conducted manipulative field experiments in a large *Phragmites* peatland in South-West Germany in October 2014 and July 2015. Using large chambers, we compared CH_4 fluxes from intact plots, plots with cut reed, and plots with cut + sealed reed to exclude gas transport through the plants. Additionally, pore water samples from the plots were analyzed for possible changes in soil chemistry due to the change of oxygen transport into the soil by the treatments. Based on our results, we will explain the potential role of rhizosphere oxygenation and convective flow on CH_4 emissions from *Phragmites*-dominated peatlands in relation to other environmental condition.