

Supplementary Information

Turunen, J., Anttila, J., Laine, A.M., Ovaskainen, J., Laatikainen, M., Alm, J., Larmola, T.

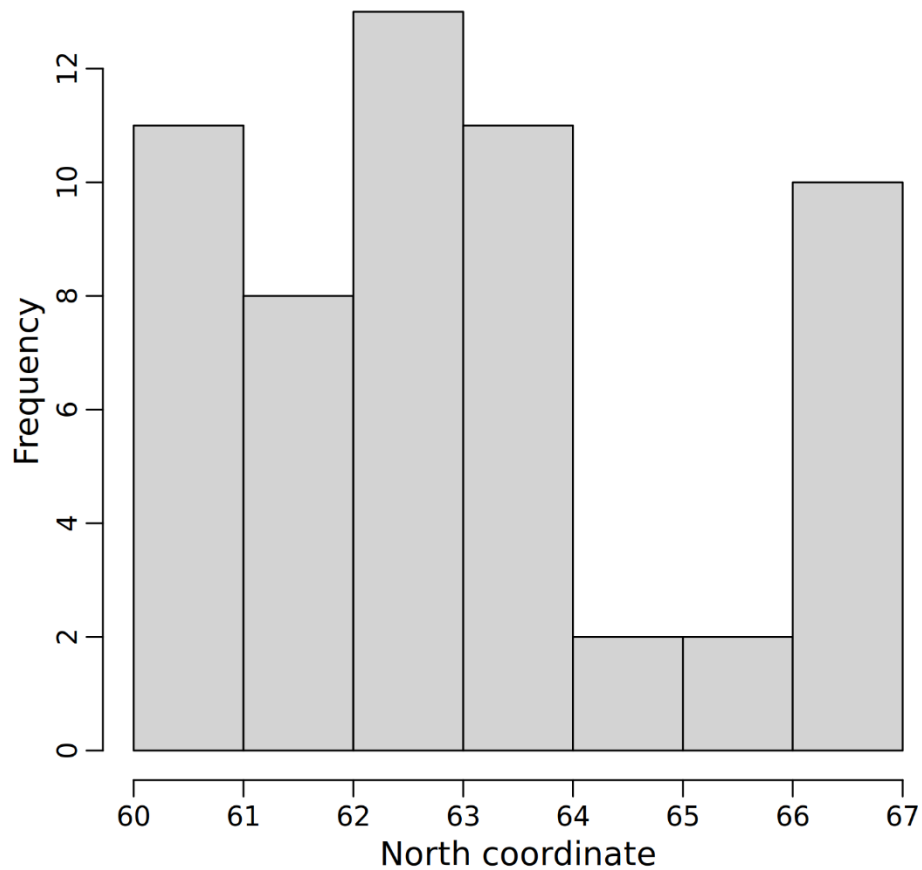


Figure S1. Histogram of north coordinates (i.e., latitudes) of the forestry-drained peatland (FDP) samples for elemental stoichiometry analyses.

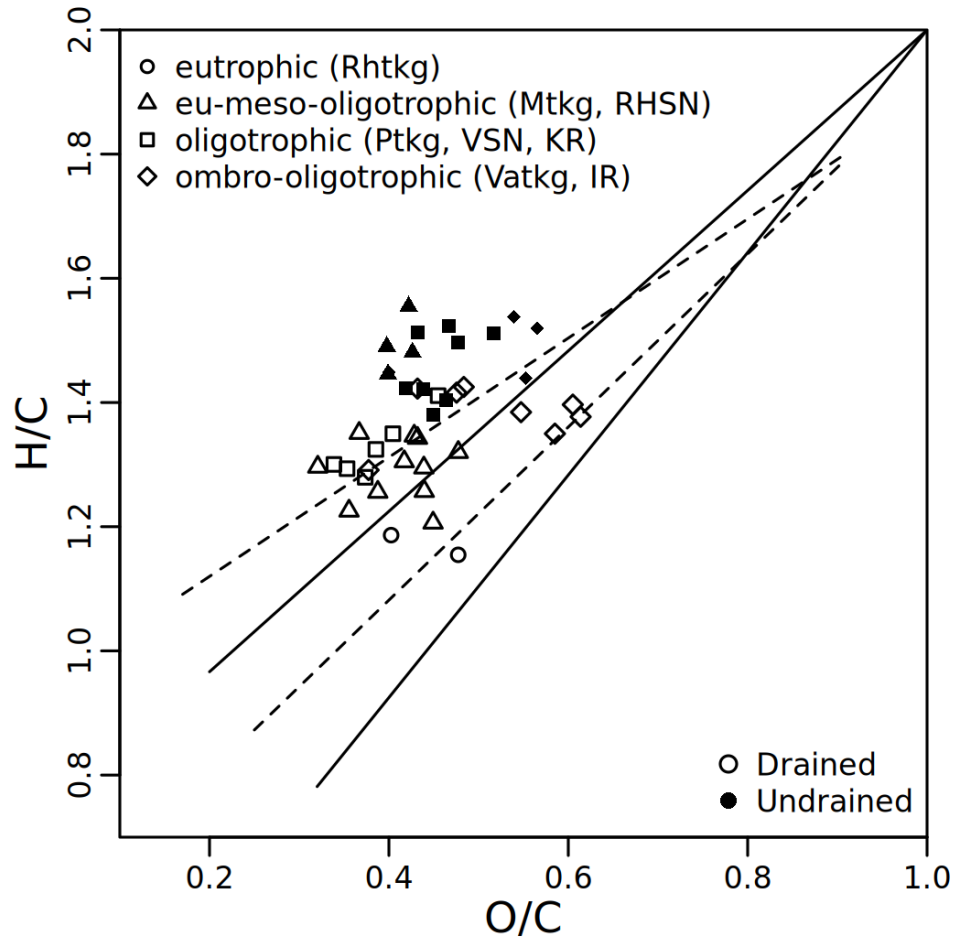


Figure S2. H:C versus O:C ratios. Markers show the individual samples from undrained (filled) and forestry-drained (open) sites. Lines show the hypothesized trajectory of changes in H:C and O:C ratios by Moore et al. (2018). Solid lines show the loss of C, H, and O through respiration and methanogenesis, and dashed lines show loss through a mixture of respiration and methanogenesis (75%) and dissolved organic C (25%).

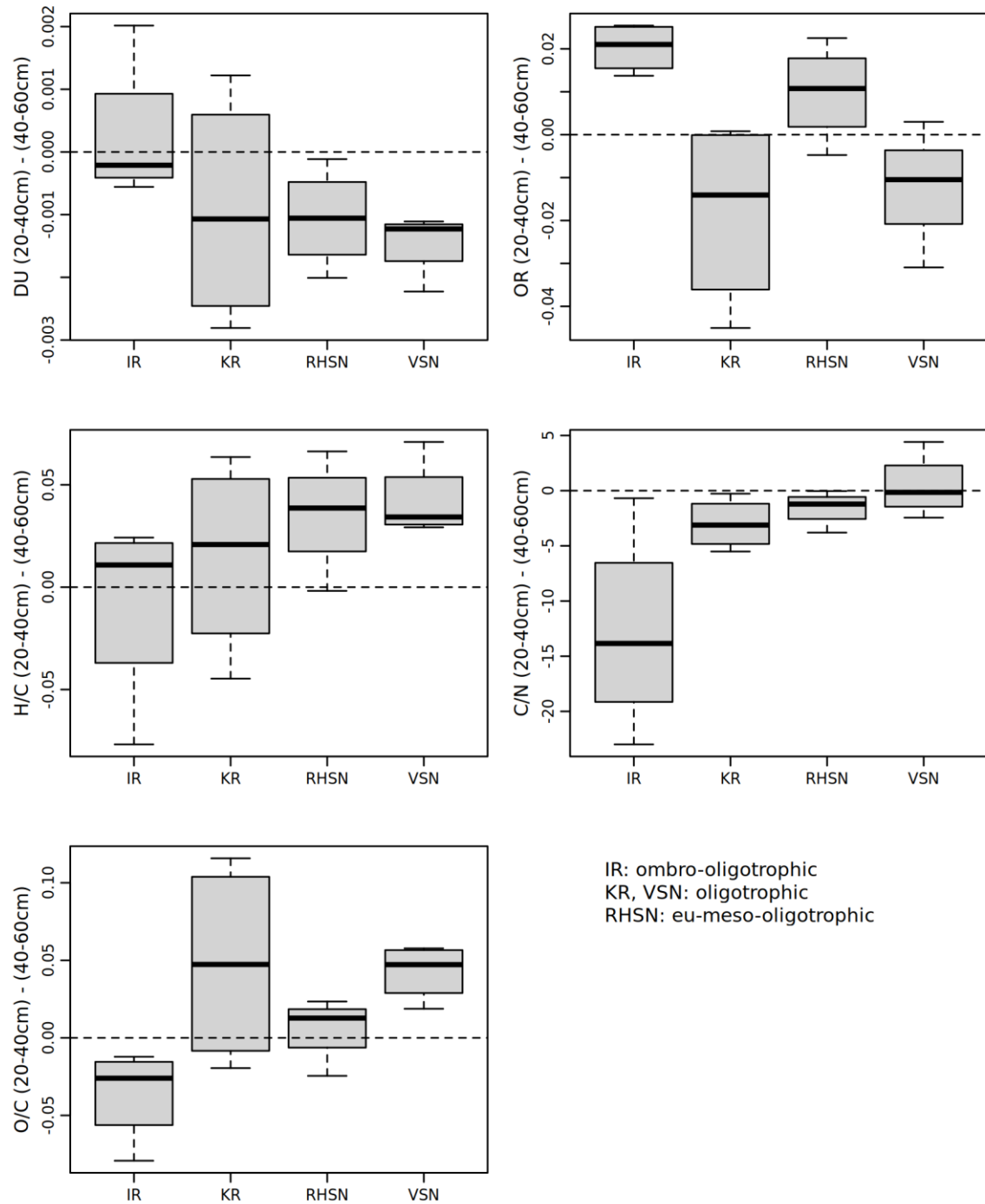


Figure S3. Box plots showing the distributions of the difference between depths 20-40 cm and 40-60 cm in undrained peats for the indicators DU, H:C, O:C, C:N and OR by peatland site types (n=4). Whiskers and box bands denote minimum, first quartile, median, third quartile and maximum.

Table S1. Results of fitting simple and stepwise multiple linear regression models to predict annual heterotrophic CO₂ efflux, CH₄ flux and the combined heterotrophic flux of CO₂ and CH₄ for 30 forestry-drained peatlands in Finland. The regression equations, their variables and coefficients with standard error, Adjusted R² values and degrees of freedom for regression and residuals are shown. NS= not significant under p value 0.05 level, NA =not available, the nonsignificant variables were not included in two independent factor models, and therefore the respective two factor model is not available. In addition, Latitude N was nonsignificant variable in two independent factor models Lat+WT for any gas and therefore the respective two factor model is not available.

Models for R _{het}	Adj.R ²	df _{reg} , df _{res}
R _{het} = 16.7 (±3.6) WT+586(±129)	0.41	1,28
R _{het} = -3943(±755) H:C + 6358(±1007)	0.48	1,28
R _{het} = 142531(±29150) DU -143698(±29616)	0.44	1,28
R _{het} = -0.01(±0) Latitude N+7655(±2366)	0.19	1,28
R _{het} = -1477(±944) O:C+1760(±424)	0.05NS	1,28
R _{het} = -3099(±615) H:C + 12.0(±2.8) WT + 4848(±851)	0.69	2,27
R _{het} = 98567(±29375) DU+11(±3.5) WT-99372(±29790)	0.57	2,27
R _{het} = WT+ O:C	NA	NA
R _{het} =Lat + WT	NA	NA
Models for CH₄ flux		
CH ₄ flux =-0.024(±0.006) WT+0.94(±0.20)	0.40	1,26
CH ₄ flux =-168(±44) DU+170(±44)	0.36	1,26
CH ₄ flux =3.7(±1.2) O:C -1.5(±0.5)	0.23	1,26
CH ₄ flux =1.2(±1.5) H:C-1.4(±2.0)	-0.01NS	1,26
CH ₄ flux =-70(±49) DU-0.02(±0.006) WT+72(±50)	0.43	2,25
CH ₄ flux =2.6 (±1.0) O:C-0.02(±0.005) WT-0.34(±0.52)	0.52	2,25
CH ₄ flux = WT + H:C	NA	NA
CH ₄ flux = Lat. + WT	NA	NA
Models for Carbon gases combined		
net C gas flux = 0.37(±0.08) WT+13.5(±2.9)	0.41	1,28
net C gas flux =-89(±17) H:C +144(±23)	0.48	1,28
net C gas flux =3230 (±658) DU -3256(±668)	0.44	1,28
net C gas flux =-33(±21) O:C+40(±9.6)	0.05NS	1,28
net C gas flux =-2.1x10 ⁻⁵ (±0) Latitude N+172(±54)	0.18	1,28
net C gas flux =-71(±14) H:C+0.28(±0.6) WT+111(±19)	0.68	2,27
net C gas flux =2250(±666) DU+0.24(±0.08) WT-2269(±675)	0.57	2,27
net C gas flux = WT + O:C	NA	NA
net C gas flux = Lat + WT	NA	NA

The input data for R_{het} models are annual heterotrophic CO₂ fluxes estimated from measured flux data as described Ojanen et al. (2010). Ojanen et al. (2010) estimated that the R_{het} fluxes have average uncertainties (half of the 95% confidence interval width) of 22% of the estimated average. This introduces uncertainty in each of the R_{het} data point (our dependent variable), the magnitude of which is small compared to the 2-4 fold variability between the R_{het} values at any H:C level. The input data for CH₄ models are annual CH₄ fluxes interpolated from measured flux data Ojanen et al. (2010).

References

Moore TR, Large D, Talbot J, Wang M, Riley JL. (2018) The stoichiometry of carbon, hydrogen, and oxygen in peat. *Journal of Geophysical Research: Biogeosciences*, 123. doi: 10.1029/2018JG004574

Ojanen P, Minkkinen K, Alm J, Penttilä T (2010) Soil–atmosphere CO₂, CH₄ and N₂O fluxes in boreal forestry-drained peatlands *Forest Ecology and Management* 260:411-421. <https://doi.org/10.1016/j.foreco.2010.04.036>