

Table S1. Regression models for soil CH₄ oxidation rate (N = 72).

Model	P	R _{adj} ²	RMSE	Residuals distribution	Spearman ρ ²
a·WFPS ^b	7.9×10^{-12}	0.49	1.42	Non-normal	0.50
a·MSM ^b	1.4×10^{-6}	0.01	1.99	Non-normal	0.01
a + VSM ^b	6.3×10^{-9}	0.38	1.57	Non-normal	0.38
a + b·T	4.4×10^{-6}	0.25	1.72	Non-normal	0.40
a + b·ln(NoC)	1.1×10^{-6}	0.28	1.69	Non-normal	0.61
a·C ² + b·C + c	0.008	0.11	1.88	Non-normal	0.05
a + b·NO ₃ ⁻		No significant model			0.13
a + b·NH ₄ ⁺		No significant model			0.00
a + b·pH		No significant model			0.02

WFPS – water-filled pore space, MSM – soil moisture by mass, VSM – soil moisture by volume, T – soil temperature °C, NoC – number of pmoA gene copies per g_{DW}, NO₃⁻ - soluble nitrate concentration μgN g_{DW}⁻¹, NH₄⁺ - soluble nitrate concentration μgN g_{DW}⁻¹, pH – soil pH, (a, b, c) – model parameters.

Table S2. Comparison of simple regression model and mixed effect models with season and forest type as tested random variables.

Fixed model	Random variable	Log-likelihood	AIC	Δ AIC
a + WFPS ^b	None	-125.25	254.50	0
a + WFPS ^b	Season	-126.25	262.50	8
a + WFPS ^b	Forest type	-126.25	262.50	8

Table S3. Regression models at the specified depth, depicted on a Figure 4.

Letter	Depth	Model	P	R _{adj} ²	RMSE	Sp ²	Residuals distribution
a	3	a + WFPS ^b	0.003	0.40	2.11	0.54	Normal
a	10	a + b·exp(WFPS)	0.19	0.05	1.46	0.19	Non-normal
a	20 and 30	a + b·exp(WFPS)	0.15	0.03	0.71	0.10	Non-normal
b	3 and 10	a + b·log(NoC)	0.07	0.07	2.28	0.12	Non-normal
b	20 and 30	a + b·NoC	3.1×10^{-16}	0.82	0.62	0.40	Normal
c	3	a + b·exp(C)	0.08	0.13	2.54	0.20	Normal
c	10	a + C ^b	4.8×10^{-4}	0.54	1.02	0.57	Normal
c	20 and 30	a + b·C	0.27	0.01	1.26	0.19	Non-normal
d	3	a + b·NH ₄ ⁺	0.41	-0.01	2.28	0.05	Non-normal
d	3	a + b·NO ₃ ⁻	0.39	-0.01	2.27	0.05	Non-normal

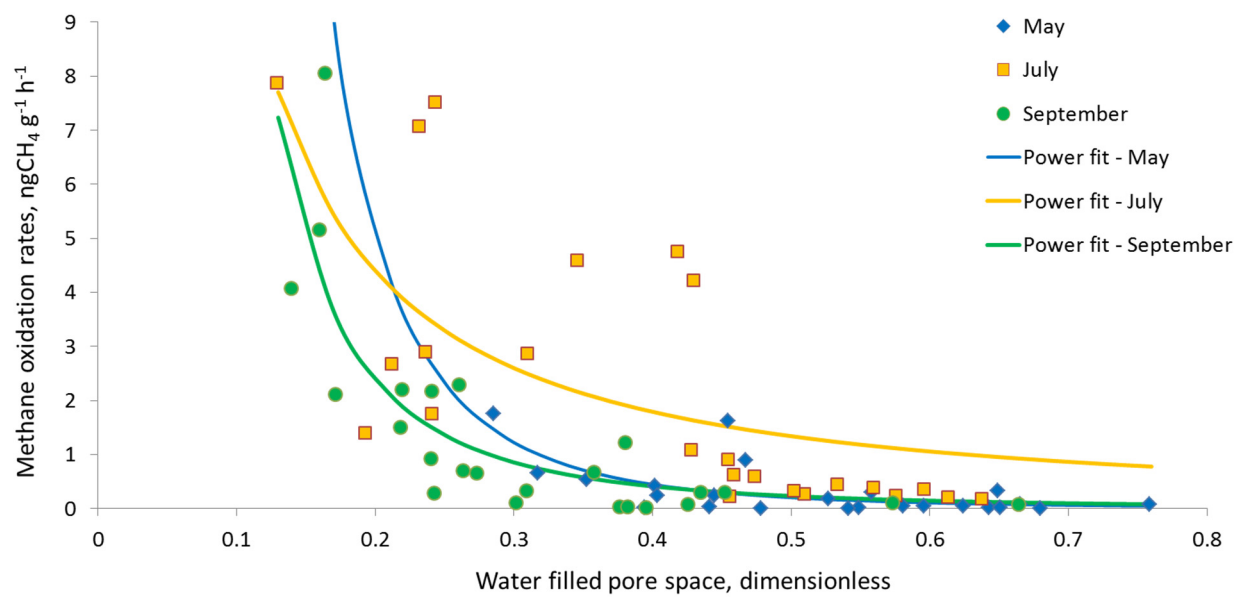


Figure S1. Power models fitted for soil CH₄ oxidation rate versus water-filled pore space for all data and for each season separately.