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Article

Evaluation of LandscapeDNDC Model Predictions of CO_2 and N_2O Fluxes from an Oak Forest in SE England with and without Considering Stand Structure.

Shirley M. Cade[1], Kevin C. Clemitshaw[1], Saúl Molina-Herrera[2], Rüdiger Grote[2], Edwin Haas[2], Matthew Wilkinson[3], James I. L. Morison[3] and Sirwan Yamulki[3]*

Supplementary Information.

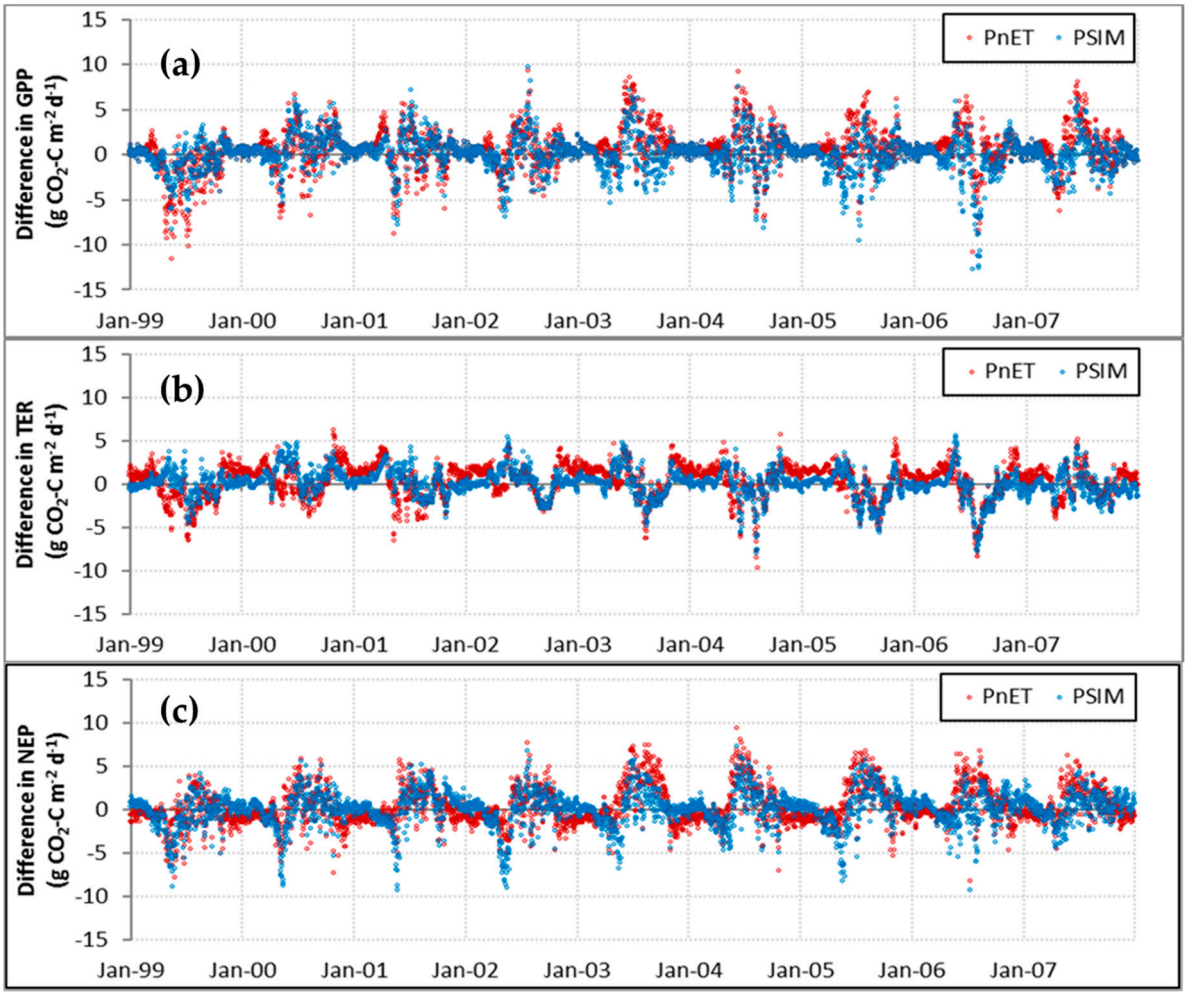

Figure S1. Daily residual values (measured – simulated) for: a) GPP, b) TER and c) NEP at the Straits Inclosure, modelled with PnET (red circles) and PSIM (blue circles) modules 1999-2007.

Table S1. Sensitivity test results showing % change in simulated annual total GHG fluxes averaged over 1999-2007 for a) input variable changes simulated with PnET (see Tables 1 and 2 for initial input values), b) parameter value changes simulated with PnET and c) parameter value changes simulated with PSIM. Parameter value units are given in Table 3. Changes >10% shaded.

(a)

Input variable	GPP % change		TER % change		NEP % change		Soil CO_2 % change		N_2O % change		NO % change	
	+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%
Soil pH (±1 pH unit)	-1.1	0.8	-0.8	0.6	-2.3	1.1	-0.3	0.6	-5.3	-1.0	-2.7	661
Clay (±10%)	-0.4	0.0	-0.4	0.2	-0.5	-0.7	-0.2	0.5	-1.2	-0.6	1.1	1.6
Organic C (±10%)	2.1	-2.8	2.2	-2.8	1.6	-3.0	2.6	-3.1	6.4	-8.7	21.6	-22.0
Organic N (±10%)	-1.2	0.7	-1.2	0.9	-1.4	0.0	-1.0	1.3	-3.1	1.3	-5.6	4.5
Bulk density (±10%)	1.5	-0.3	1.7	-0.4	0.9	-0.2	1.9	-0.5	12.4	-6.7	39.3	-22.6
Field capacity (±10%)	-1.3	0.9	-1.8	1.7	0.0	-1.6	-1.9	2.1	5.9	-4.5	16.2	-8.5
Wilting point (±10%)	-0.1	0.1	0.3	-0.1	-1.1	0.5	0.3	0.2	0.4	-0.3	1.5	-1.2
Hydraulic conductivity /10		-0.6		-0.6		-0.5		-0.6		1.4		1.5
Hydraulic conductivity x10	-0.2		-0.1		-0.5		0.0		-3.2		-0.1	
Hydraulic conductivity x100	-0.2		0.0		-0.9		-0.2		-4.8		-0.5	
N deposition (±10%)	0.1	-1.3	0.0	-1.1	0.5	-2.1	-0.2	-1.0	0.4	-3.8	1.9	-2.9
N deposition (+100, -50%)	7.0	-5.3	5.7	4.5	11.7	-8.2	4.7	-3.9	17.7	-14.1	24.8	-15.4
Temperature* (±10%)	3.2	-1.5	2.8	0.3	4.8	-7.8	-3.9	6.9	-1.9	8.0	-6.3	15.0
Precipitation (±10%)	-1.5	-0.8	-3.3	-2.1	4.6	3.4	-6.7	-5.8	-3.7	-5.6	-3.1	-4.2

* = min., max and mean

(b)

PnET Parameter	GPP % change		TER % change		NEP % change		Soil CO_2 % change		N_2O % change		NO % change	
	+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%
BASEFOLRESPFRAC (0.165, 0.135)	3.5	-4.0	5.1	-5.5	-1.8	1.4	0.7	-0.6	5.1	-6.1	1.0	-3.6
MFOLOPT (0.517, 0.423)	7.6	-7.8	9.1	-8.9	2.3	-4.1	6.7	-6.1	4.4	-0.8	5.7	-6.8
RESPQ10 (2.2, 1.8)	-2.4	3.0	-3.6	4.7	1.6	-3.0	1.1	-0.5	-6.5	5.2	-3.6	2.4
ROOTMRESPFRAC (2.2, 1.8)	0.7	-1.0	1.5	-1.4	-1.6	0.5	2.9	-2.3	3.6	-3.2	0.3	-1.4
EXT (0.44, 0.36)	0.4	-1.4	2.0	-2.7	-5.3	3.0	0.6	-1.0	7.6	-8.7	3.5	-5.6
NCFOLOPT (0.0264, 0.0216)	0.4	-2.4	0.5	-1.9	0.2	-4.4	0.3	-1.1	-4.5	3.3	-3.0	0.6
EXPL_NH4 (0.33, 0.270	-0.6	-0.5	-0.5	-0.3	-0.5	-0.9	-0.5	-0.3	-0.2	2.1	-2.2	0.2
EXPL_NO3 (0.176, 0.144)	-0.2	-0.5	-0.1	-0.3	-0.2	-1.4	0.0	0.0	-2.0	3.4	-3.5	1.2
SENESCSTART (330, 270)[1]	-12.6	-4.9	-14.9	-5.3	-4.8	-3.4	-11.4	-2.7	0.4	-3.2	-13.5	-3.7
GDDFOLSTART (550, 450)	-2.9	2.5	-3.9	3.7	0.2	-1.4	-5.9	5.9	-4.2	1.6	-2.8	2.3
GDDFOLEND (1210, 990)	5.8	-6.0	9.9	-8.9	-8.0	3.7	17.0	-13.2	19.3	-14.9	11.8	-11.5

1 = SENESCSTART ± 30 days

(c)

PSIM parameter	GPP % change		TER % change		(c)NEP % change		Soil CO_2 % change		N_2O % change		NO % change	
	+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%
MFOLOPT (0.517, 0.423)	1.9	-0.9	2.8	-1.5	0.8	1.2	3.2	-1.3	3.9	-4.8	1.1	-4.7
NCFOLOPT (0.0264, 0.0216)	0.0	-0.1	0.2	-0.3	-0.6	0.4	-0.2	0.4	-1.7	-0.9	-2.6	-2.6
GDDFOLSTART (550, 450)	-1.8	1.5	-0.8	0.7	-4.9	3.9	-0.1	0.2	-1.7	0.5	-2.9	1.0
NDFLUSH (49.5, 40.5)	-1.2	1.7	-0.6	0.8	-2.9	3.7	-0.2	0.3	-0.9	0.6	-2.0	1.1
DLEAFSHED (340, 320)[1]	1.9	-2.0	1.4	-1.3	3.3	-4.1	1.1	-0.7	2.5	-2.9	5.0	-4.7
DLEAFSHED (350, 300)[2]	3.7	-4.5	3.0	-2.3	6.0	-11.7	2.2	0.4	5.1	-8.9	9.6	-12.8
NDMORTA (110, 90)	-0.7	0.7	-0.5	0.6	-1.2	1.2	-0.4	0.5	-1.8	5.8	-2.4	1.9
Canopy VCMAX25 (99, 81)	3.8	-4.2	2.1	-2.4	8.9	-9.9	1.3	-1.4	-1.8	1.7	-2.9	2.3
KM20 (0.33, 0.27)	0.1	-0.1	0.8	-0.8	-2.1	2.1	0.3	-0.3	0.5	-1.0	0.7	-1.5
EXT (0.44, 0.26)	-2.4	2.8	-2.4	2.9	-2.5	2.5	-2.6	3.5	2.3	-2.0	2.5	-3.3
Understorey VCMAX25 (93.5, 76.5)	0.2	-0.3	0.1	-0.3	0.4	-0.4	0.2	-0.3	-0.7	0.6	-0.8	0.8
No understorey	-17.4		-20.7		-7.0		-21.7		-13.8		-4.4	

1=DLEAFSHED ± 10 days 2 = DLEAFSHED ± 20 days