Supplement

Modelling root exudation and plant-microbe interactions under CO_2 fertilization in a mature forest

This supplement contains tables for data displayed in figures

STable 1: Comparison of the fate of additional sequestered C (Figure 3)

	flux_class	**flux**	**Percentage of additional GPP**
simulated			
	Ra+BP+CEX	BP	32.6
	Ra+BP+CEX	Ra	37.0
	Ra+BP+CEX	CEX	30.3
	R	Rh	27.8
	R	Ra	37.0
	DCpools	dVeg	19.5
	DCpools	dSOC_deep_soil	7.11
	DCpools	dSOC_top_soil	2.96
	DCpools	dlitter	5.57
observed			
	Ra+BP+CEX	BP	8.97
	Ra+BP+CEX	Ra	31.0
	Ra+BP+CEX	CEX	60.1
	R	Ra	31.0
	R	Rh	55.8
	DCpools	dVeg	-0.196
	DCpools	dSOC_top_soil	-12.4
	DCpools	dlitter	14.1

STable 2: simulated CO_2 effect on sources and sinks for C in soils at EucFACE (Figure 1)

flux	values (gC m^{-2} yr^{-1})	Flux_class	Frac_per_input	Panel
l_fall	431.05	soil C input	0.54	ambient
CEX	366.15	soil C input	0.46	ambient
Rh_res	157.77	Heterotrophic respiration	0.20	ambient
Rh_CEX	179.63	Heterotrophic respiration	0.23	ambient
Rh_other	393.54	Heterotrophic respiration	0.49	ambient
mic_growth_deep_soil	40.78	microbial growth	0.5	ambient
mic_growth_top_soil	374.1	microbial growth	0.47	ambient
l_fall	47.73	soil C input	0.3	CO_2 effect
CEX	110.11	soil C input	0.7	CO_2 effect
Rh_res	15.47	Heterotrophic respiration	0.1	CO_2 effect
Rh_CEX	54.25	Heterotrophic respiration	0.34	CO_2 effect
Rh_other	31.29	Heterotrophic respiration	0.2	CO_2 effect
mic_growth_deep_soil	5.37	microbial growth	0.03	CO_2 effect
mic_growth_top_soil	52.99	microbial growth	0.34	CO_2 effect
dSOC_top_soil	10.76	change in C pools	0.07	CO_2 effect
dSOC_deep_soil	25.83	change in C pools	0.16	CO_2 effect
dlitter	20.23	change in C pools	0.13	CO_2 effect

STable 3: Simulated uptake sources (C, N, P) for microbial growth at EucFACE in top soil (50 cm) (Figure 2 a-c)

element	flux	Value [g m^{-2} yr^{-1}]	flux_class	fraction
Carbon				
	exudation	31.54	organic	0.6
	microbial recycling	5.66	organic	0.11
	polymeric litter	0.92	organic	0.02
	microbial residue	8.24	organic	0.16
	soluble litter	6.63	organic	0.13
Nitrogen				
	exudation	0.26	organic	0.02
	microbial recycling	3.67	organic	0.29
	polymeric litter	0.02	organic	0
	microbial residue	2.84	organic	0.23
	soluble litter	0.42	organic	0.03
	NH4 Uptake	4.14	inorganic	0.33
	NO3 Uptake	0.11	inorganic	0.01
	Asym N fixation	1.06	inorganic	0.08
Phosphorus				
	microbial recycling	1.09196	organic	0.36
	polymeric litter	0.00054	organic	>0.01
	microbial residue	0.16812	organic	0.06
	soluble litter	0.01397	organic	>0.01
	PO4 Uptake	1.7282	inorganic	0.58

STable 4: Simulated uptake sources (C, N, P) for microbial growth at EucFACE in top soil (50 cm) (Figure 3 d)

flux	Flux_class	fraction	CO2 treatment
soluble litter	organic	0.14	ambient
microbial residue	organic	0.29	ambient
polymeric litter	organic	0.15	ambient
microbial recycling	organic	0.12	ambient
exudation blank	organic	0.30	ambient
soluble litter	organic	0.14	elevated
microbial residue	organic	0.27	elevated
polymeric litter	organic	0.14	elevated
microbial recycling	organic	0.12	elevated
exudation blank	organic	0.34	elevated

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STable 5: Simulated uptake sources (C, N, P) for microbial growth at EucFACE in top soil (50 cm) (Figure 4 e)

flux	Flux_class	fraction	CO2 treatment
NH4 Uptake	inorganic	0.22	ambient
NO3 Uptake	inorganic	0.01	ambient
AsymN fixation	inorganic	0.01	ambient
soluble litter	organic	0.04	ambient
microbial residue	organic	0.38	ambient
polymeric litter	organic	0.02	ambient
microbial recycling	organic	0.32	ambient
exudation blank	organic	0.01	ambient
NH4 Uptake	inorganic	0.23	elevated
NO3 Uptake	inorganic	0.01	elevated
AsymN fixation	inorganic	0.02	elevated
soluble litter	organic	0.04	elevated
microbial residue	organic	0.36	elevated
polymeric litter	organic	0.01	elevated
microbial recycling	organic	0.32	elevated
exudation blank	organic	0.02	elevated

STable 6: Simulated uptake sources (C, N, P) for microbial growth at EucFACE in top soil (50 cm) (Figure 5 f)

flux	Flux_class	fraction	CO2 treatment
PO4 Uptake	inorganic	0.45	ambient
soluble litter	organic	0.01	ambient
microbial residue	organic	0.15	ambient
polymeric litter	organic	0	ambient
microbial recycling	organic	0.39	ambient
PO4 Uptake	inorganic	0.46	elevated
soluble litter	organic	0.01	elevated
microbial residue	organic	0.14	elevated
polymeric litter	organic	0	elevated
microbial recycling	organic	0.39	elevated

STable 7: Simulated CO2 effect on mineral P fluxes in top soil layers (50cm) (Figure 6 a)

flux	Value [gP m^{-2} yr^{-1}]	Flux_class
Gross_min_PO4	0.32	input
Biochem_min	1.48	input
Plant_upt	0.06	uptake
Mic_upt	1.73	uptake

STable 8: Simulated balance for microbial necromass cycling in top soils (50 cm) (Figure 8)

element	Flux_class	Value [g m^{-2} yr^{-1}]	CO2 treatment
carbon	res_in	260.	ambient
carbon	res_out	-260.	ambient
carbon	res_in	295.	elevated
carbon	res_out	-283.	elevated
nitrogen	res_in	41.5	ambient
nitrogen	res_out	-41.6	ambient
nitrogen	res_in	47.1	elevated
nitrogen	res_out	-45.4	elevated
phosphor	res_out	-4.02	ambient
phosphor	biomin_loss	-7.55	ambient
phosphor	res_in	10.5	ambient
phosphor	res_out	-4.25	elevated
phosphor	biomin_loss	-10.8	elevated
phosphor	res_in	11.9	elevated

STable 9 : Allocation of additional GPP under eCO_2 (Figure B 4)

Simulation	Sink	Fraction of GPP
With RE	Total_veg_C	0.195
With RE	litter	0.0557
With RE	SOM	0.101
With RE	HetResp	0.278
With RE	AutResp	0.370
Without RE	Total_veg_C	0.291
Without RE	litter	0.0609
Without RE	SOM	0.0173
Without RE	HetResp	0.120
Without RE	AutResp	0.510

STable 10: Simulated fate of additional sequestered C under eCO_2 (Figure B 5)

flux_class	flux	Percentage of additional GPP
Ra+BP+CEX	BP	49.0
Ra+BP+CEX	Ra	51.0
R	Rh	12.0
R	Ra	51.0
DCpools	dVeg	29.1
DCpools	dSOC_deep_soil	1.88
DCpools	dSOC_top_soil	-0.16
DCpools	dlitter	6.09

STable 11: Simulated major mineralization fluxes (Figure B 6)

Year	treatment	Heterotrophic respiration [g C m^{-2} yr^{-1}]	Root respiration [g C m^{-2} yr^{-1}]	NH_4 Net Mineralization [g N m^{-2} yr^{-1}]	Biochemical mineralization [g P m^{-2} yr^{-1}]	PO_4 Net Mineralization [g P m^{-2} yr^{-1}]
1	aCO2	643.79	381.95	9.13	6.13	0.08
2	aCO2	626.97	356.73	7.86	6.84	0.68
3	aCO2	685.83	375.94	7.16	7.4	0.04
4	aCO2	694.24	367.54	7.27	6.97	-0.04
5	aCO2	581.33	372.34	13.17	5.14	0.21
6	aCO2	626.97	324.3	8.78	6.44	0.02
7	aCO2	721.86	331.5	3.88	8.24	0.2
1	eCO2	695.44	401.17	6.22	7.53	0.25
2	eCO2	713.45	392.76	5.06	8.76	0.88
3	eCO2	760.3	426.39	7.42	8.36	-0.14
4	eCO2	804.74	417.98	5.14	9.04	0.18
5	eCO2	665.41	427.59	13.46	6.35	0.22
6	eCO2	726.67	372.34	9.96	7.99	0.37
7	eCO2	833.56	389.16	3.57	9.45	-0.11

STable 12: Mean annual available PO_4 (Figure B 7)

Year	Available PO_4 [g P m^{-2}]	treatment
1	0.15	aCO2
2	0.18	aCO2
3	0.22	aCO2
4	0.15	aCO2
5	0.26	aCO2
6	0.13	aCO2
7	0.18	aCO2
1	0.19	eCO2
2	0.23	eCO2
3	0.24	eCO2
4	0.16	eCO2
5	0.34	eCO2
6	0.17	eCO2
7	0.19	eCO2

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STable 13: Simulated changes in top soil pools (Figure B 10)

DOM [g m^{-2} yr^{-1}]	Mic [g m^{-2} yr^{-1}]	Res [g m^{-2} yr^{-1}]	aDOM [g m^{-2} yr^{-1}]	aRes [g m^{-2} yr^{-1}]	treatment	element
-0.46	2.98	0.08	0.36	-1.32	aCO2	carbon
-0.03	6.02	10.4	4.11	-8.11	eCO2	carbon
-0.05	0.69	-0.05	0.04	-0.21	aCO2	nitrogen
-0.01	1.41	1.66	0.31	-1.3	eCO2	nitrogen
-0.01	0.17	-0.17	0.01	-0.02	aCO2	phosphorus
0	0.34	-0.19	0.04	-0.36	eCO2	phosphorus

STable 14: Simulated changes in soil pools (Figure B 11)

DOM [g m^{-2} yr^{-1}]	Mic [g m^{-2} yr^{-1}]	Res [g m^{-2} yr^{-1}]	aDOM [g m^{-2} yr^{-1}]	aRes [g m^{-2} yr^{-1}]	treatment	element
22.26	3.25	8.50	29.41	-3.98	aCO2	carbon
30.01	6.65	21.33	43.88	-5.85	eCO2	carbon
0.22	0.75	1.33	0.44	-0.76	aCO2	nitrogen
0.30	1.54	3.41	0.87	-1.05	eCO2	nitrogen
0.00	0.18	-0.13	0.03	-0.05	aCO2	phosphorus
0.01	0.38	-0.09	0.08	-0.37	eCO2	phosphorus