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Supplement of

Carbon dioxide flux and net primary production of a boreal treed bog: responses to warming and water table manipulations

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Supplement Table S1: Estimated parameter values (\pm SE), standard error of the estimate (SEE) and goodness of fit (r^2) for the gross primary production of forest Floor (GPP_{ff}) model (Eq. 1) ^a.

Yr	Site / Microform	GPP _{ff} vs. PAR		GPP _{ff} vs. WT		GPP _{ff} vs. T		SEE	r^2
		P_{\max} g CO ₂ m ⁻² d ⁻¹	k μmol m ⁻² s ⁻¹	WT _{opt} cm	WT _{tol} cm	T _{opt} °C	T _{tol} °C		
2011	CONTROL								
	Ambient Hummock	-22.2 ± 4	900 ± 422	-56 ± 13	30 ± 16	16 ± 4	10 ± 5	2.3	0.83
	Warmed Hummock	-27.2 ± 6	999 ± 468	-48 ± 4	15 ± 11	9 ± 15	20 ± 16	3.4	0.77
	Ambient Hollow	-19.4 ± 7	950 ± 601	-28 ± 10	23 ± 21	14 ± 8	10 ± 13	2.0	0.63
	Warmed Hollow	-15.7 ± 4	500 ± 318	-36 ± 2	11 ± 3	17 ± 13	18 ± 30	3.0	0.54
	EXPERIMENTAL								
	Ambient Hummock	-26.2 ± 24	999 ± 805	-64 ± 4	18 ± 9	30 ± 7	16 ± 2	3.2	0.75
	Warmed Hummock	-23.0 ± 15	999 ± 994	-57 ± 15	30 ± 11	30 ± 5	17 ± 16	5.4	0.54
	Ambient Hollow	-40.5 ± 15	999 ± 729	-58 ± 1	7 ± 1	13 ± 0	3 ± 0	3.3	0.82
	Warmed Hollow	-26.1 ± 18	999 ± 753	-82 ± 6	30 ± 8	15 ± 9	20 ± 6	5.0	0.62
	DRAINED								
	Ambient Hummock	-35.9 ± 9	950 ± 440	-118 ± 8	30 ± 11	12 ± 2	10 ± 3	1.0	0.82
	Warmed Hummock	-35.6 ± 14	999 ± 398	-111 ± 3	30 ± 6	15 ± 8	20 ± 8	1.0	0.80
	Ambient Hollows	-29.2 ± 17	850 ± 639	-71 ± 32	30 ± 17	11 ± 3	10 ± 10	0.9	0.68
	Warmed Hollow	-19.4 ± 27	998 ± 779	-124 ± 6	21 ± 10	9 ± 2	2 ± 2	3.2	0.56
2012	CONTROL								
	Ambient Hummock	-24.8 ± 5	900 ± 286	-35 ± 11	30 ± 14	15 ± 2	10 ± 4	1.8	0.86
	Warmed Hummock	-32.9 ± 5	999 ± 335	-54 ± 10	30 ± 17	21 ± 1	9 ± 1	1.9	0.85
	Ambient Hollow	-21.8 ± 4	950 ± 299	-42 ± 14	30 ± 20	15 ± 1	10 ± 2	1.1	0.85
	Warmed Hollow	-38.8 ± 12	999 ± 382	-25 ± 43	30 ± 9	17 ± 1	10 ± 2	1.2	0.85
	EXPERIMENTAL								
	Ambient Hummock	-28.4 ± 10	998 ± 638	-29 ± 12	30 ± 12	20 ± 4	12 ± 11	2.2	0.75
	Warmed Hummock	-27.8 ± 26	500 ± 463	-42 ± 31	30 ± 12	17 ± 21	20 ± 5	3.4	0.74
	Ambient Hollow	-40.1 ± 18	999 ± 574	-73 ± 3	30 ± 4	11 ± 0	3 ± 1	2.4	0.74
	Warmed Hollow	-12.6 ± 5	738 ± 679	-48 ± 13	23 ± 11	20 ± 2	5 ± 3	7.4	0.50
	DRAINED								
	Ambient Hummock	-50.0 ± 14	950 ± 416	-105 ± 3	30 ± 3	10 ± 2	10 ± 2	0.9	0.82
	Warmed Hummock	-50.0 ± 19	950 ± 444	-107 ± 2	30 ± 4	11 ± 3	12 ± 1	0.9	0.83
	Ambient Hollow	-31.3 ± 10	850 ± 246	-100 ± 11	23 ± 7	10 ± 6	10 ± 5	1.6	0.83
	Warmed Hollow	-18.5 ± 28	999 ± 779	-125 ± 6	21 ± 13	8 ± 1	1 ± 1	4.1	0.55
2013	CONTROL								
	Ambient Hummock	-32.1 ± 5	837 ± 219	-51 ± 7	30 ± 12	11 ± 7	20 ± 4	1.8	0.68
	Warmed Hummock	-38.7 ± 10	500 ± 136	-45 ± 6	30 ± 20	20 ± 9	20 ± 4	1.1	0.85
	Ambient Hollow	-46.8 ± 5	554 ± 121	-31 ± 1	12 ± 1	9 ± 1	6 ± 1	5.4	0.85
	Warmed Hollow	-45.5 ± 24	500 ± 157	-24 ± 8	23 ± 9	19 ± 5	11 ± 10	1.2	0.85
	EXPERIMENTAL								
	Ambient Hummock	-38.0 ± 13	634 ± 292	-63 ± 3	30 ± 4	14 ± 5	10 ± 17	3.1	0.85
	Warmed Hummock	-28.3 ± 28	500 ± 314	-67 ± 2	13 ± 2	15 ± 7	20 ± 10	3.4	0.85
	Ambient Hollow	-26.3 ± 14	500 ± 156	-64 ± 9	30 ± 8	15 ± 7	13 ± 9	2.1	0.85
	Warmed Hollow	-16.9 ± 14	557 ± 461	-74 ± 5	11 ± 5	20 ± 26	17 ± 12	0.4	0.85
	DRAINED								
	Ambient Hummock	-50.0 ± 37	500 ± 180	-102 ± 3	26 ± 7	30 ± 26	9 ± 5	0.6	0.82
	Warmed Hummock	-50.0 ± 41	500 ± 241	-115 ± 5	28 ± 7	21 ± 18	9 ± 11	2.0	0.85
	Ambient Hollow	-40.0 ± 41	820 ± 591	-76 ± 2	2 ± 1	18 ± 5	2 ± 2	1.5	0.83
	Warmed Hollow	-28.0 ± 43	500 ± 456	-89 ± 17	7 ± 29	16 ± 1	1 ± 0	1.6	0.85

^a The models were developed for each microform type ($n = 3$) at the control, experimental and drained sites separately for growing seasons of 2011, 2012 and 2013. PAR, WT and T represent photosynthetically active radiation, water table (negative values show belowground water level) and 5 cm soil temperature, respectively. P_{\max} denotes potential maximum rate of GPP_{ff} and k is level of PAR at which half of GPP_{ff} occurs. WT_{opt} and T_{opt} are Gaussian response parameters for optimum GPP_{ff} while WT_{tol} and T_{tol} are Gaussian response parameters describing the width of the curve. All modeled parameters are significant at $p = 0.05$ level.

Supplement Table S1. Estimated regression coefficient values (\pm SE), standard error of the estimate (SEE) and goodness of fit (r^2) for the forest floor respiration (R_{ff}) model (Eq. 2) ^a.

Year	Site	Warming Treatment / Microform	<i>a</i>	<i>b</i>	<i>c</i>	SEE g CO ₂ m ⁻² d ⁻¹	<i>r</i> ²	
2011	CONTROL	Ambient Hummock	1.30 ± 0.3	-0.21 ± 0.1	-18.3 ± 6.8	0.8	0.81	
		Warmed Hummock	0.49 ± 0.1	-0.16 ± 0.0	-1.8 ± 2.5	3.8	0.37	
		Ambient Hollow	1.70 ± 0.3	-0.61 ± 0.2	-32.3 ± 10.7	0.7	0.79	
	EXPERIMENTAL	Warmed Hollow	0.54 ± 0.1	-0.38 ± 0.1	-8.1 ± 2.0	1.8	0.75	
		Ambient Hummock	1.32 ± 0.1	-0.07 ± 0.0	-5.7 ± 2.0	2.0	0.83	
		Warmed Hummock	0.71 ± 0.1	-0.06 ± 0.1	-3.9 ± 3.6	2.8	0.56	
	DRAINED	Ambient Hollow	0.67 ± 0.2	-0.37 ± 0.1	-17.1 ± 4.7	5.5	0.51	
		Warmed Hollow	1.65 ± 0.3	-0.15 ± 0.1	-18.5 ± 5.1	5.3	0.60	
		Ambient Hummock	0.31 ± 0.3	-0.02 ± 0.0	2.62 ± 7.3	0.4	0.49	
	2012	CONTROL	Warmed Hummock	0.66 ± 0.1	-0.09 ± 0.0	-7.2 ± 4.2	3.4	0.45
			Ambient Hollow	0.55 ± 0.1	-0.02 ± 0.0	2.3 ± 3.6	0.2	0.85
			Warmed Hollow	1.80 ± 0.1	-0.10 ± 0.1	-20.7 ± 4.7	3.6	0.84
EXPERIMENTAL		Ambient Hummock	0.39 ± 0.2	-0.25 ± 0.1	-10.7 ± 5.3	0.6	0.53	
		Warmed Hummock	0.57 ± 0.1	-0.20 ± 0.1	-1.3 ± 2.2	2.9	0.57	
		Ambient Hollow	0.93 ± 0.1	-0.25 ± 0.1	-12.8 ± 1.8	0.4	0.81	
DRAINED		Warmed Hollow	0.90 ± 0.1	-0.16 ± 0.1	-2.8 ± 2.0	3.1	0.71	
		Ambient Hummock	0.61 ± 0.1	-0.22 ± 0.1	-9.4 ± 2.9	3.2	0.68	
		Warmed Hummock	1.08 ± 0.1	-0.15 ± 0.1	-13.5 ± 4.9	4.6	0.62	
EXPERIMENTAL		Ambient Hollow	1.56 ± 0.2	-0.18 ± 0.1	-19.6 ± 9.4	6.0	0.67	
		Warmed Hollow	0.63 ± 0.1	-0.25 ± 0.0	-12.4 ± 1.4	3.2	0.85	
		Ambient Hummock	0.65 ± 0.1	-0.03 ± 0.1	-3.4 ± 8.1	0.3	0.91	
	Warmed Hummock	0.89 ± 0.1	-0.00 ± 0.0	4.4 ± 4.5	4.4	0.60		
	Ambient Hollow	1.07 ± 0.1	-0.15 ± 0.0	-17.3 ± 5.6	0.9	0.80		
	Warmed Hollow	1.27 ± 0.1	-0.00 ± 0.0	-1.5 ± 3.7	5.0	0.67		
2013	CONTROL	Ambient Hummock	1.74 ± 0.1	-0.01 ± 0.1	-5.3 ± 3.1	3.0	0.67	
		Warmed Hummock	2.02 ± 0.2	-0.03 ± 0.0	-8.3 ± 3.4	4.2	0.56	
		Ambient Hollow	1.18 ± 0.1	-0.15 ± 0.1	-3.8 ± 1.7	3.1	0.68	
	EXPERIMENTAL	Warmed Hollow	1.56 ± 0.2	-0.18 ± 0.1	-5.4 ± 2.1	3.7	0.71	
		Ambient Hummock	0.75 ± 0.5	-0.53 ± 0.1	-10.3 ± 3.3	3.5	0.70	
		Warmed Hummock	1.29 ± 0.3	-0.47 ± 0.1	-45.9 ± 7.5	6.2	0.53	
	DRAINED	Ambient Hollow	0.48 ± 0.3	-0.61 ± 0.1	-29.8 ± 2.5	2.5	0.83	
		Warmed Hollow	0.96 ± 0.3	-0.19 ± 0.1	-10.3 ± 5.5	6.9	0.38	
		Ambient Hummock	1.44 ± 0.2	-0.17 ± 0.0	-27.5 ± 2.7	2.8	0.82	
	EXPERIMENTAL	Warmed Hummock	2.17 ± 0.2	-0.17 ± 0.0	-32.1 ± 3.2	2.9	0.80	
		Ambient Hollow	1.7 ± 0.3	-0.32 ± 0.0	-41.5 ± 5.5	6.5	0.61	
		Warmed Hollow	0.77 ± 0.2	-0.20 ± 0.0	23.2 ± 4.8	3.5	0.63	

^a The models were developed for each microform type ($n = 3$) at the control, experimental and drained sites separately for growing seasons of 2011, 2012 and 2013. *a*, *b* and *c* are regression coefficients. Negative values of *b* represent greater respiration with deeper water table values (below-ground WT having negative values). All modeled parameters are significant at $p = 0.05$ level.