GHG emissions from peatlands: Effects of rewetting and land use

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RRR 2013 Greifswald, Germany

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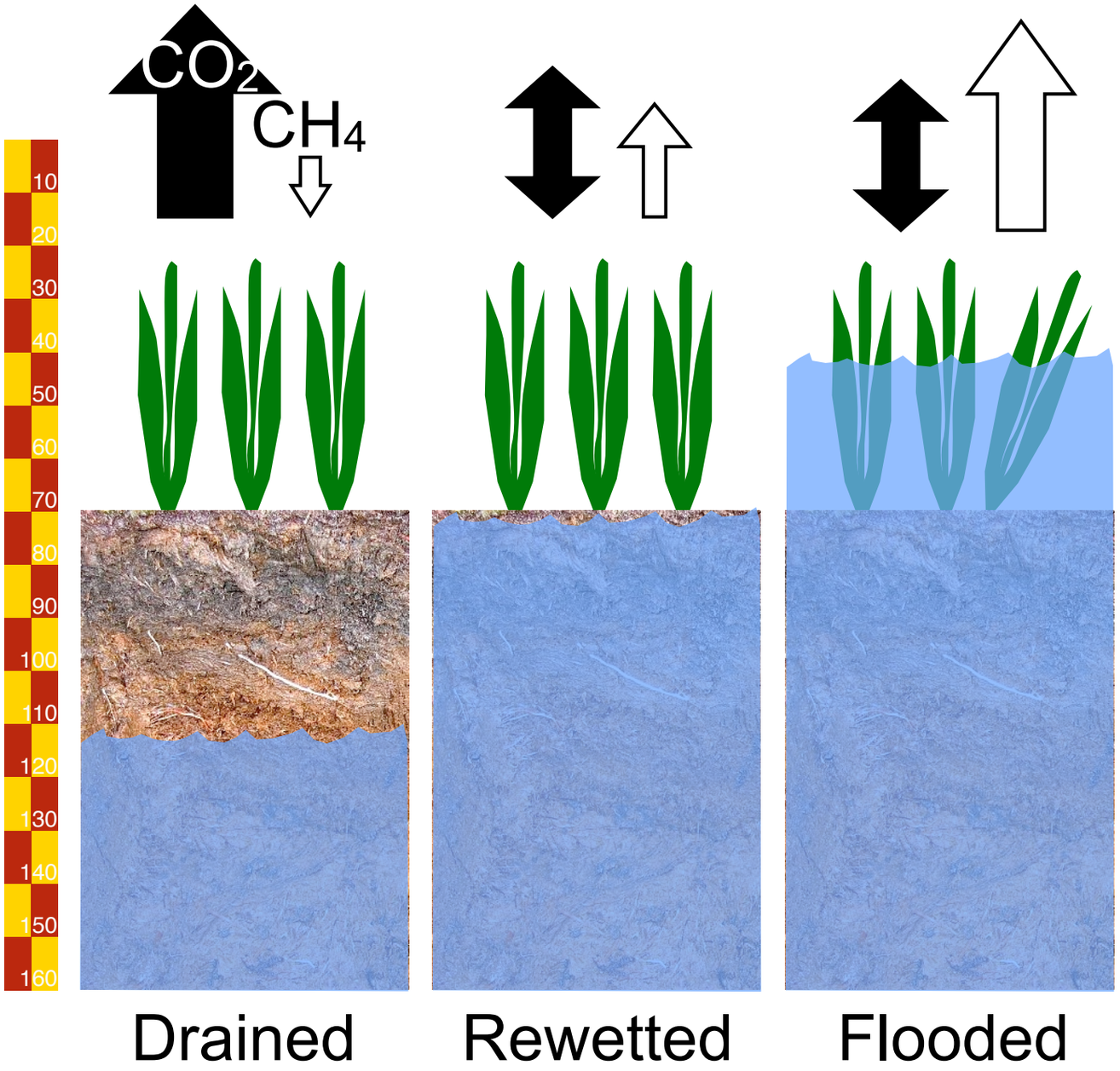
Annual GHG exchange is mainly driven by mean annual water level



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Data on GHG exchange in temperate wetlands

- 52 studies (incl. unpublished data sets)
- 594 data points (CO_2: 161, CH_4: 261, N_2O: 171)
- Closed chamber (542), eddy covariance (25), other (27)
- Recorded from 1992 to 2012 (relatively evenly distributed)
- In Fens (380), Bogs (156), Others (58)

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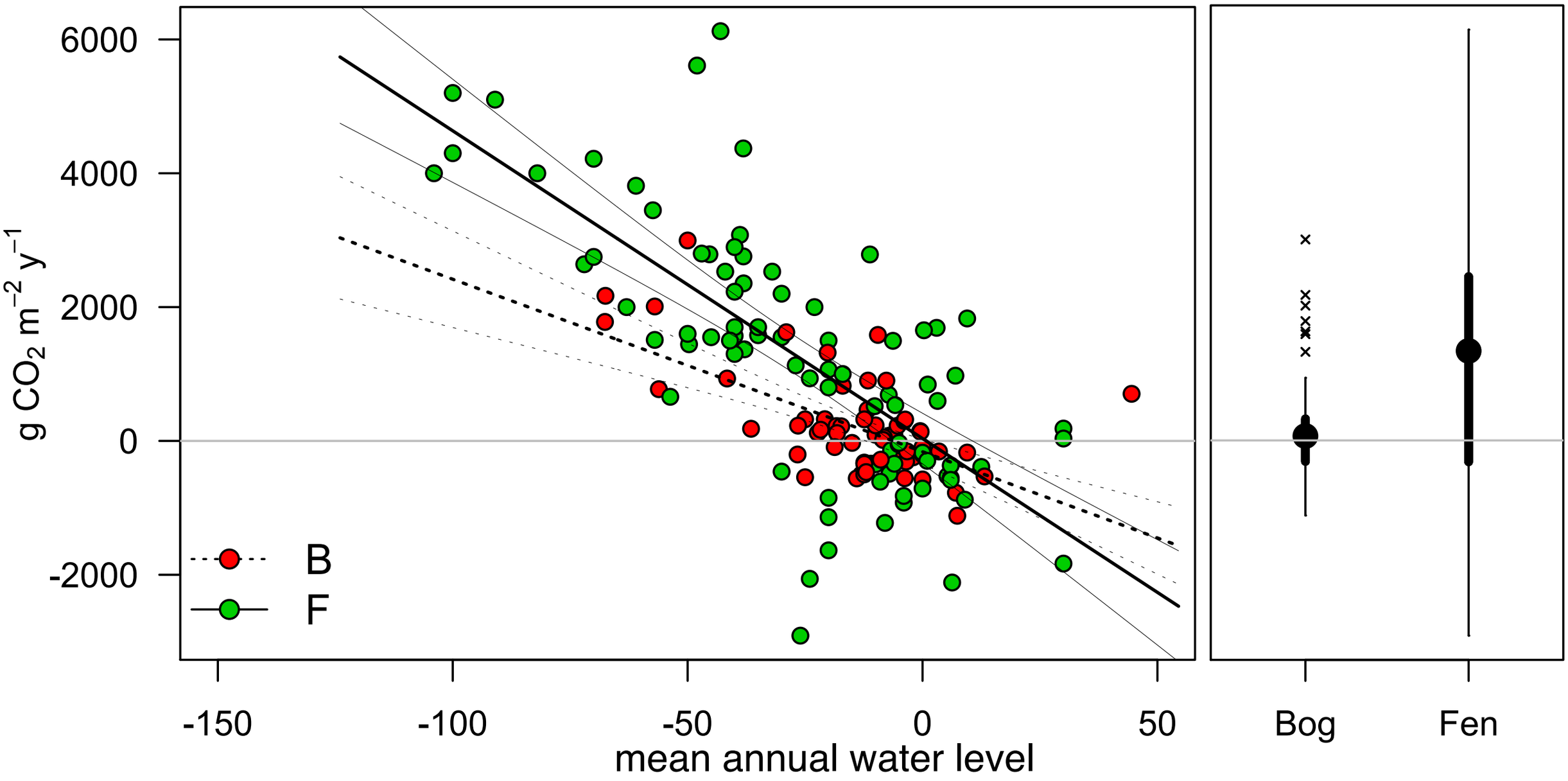
CO_2 exchange is driven by water level across peatland types



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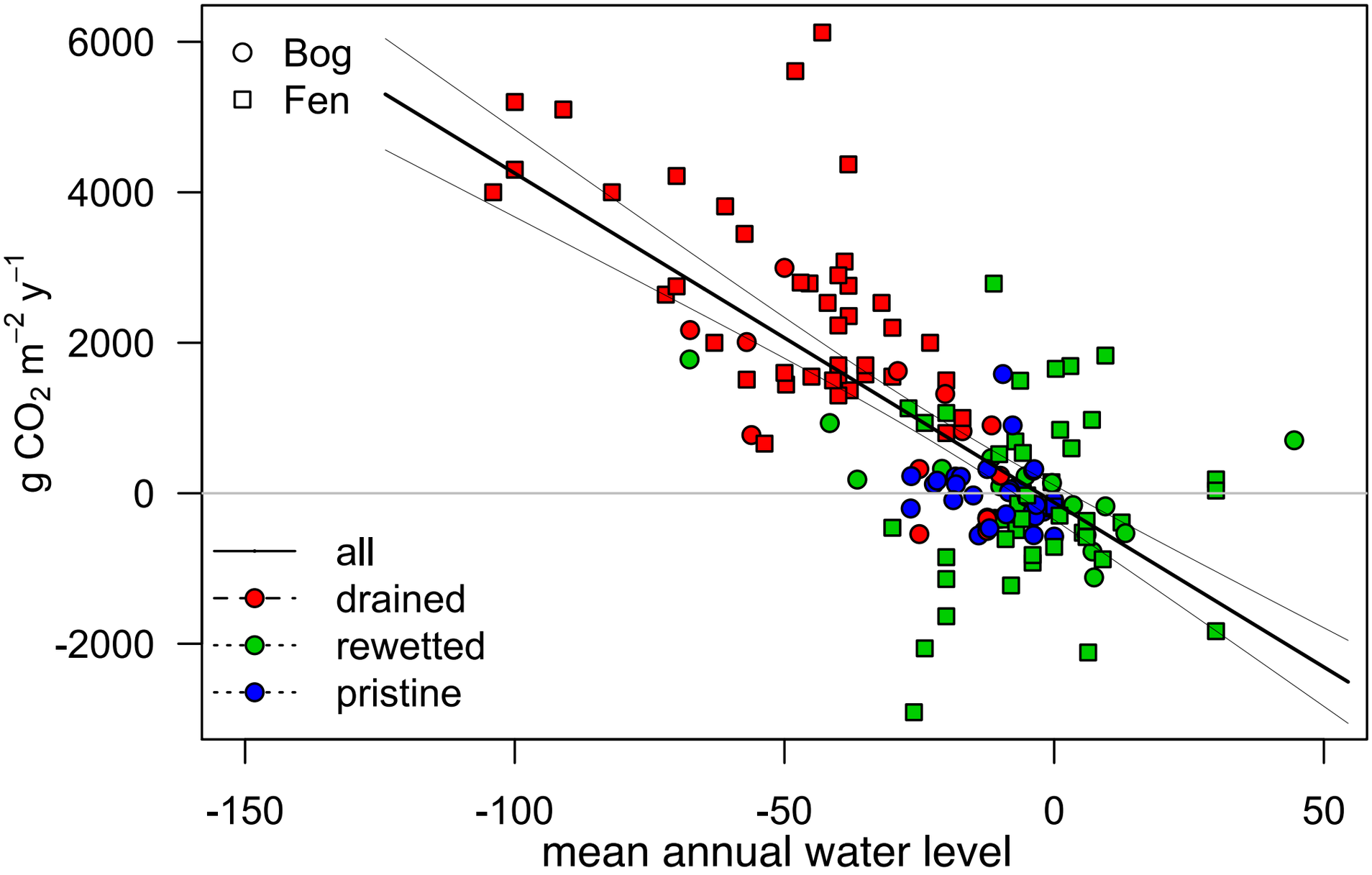
Drainage increases CO_2 emissions and rewetting effectively stops them.



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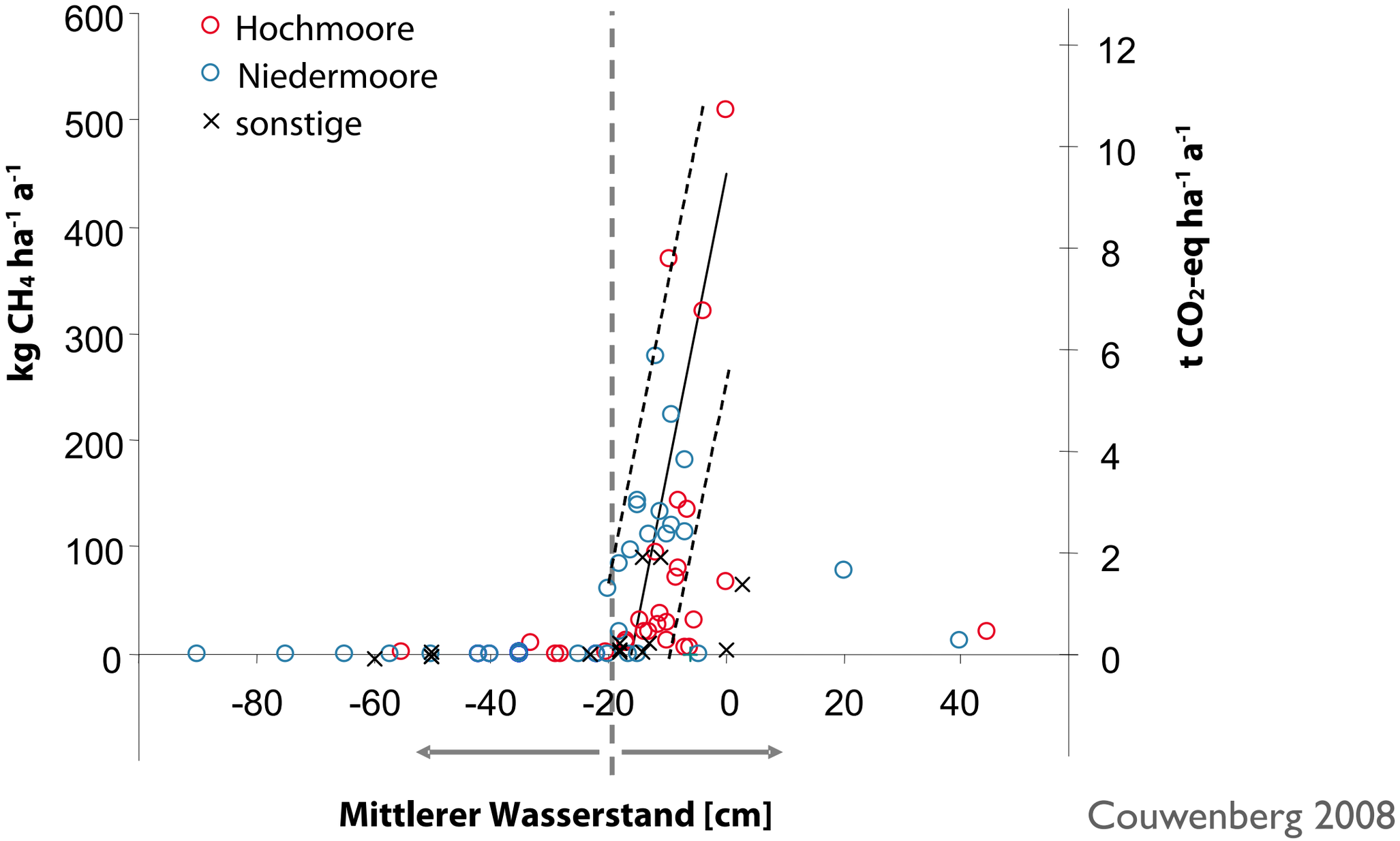
CH_4 exchange is driven by water level across peatland types



Couwenberg 2008

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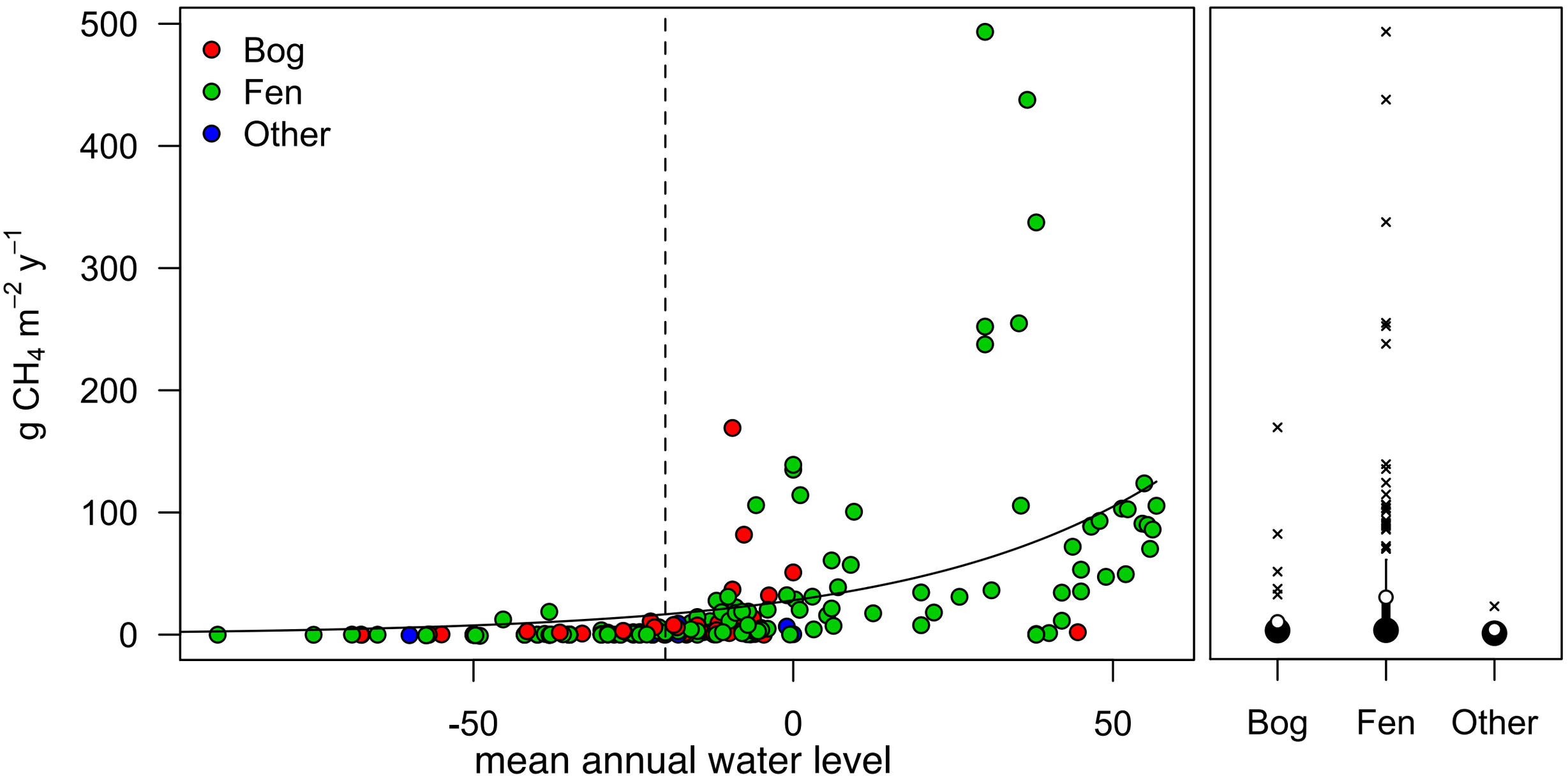
CH_4 exchange – also with more data the –20cm switch remains apparent



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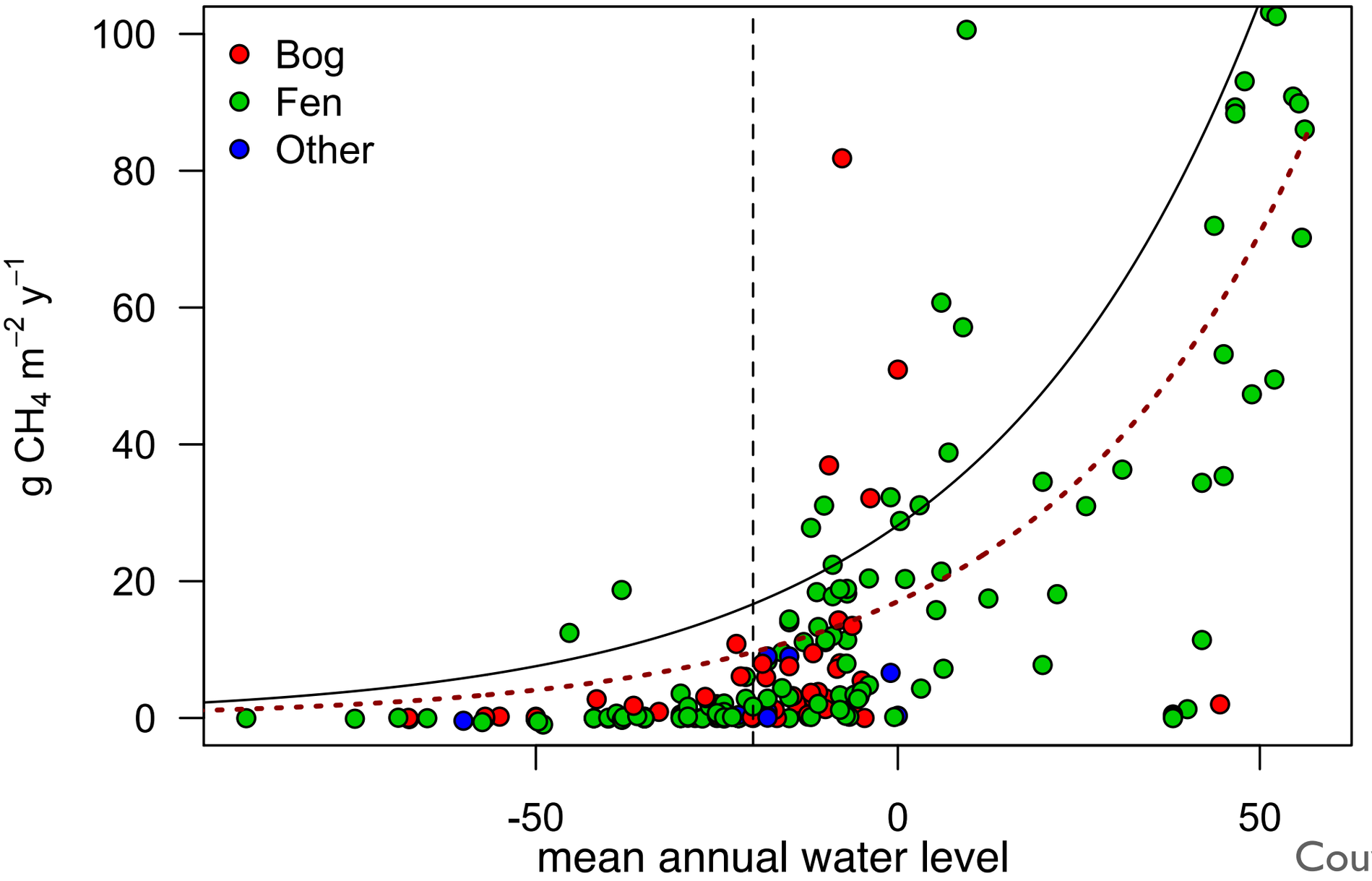
CH_4 exchange: the –20cm switch gets blurry when zooming in – a lower fit seems more appropriate



Couwenberg 2008

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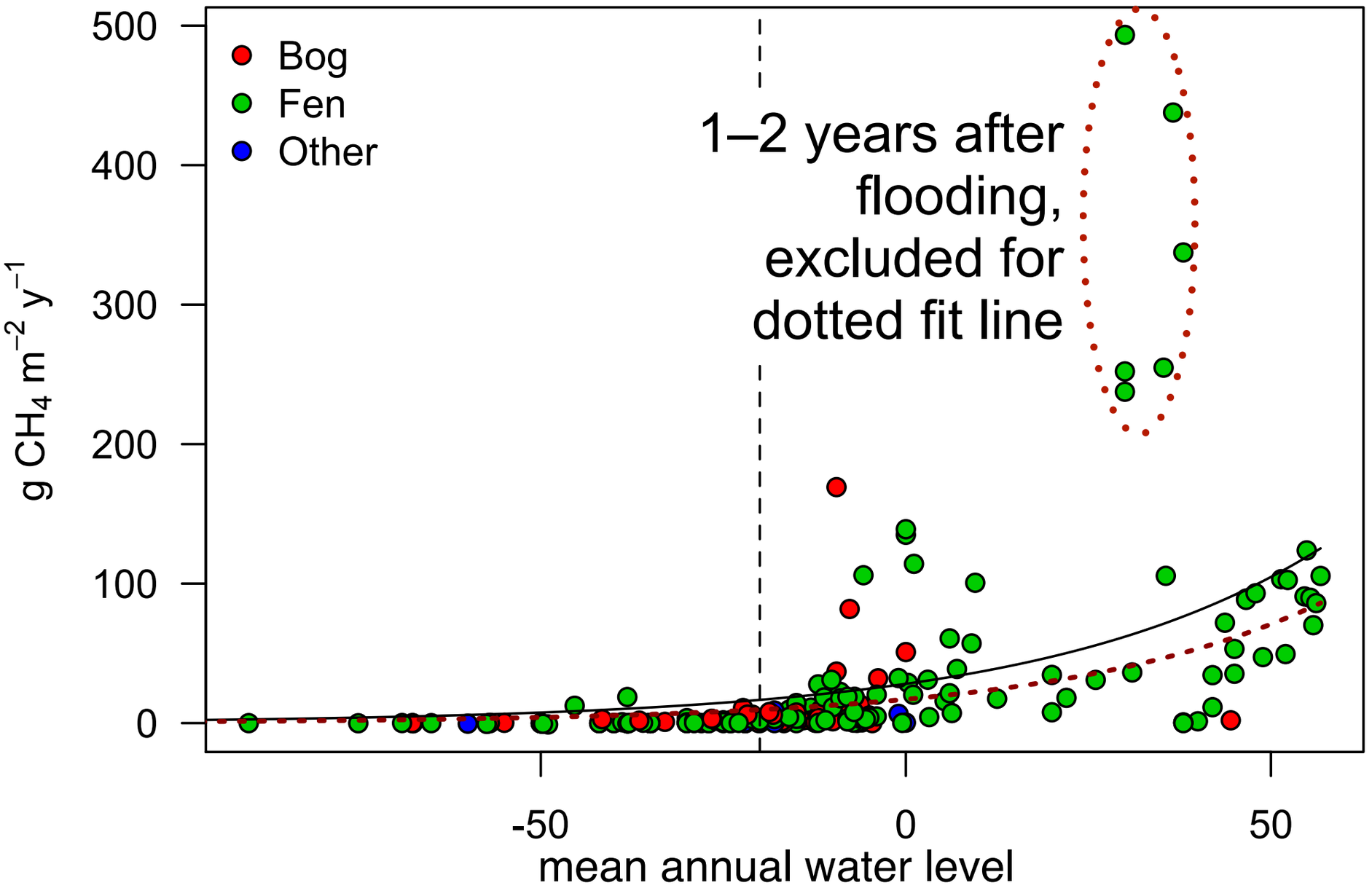
Very high CH_4 emissions may occur shortly after flooding hypertrophic fens



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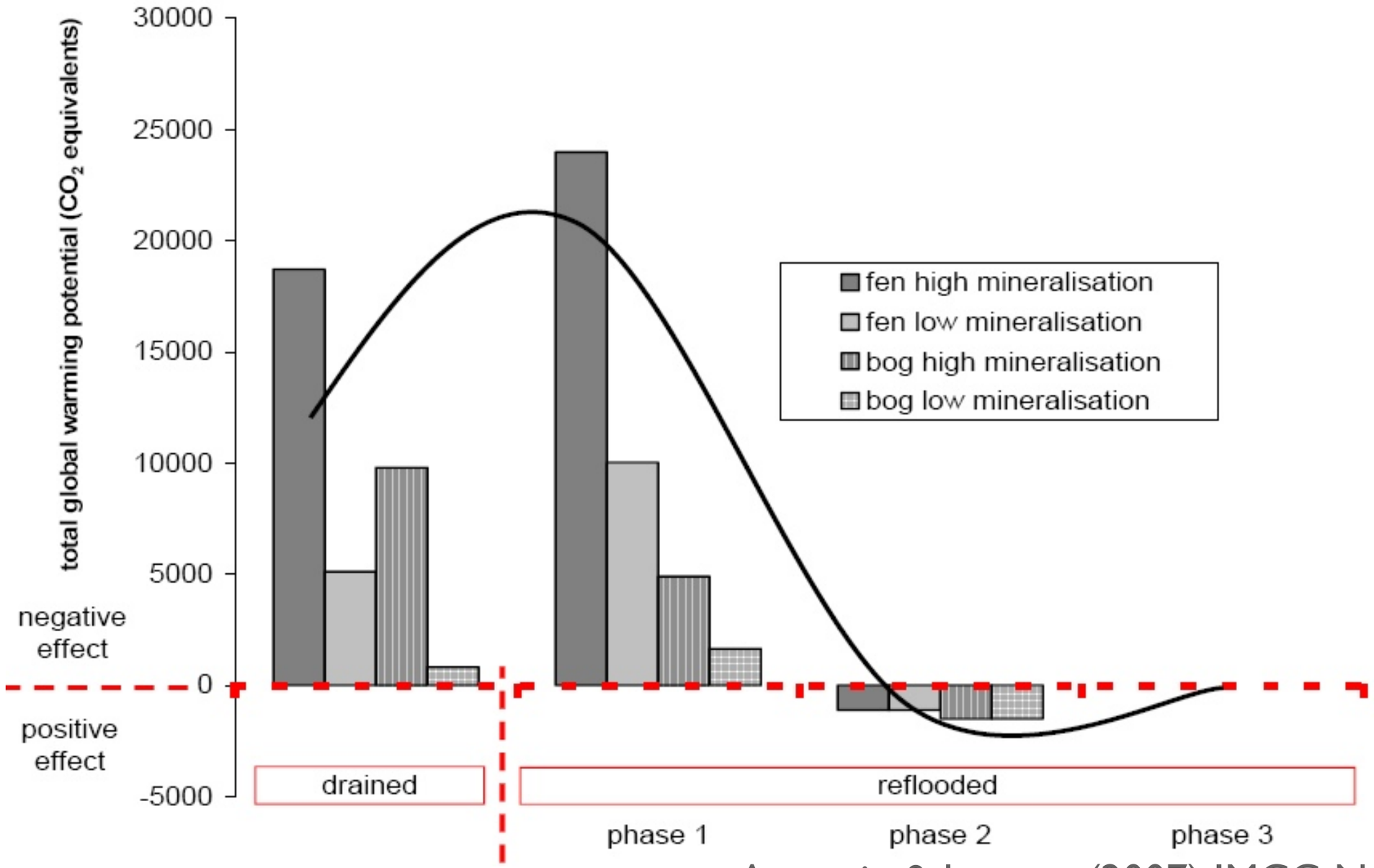
High CH_4 emissions after rewetting are reported from hypertrophic German fens



Augustin & Joosten (2007) IMCG Newsletter

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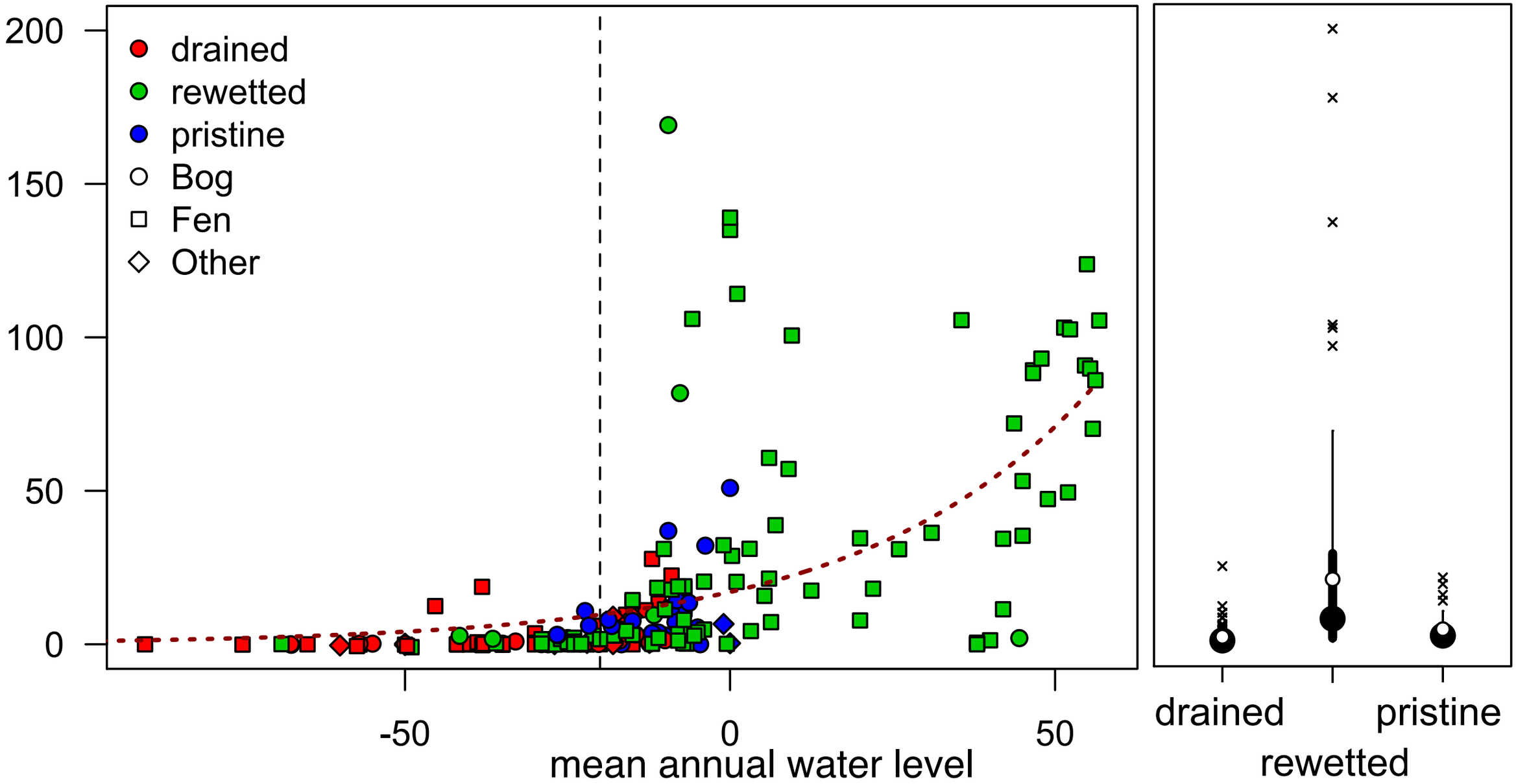
Omitting very high CH_4 emissions that occur shortly after rewetting hypertrophic fens leads to better fit



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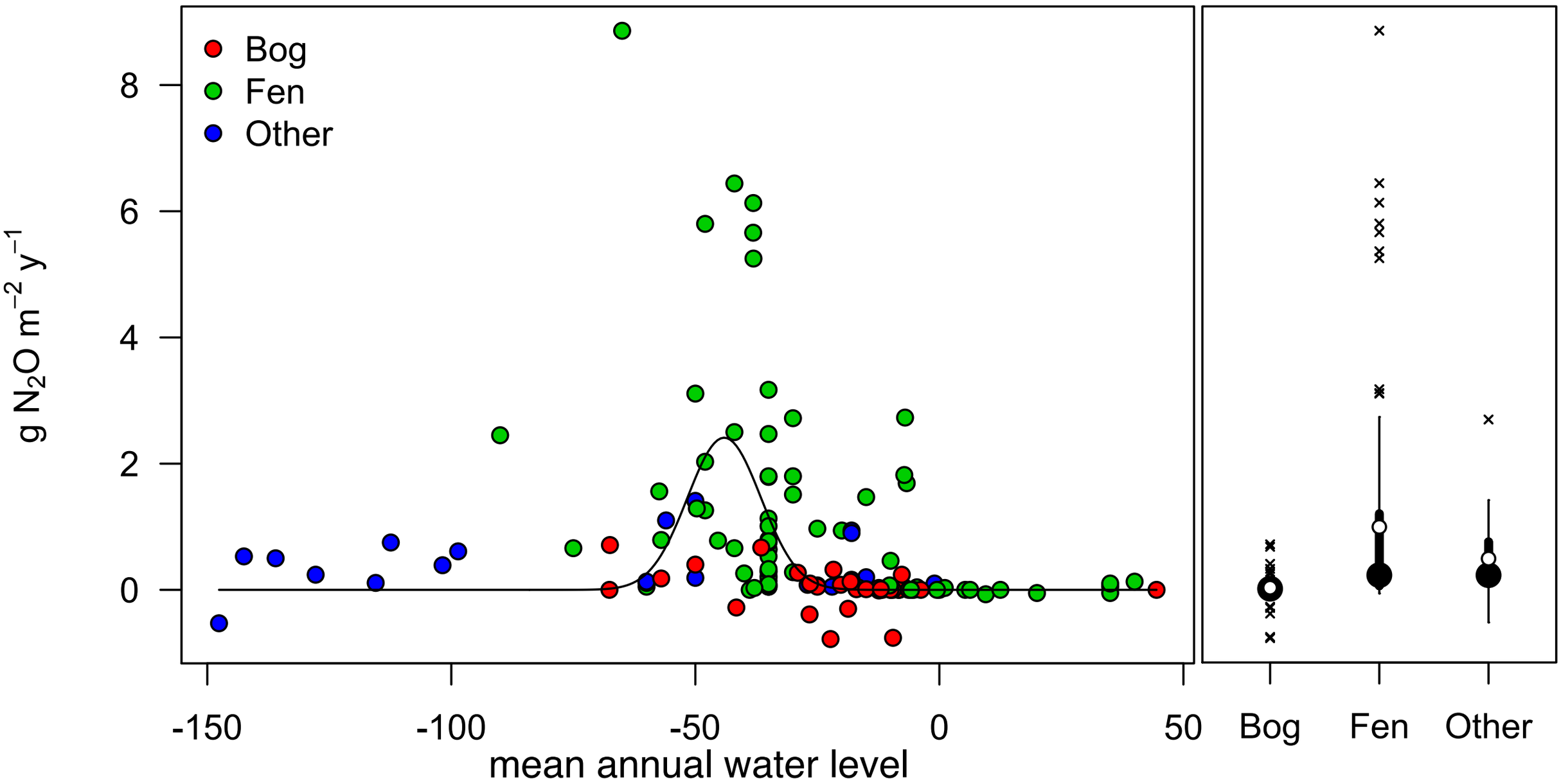
N_2O emissions higher from Fens – an optimum model can be fit to the data



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From the literature – land use may influence GHG emissions from rewetted peatlands

- Data regarding land use effects on rewetted peatlands are sparse (but there are some from pristine peatlands)
- No or a small positive effect of biomass harvest on GHG emissions of sites
- Small or sometimes considerably negative effect of grazing (without incl. the emissions from ruminants) on GHG emissions

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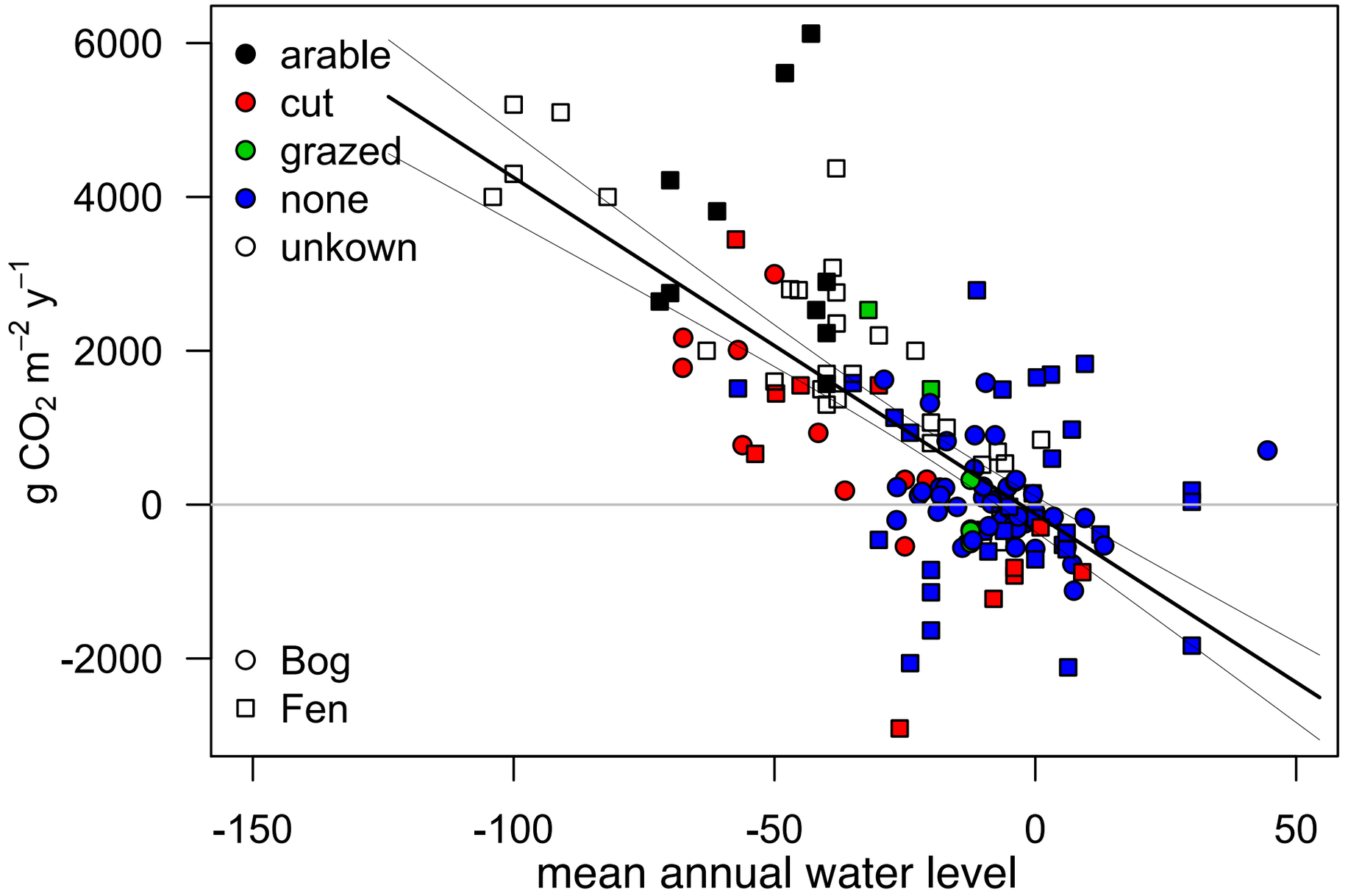
CO_2 emissions are lower at same water levels under biomass harvest compared to no use



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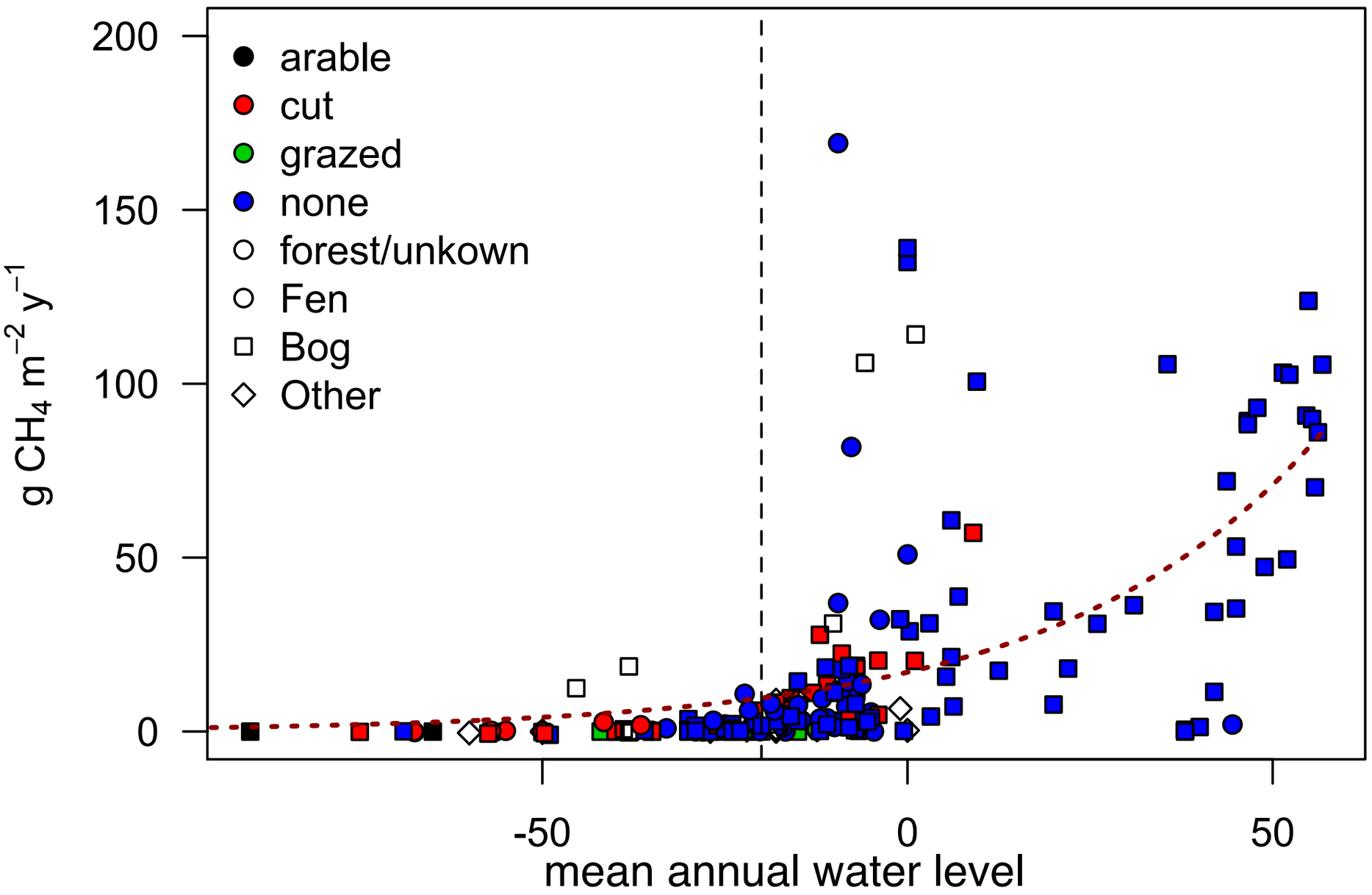
High methane emissions from not used sites because most rewetting does not involve land use



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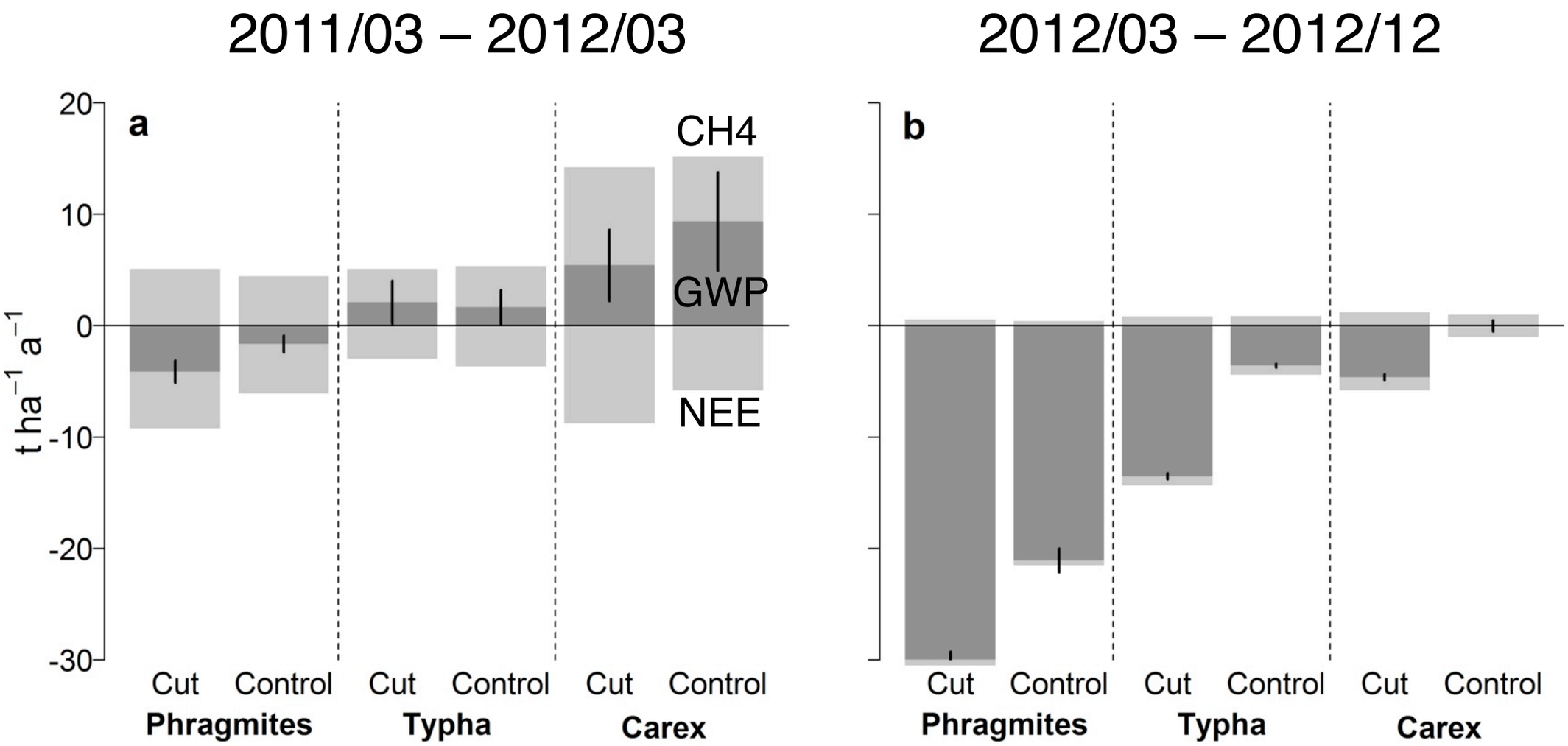
Experimental cut in VIP project – Cutting does not increase GHG emissions



see also Posters of Günther et al. and Huth et al.

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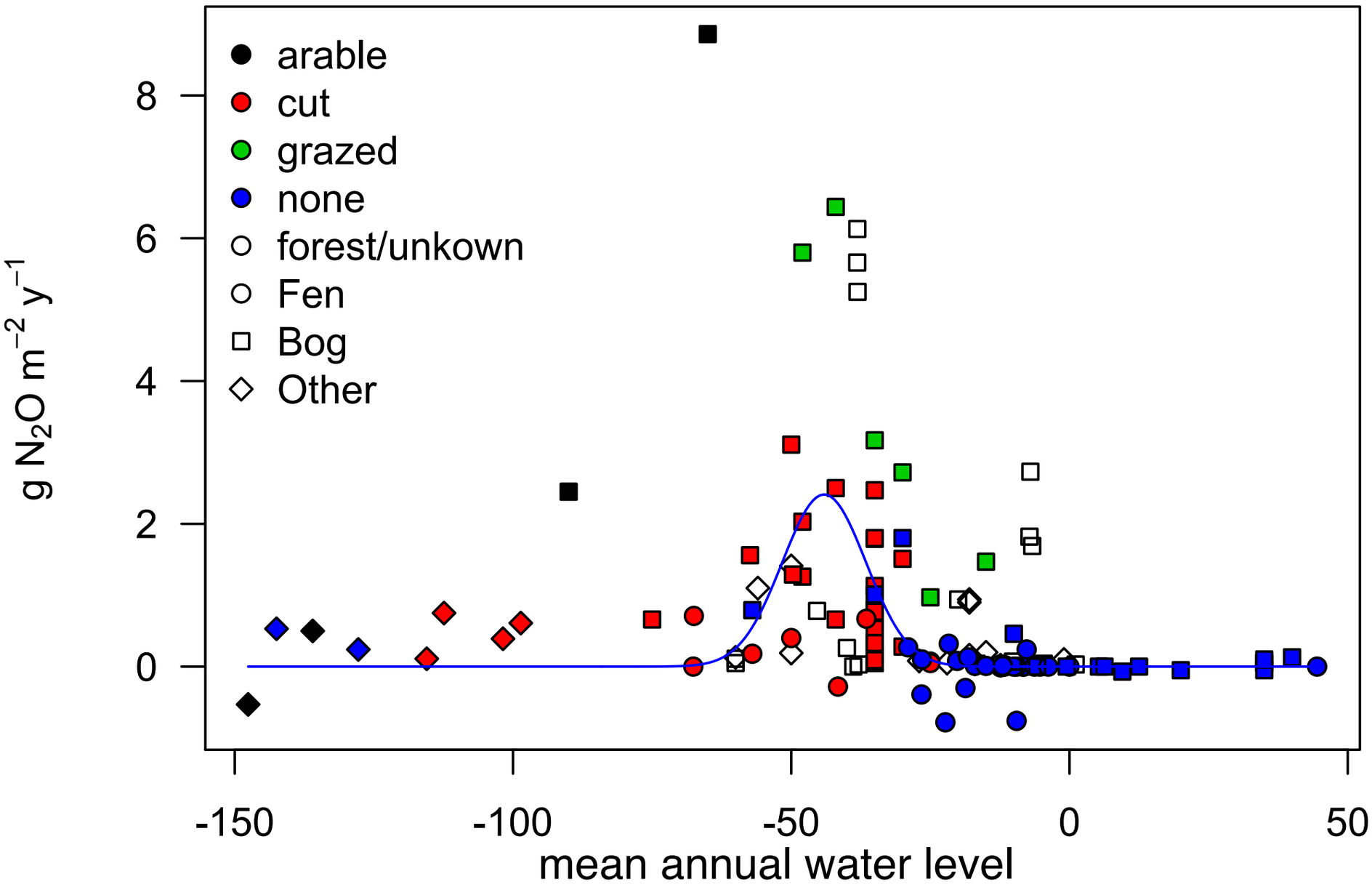
N_2O emissions higher under grazing and arable land



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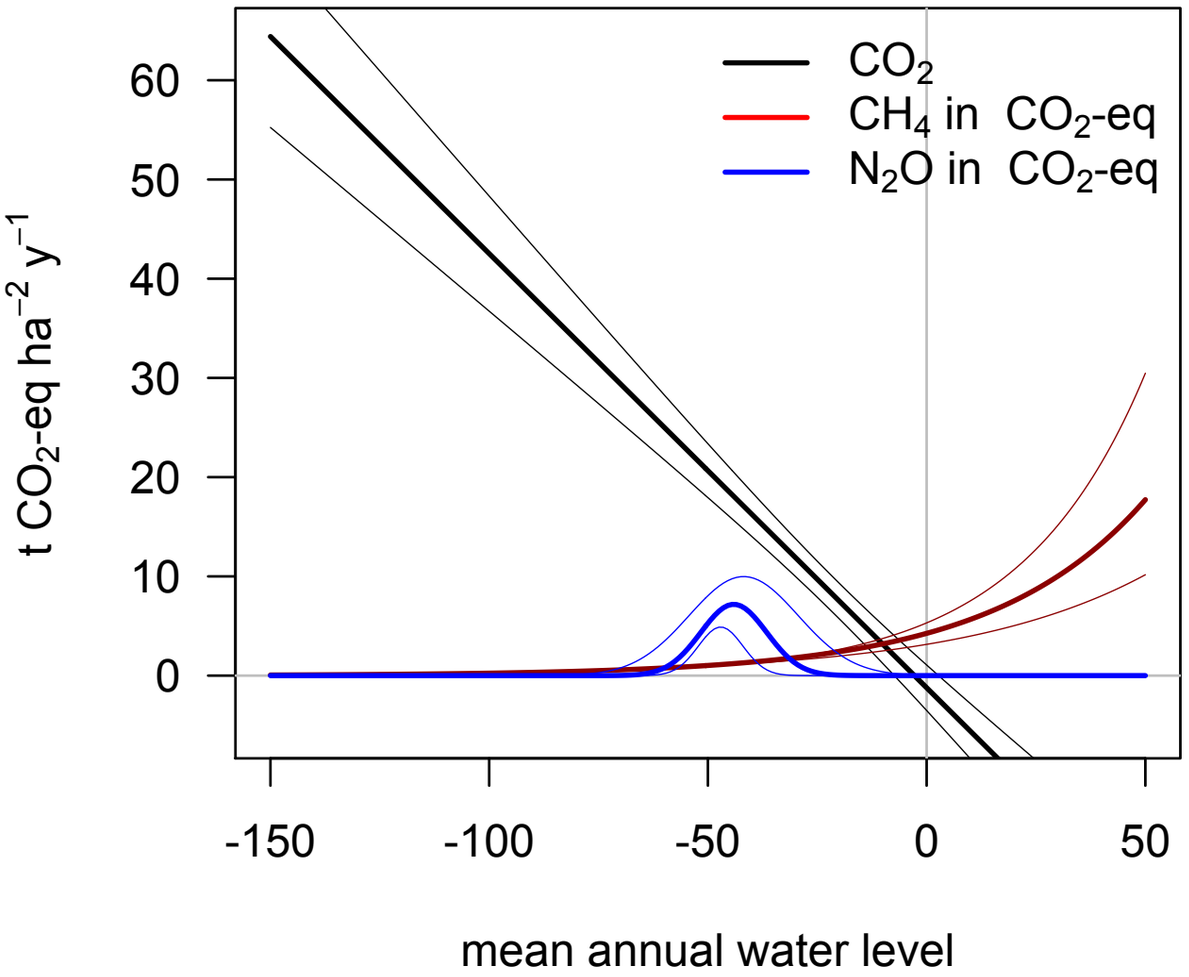
Conclusion



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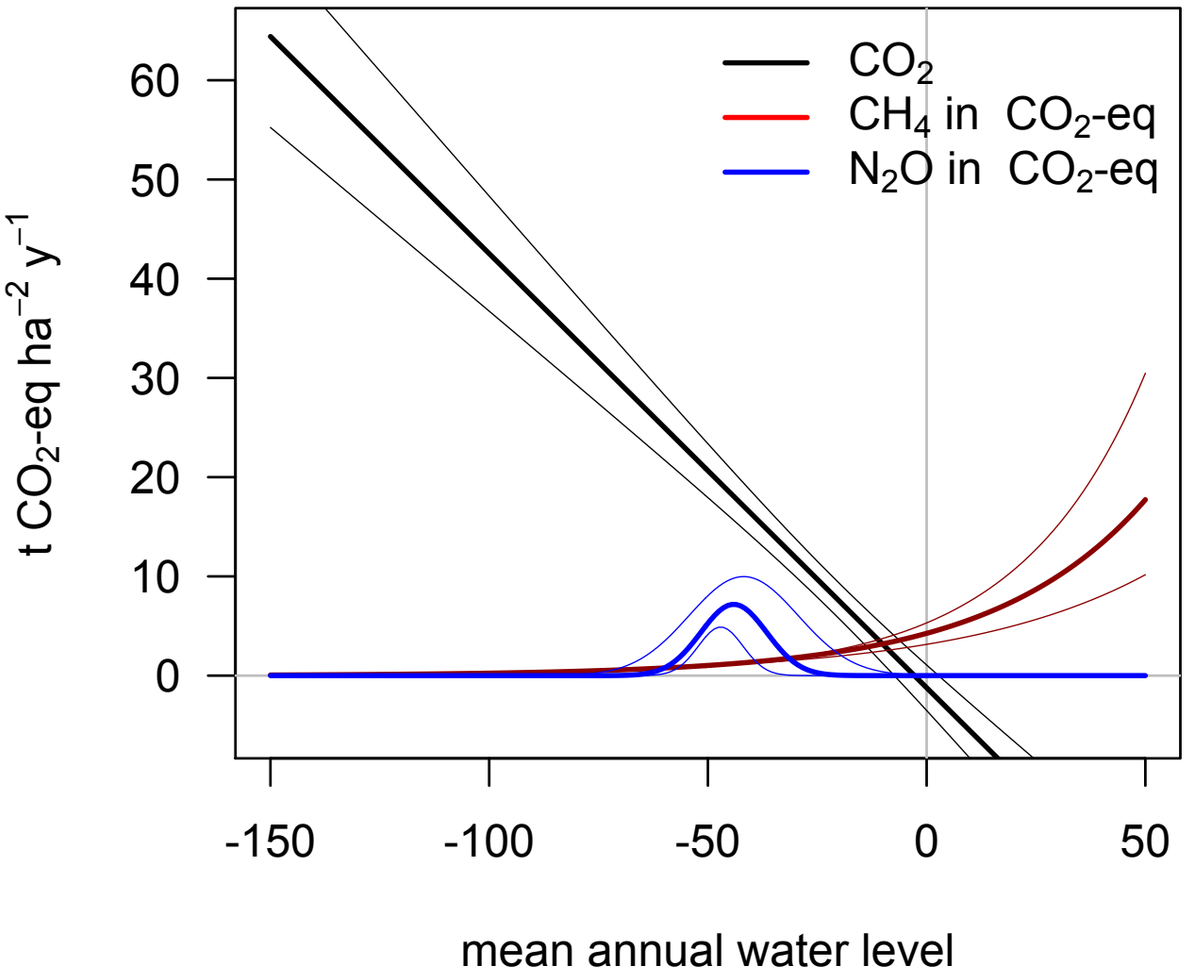
GWP of temperate peatlands in relation to water table depth – Omit flooding when rewetting



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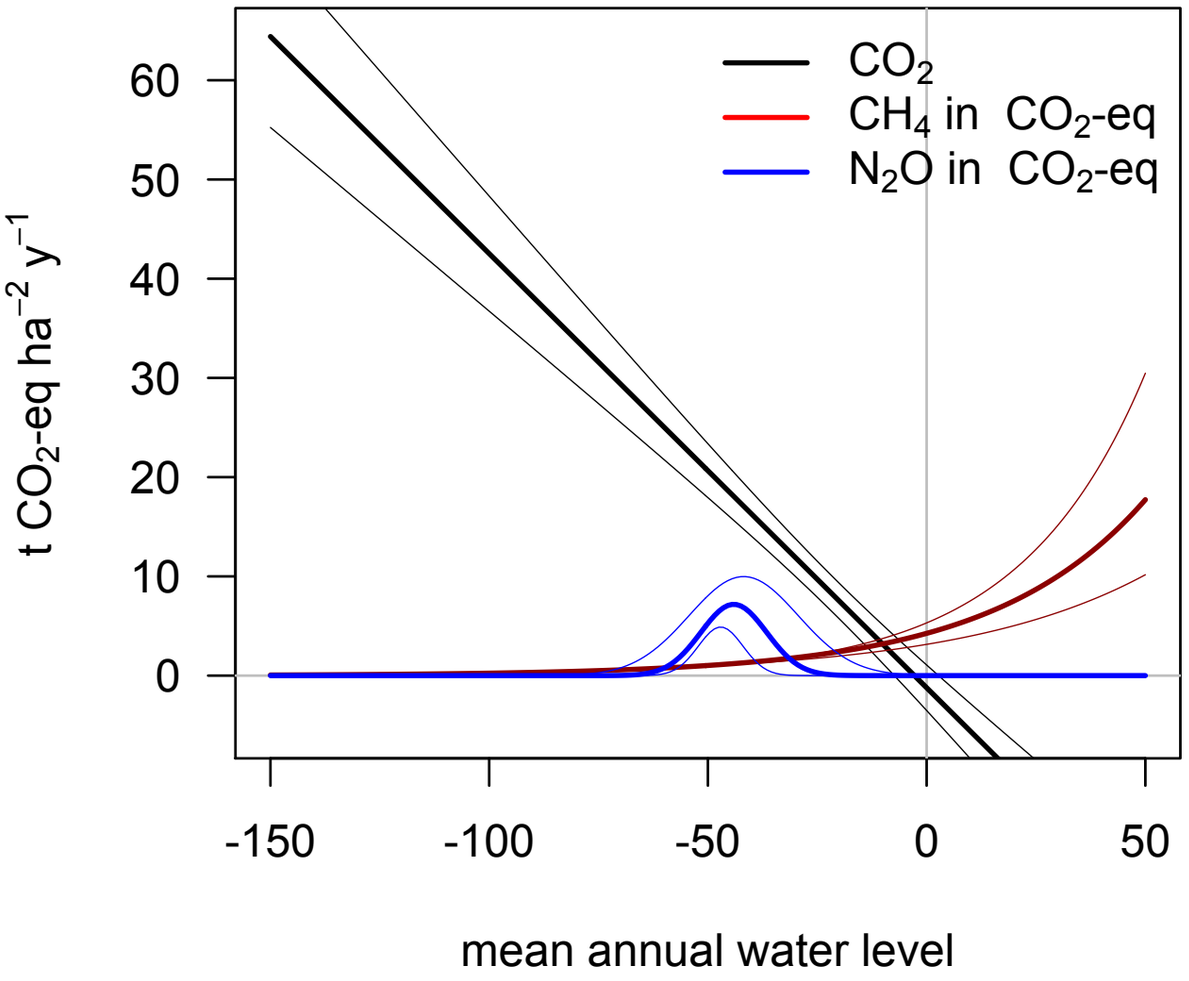

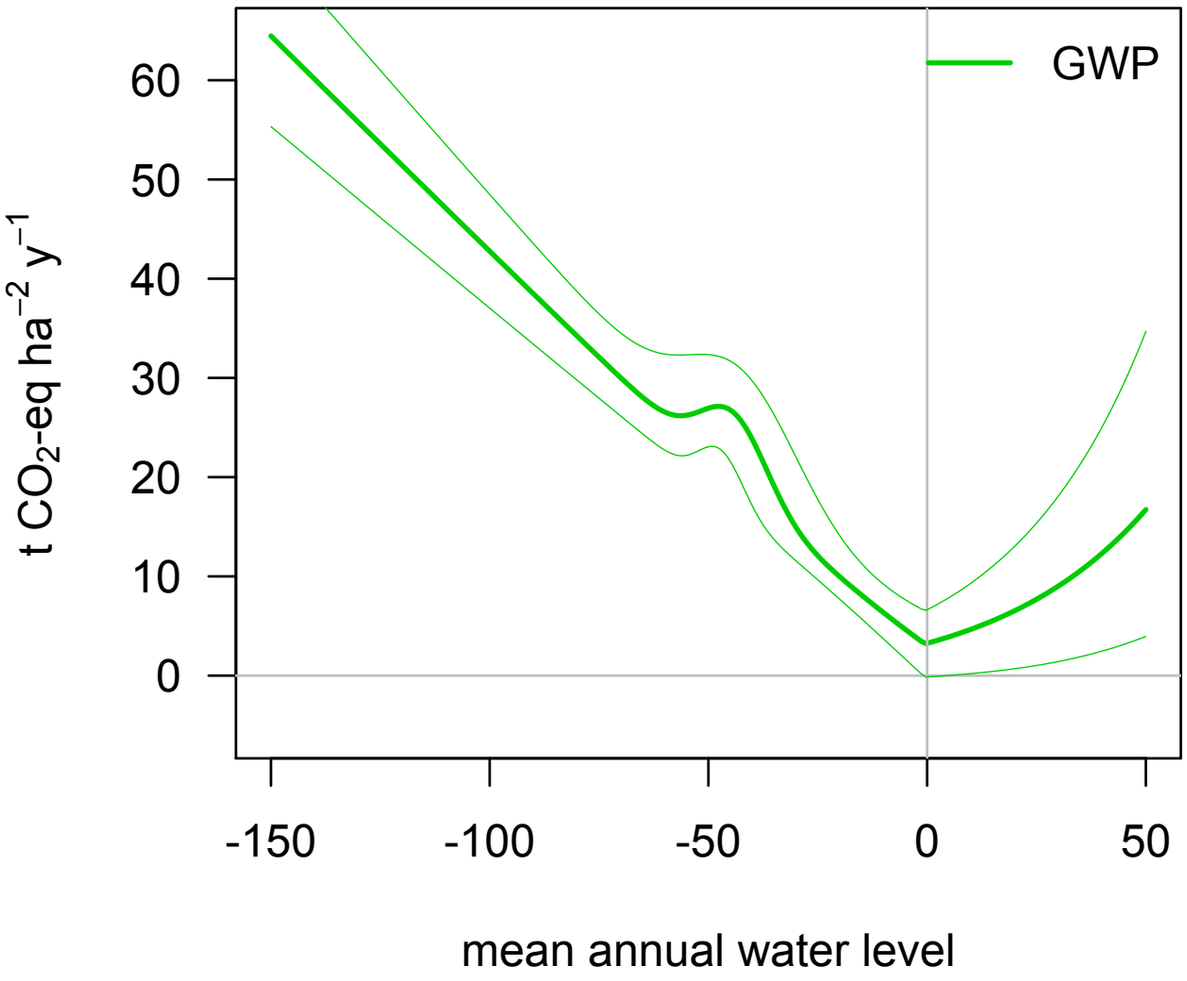

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Rewetting reduces GWP of peatlands – Biomass harvest does not affect GWP negatively

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- Main driver of GWP in peatlands is water level

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- Rewetting reduces GWP, but flooding may lead to very high methane emissions shortly after rewetting

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- Main driver of GWP in peatlands is water level
- Rewetting reduces GWP, but flooding may lead to very high methane emissions shortly after rewetting
- Biomass harvest does not affect the GWP of peatlands negatively
- Grazing seems to influence GWP slightly negatively, but needs to be further investigated

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Thank you for your attention

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