Supplementary material for

Impacts of temperature and soil characteristics on methane production and oxidation in Arctic polygonal tundra

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Table S1. Physicochemical characteristics of soils from FCP and HCP

	Depth (cm)	Layer	Water content ($g\ g^{-1}$)	pH (KCl)	Fe(II) $\mu mol\ g^{-1}$ soil	Total C (%)	C:N
FCP	10-30	Active	0.44	4.24	9.72	18.56	18
	40-50	Transition zone	2.48	4.86	50.20	5.80	16
	50-70	Permafrost	3.95	4.95	68.95	30.83	18
HCP	10-30	Active	0.67	4.70	14.36	20.49	21
	50-70	Permafrost	4.43	5.72	79.37	17.10	21

Table S2. Fitted parameters for CH_4 production with linear model *($C=A\times t+B$)*.

Horizon	Temperature	model	A	B	R^2
FCP Transition zone	+8	Linear	0.0685	0.0372	0.94
	+4	Linear	0.0427	0.2133	0.81
	-2	Linear	0.0166	0.1751	0.92
FCP Permafrost	+8	Linear	0.0074	0.1039	0.79
	+4	Linear	0.0060	0.0758	0.76
	-2	Linear	0.0043	0.0895	0.73

Table S3. Fitted parameters for CO_2 production using best-fit Hyperbolic $(C=A\times t/(B+t))$, Linear $(C=A\times t+B)$, or Sigmoidal $(C=A\times t^d/(B^d+t^d))$ models.

Horizon	Temperature	model	A	B	d	R^2
FCP Active	+8	Hyperbolic	545.19	53.60	-	0.85
	+4	Hyperbolic	1588.17	545.18	-	0.91
	-2	Linear	1.70	6.96	-	0.95
FCP Transition zone	+8	Hyperbolic	32.18	13.30	-	0.82
	+4	Hyperbolic	28.35	16.11	-	0.78
	-2	Hyperbolic	12.09	2.82	-	0.47
FCP Permafrost	+8	Hyperbolic	48.52	14.63	-	0.84
	+4	Hyperbolic	67.51	38.05	-	0.67
	-2	Hyperbolic	45.80	32.55	-	0.87
HCP Active	+8	Sigmoidal	31.12	57.19	1.85	0.96
	+4	Sigmoidal	17.10	44.42	2.32	0.87
	-2	Sigmoidal	6.48	33.48	5.12	0.91
HCP Permafrost	+8	Sigmoidal	3.69	50.56	25.43	0.90
	+4	Sigmoidal	3.81	52.71	18.00	0.81
	-2	Sigmoidal	1.93	51.50	10.48	0.98

Figure S1. Fe(II) concentrations and soil porewater dissolved CH_4 measured at 10 cm intervals from (a) FCP and (b) HCP

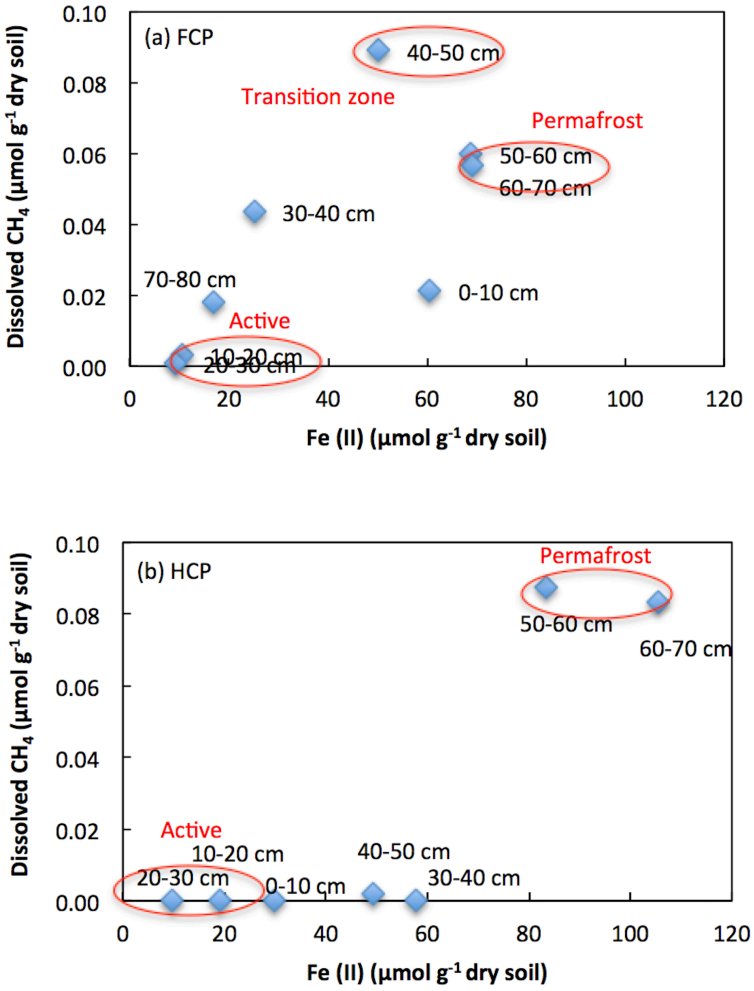

Figure S2. CH_4 production in soil microcosm from organic and permafrost layers of HCP and organic layer of FCP.