Supplementary materials

Table S1 The information of yields, cumulative CH_4, N_2O, NO, NH_3, NEE and NO_3^- leaching from cotton (C) and winter wheat-summer maize (W-M) cropping systems used in this study for evaluating the model performance on annual or seasonal scale.

	Period	Crop	Treatment	Ref [b]
Yield	2005.10−2006.10	W-M	CT/IT	[4]
	2006.10−2007.10	W-M	CT/IT	[4]
	2007.10−2008.10	W-M	All [a]	[4]
	2008.10−2009.10	W-M	All	[4], [5]
	2009.10−20010.10	W-M	All	[4], [5]
	2007.10−2008.10	C		[3], [7]
	2008.10−2009.10	C		[3], [7]
	2009.10−20010.10	C		[3], [7]
CH_4	2009.10.19−2010.10.15	W-M	N135	[5]
	2009.10.19−2010.10.15	W-M	N270	[5]
	2009.10.19−2010.10.15	W-M	N430	[5]
	2009.10.19−2010.10.15	W-M	N650	[5]
	2009.10.19−2010.10.15	W-M	N850	[5]
	2008.11.06−2009.11.07	C		[9]
	2009.11.08−2010.11.05	C		[9]
N_2O/NO	2008.10.11-2009.10.15	W-M	WS	[4]
	2008.10.11-2009.10.15	W-M	NS	[4]
	2009.10.20−2010.10.15	W-M	U	[6]
	2009.10.20−2010.10.15	W-M	DCD	[6]
	2009.10.20−2010.10.15	W-M	DMPP	[6]
	2009.10.19−2010.10.15	W-M	N135	[5], [8]
	2009.10.19−2010.10.15	W-M	N270	[5], [8]
	2009.10.19−2010.10.15	W-M	N430	[5], [8]
	2009.10.19−2010.10.15	W-M	N650	[5], [8]
	2009.10.19−2010.10.15	W-M	N850	[5], [8]
	2007.10.11−2008.10.10	C		[2], [3], [7]
	2008.10.11−2009.10.15	C		[2], [3], [7]
NH_3	2008.03.18-2008.03.28	W-M	CT	[10]
	2008.03.18-2008.03.28	W-M	IT	[10]
	2008.07.09−2008.07.24	W-M	WS	[1]
NEE	2008.10.15−2009.06.05	W-M	WS	[9]
	2009.10.1−2010.06.16	W-M	U	[9], [11]
	2010.6.17−2010.10.17	W-M	U	[9], [11]
	2008.11.06−2009.11.07	C		[9]
	2009.11.08−2010.11.05	C		[9]
NO_3^-	2007.10.11−2008.10.10	C		[7]
	2008.10.11−2009.10.15	C		[7]

[a] All, including all the treatment for winter wheat-summer maize cropping system.

[b] References

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Table S2 The calibrated parameters of new algorithm for NEE simulation.

Parameter	Cotton	Wheat	Maize
a	0.1	0.1	0.2
b	680	2440	2500
c	4.4	4	6.4
g	24	0.0006	0.00016
h	17	18.2	16.4
i	125	411	393
j	3	4.4	6
l	51	25	23
m	30	26	23
d_1	0.2	0.2	0.2
d_2	0.5	0.8	1.0

Table S3 Details of the field management practices for the cotton cropping system with observations for model validation [a].

Date (yyyy-mm-dd)	Management practices
2007-11-09	Incorporation of aboveground residues (100%: 1.9 Mg C ha^{-1} and 57 kg N ha^{-1} on average) by plow tillage (30 cm depth)
2008-04-09	Tillage (20 cm)
2008-04-14	Sowing and film mulch (70% of covered soil surface area)
2008-07-01	Fertilization (band placement, 5 cm depth; urea: 59 kg N ha^{-1}; diammonium hydrogen phosphate: 7 kg N ha^{-1})
2008-07-11	Irrigation (88.5 mm)
2008-08-02	Irrigation (95.7 mm)
2008-08-23	First cotton grain harvest (914.75 kg ha^{-1})
2008-09-16	Second cotton grain harvest (914.75 kg ha^{-1})
2008-10-03	Third cotton grain harvest (914.75 kg ha^{-1})
2008-10-26	Last cotton grain harvest (914.75 kg ha^{-1})
2008-11-05	Cutting cotton stems (machinery)
2008-11-06	Incorporation of aboveground residues (100%: 2.1 Mg C ha^{-1} and 61 kg N ha^{-1} on average) by plow tillage (30 cm)
2009-03-14	Tillage (20 cm)
2009-04-09	Irrigation (35.5 mm)
2009-04-10	Sowing and film mulch (70% of covered soil surface area)
2009-06-28	Fertilization (urea: 68 kg N ha^{-1}; diammonium hydrogen phosphate: 7 kg N ha^{-1})
2009-07-13	Irrigation (85.3 mm)
2008-08-18	First cotton grain harvest (842.5 kg ha^{-1})
2009-08-21	Irrigation (58.5 mm)
2008-09-23	Second cotton grain harvest (842.5 kg ha^{-1})
2008-10-09	Third cotton grain harvest (842.5 kg ha^{-1})
2008-11-08	Last cotton grain harvest (842.5 kg ha^{-1})
2009-12-02	Cutting cotton stems (machinery)
2009-12-04	Incorporation of aboveground residues (100%: 1.6 Mg C ha^{-1} and 53 kg N ha^{-1} on average) by plow tillage (30 cm)

[a] Li et al. (2009), Liu et al. (2010, 2014), Wang et al. (2013), and the authors' unpublished data.

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Table S4 Details of the baseline field management practices except for irrigation.

Crop	Date (mm-dd)	Management
Cotton	04-09 [a]	Fertilization (urea: 43 kg N ha^{-1})
	04-10	Tillage (20 cm)
	04-14	Sowing and film mulch (70% area)
	06-27	Fertilization (band application, 5 cm; urea: 67 kg N ha^{-1})
	10-23 [b]	Final grain harvest
	10-24/11-06 [c]	Stem cutting and fully incorporation by plow tillage (30 cm depth)
Wheat	10-24 [a]	Fertilization (urea: 60 kg N ha^{-1})
	10-25	Tillage (20 cm); sowing
	03-06	Fertilization (band application, 5 cm; urea: 120 kg N ha^{-1})
	06-03	Harvest; straw incorporation (100%)
Maize	06-06	Tillage (20 cm); sowing
	07-11	Fertilization (band application, 5 cm; urea: 250 kg N ha^{-1})
	10-14	Harvest; straw incorporation (100%)

[a] As it is assumed that there is no limit of phosphorous and potassium supplies, a minor nitrogen dose (approximately 5−10% of the total fertilizer nitrogen dose) in form of diammonium hydrogen phosphate is regarded as part of applied urea.

[b] Although there are four agronomic harvests, the model calculation needs to know the date of the final one to terminate the cotton growing season and accumulation of the daily grain production.

[c] The operations were performed immediately after the final cotton grain harvest if the wheat is planted in the following season.

Table S5 Baseline irrigation dates and amounts depending on precipitation.

Year	Cotton		Winter wheat−summer maize	
	Date (mm-dd)	Amount (mm)	Date (mm-dd)	Amount (mm)
1	07-15	106.3	03-15	106.3
	08-20	75	04-25	100
			06-10	50
			08-15	31.3
			12-18	106.3
2	07-11	106.3	03-23	75
	08-13	112.5	04-25	100
			06-08	125
			08-10	31.3
3	08-21	75	01-05	106.3
			03-21	75
			06-18	75
			08-10	31.3
			12-20	106.3
4	07-16	106.3	03-10	106.3
	08-15	112.5	04-19	100
			06-18	75
			08-07	100
			12-21	106.3
5	07-11	106.3	03-15	106.3
	08-21	75	04-28	100
			06-18	75
			07-17	81.3
			08-14	31.3
			12-28	106.3
6	07-09	106.3	03-15	106.3
	08-23	75	04-19	100
			06-08	125
			08-13	31.3
			12-28	75
7	07-18	106.3	03-23	106.3
	08-23	75	04-25	100
			06-07	50
			08-18	31.3
			12-20	75
8	07-15	106.3	03-19	106.3
	08-24	75	04-20	100
			06-18	50
			08-13	31.3

			12-31	106.3
9	04-10	43.8	03-16	106.3
	07-20	106.3	04-22	100
	08-23	75	06-14	50
			08-09	31.3
10	07-15	106.3	01-05	75
	08-25	75	03-15	106.3
			04-25	100
			06-18	75
			08-13	100
			12-22	106.3
11	07-16	106.3	03-15	106.3
	08-10	75	05-04	100
			06-18	50
			08-12	31.3
			12-18	75
12	04-10	43.8	03-24	75
	08-19	75	04-19	100
			06-08	75
			08-18	31.3
			12-22	101.9
13	07-09	110.6	03-21	78.3
	07-31	119.4	06-08	125.6
			08-10	35.8
			12-18	72.8
14	04-09	44.4	03-15	111.8
	07-11	109.1	04-19	117
	08-21	73.1	06-10	52.4
			07-17	81.3
			08-14	26.6
15	04-09	43.8	01-09	111.8
	07-06	106.3	03-23	108.4
	08-17	37.5	05-04	97
			06-18	75.6
			08-07	116.9
			12-18	106.3
16	07-16	106.3	03-15	106.3
	08-16	75	04-29	100
			06-15	100
			08-14	50
			12-22	75
17	07-03	106.3	03-15	106.3

	08-14	75	04-28	100
			06-18	75
			08-12	31.3
			12-22	106.3
18	07-03	106.3	03-23	106.3
	08-21	75	04-30	100
			06-18	50
			08-18	31.3
			12-30	75

Table S6 The results of Figure 2 for model validation.

	Crop	Observation	Simulation	Notes
Yield	Wheat	5.4 ±0.6	5.3	
(Mg DM ha^{-1})		4.3 ±0.2	4.7	
		5.5 ±0.5	5.5	
		5.3 ±0.6	5.9	
		5.9 ±0.2	6.0	
		5.4 ±0.3	5.2	
		4.3 ±0.3	4.8	
		5.5 ±0.4	5.7	
		4.9 ±0.3	5.9	
		5.7 ±1.4	6.0	
		6.3 ±1.2	6.0	
		5.6 ±0.7	6.0	
		5.7 ±0.6	6.0	
		6.0 ±0.8	6.0	
		6.8 ±1.4	6.0	
		6.1 ±0.9	6.0	
	Maize	5.1 ±0.4	5.5	
		7.8 ±0.7	7.9	
		7.5 ±0.7	7.5	
		7.1 ±0.8	7.5	
		6.7 ±0.9	7.9	
		5.8 ±0.2	5.9	
		8.4 ±0.3	7.9	
		8.2 ±1.5	6.7	
		7.1 ±1.0	7.4	
		6.7 ±1.7	7.9	
		5.8 ±1.8	5.6	
		6.7 ±1.6	7.9	
		6.9 ±2.0	7.9	
		7.6 ±2.2	7.9	
		8.2 ±1.6	7.9	
		7.1 ±0.8	7.9	
	Cotton	3.4 ±0.7	4.2	
		4.4 ±1.0	4.3	
		4.2 ±1.2	4.2	
NEE	Wheat	−2.56 ±0.64	−2.41	
(Mg C ha^{-1} $season^{-1}$)		−2.38 ±0.60	−2.24	
	Maize	−4.70 ±1.17	−5.43	
	Cotton	−0.40 ±0.10	−0.35	
		−0.85 ±0.21	−0.75	

NEGE	Wheat	0.049 ± 2.57	1.17	
(Mg CO_2eq ha^{-1} $season^{-1}$)		1.51 ± 2.57	1.00	
	Maize	−4.56 ± 5.40	−8.44	
	Cotton	6.35 ± 1.70	6.72	
		4.30 ± 2.10	4.66	
ΔSOC	Wheat	0.16 ± 0.70	−0.16	
(Mg C ha^{-1} $season^{-1}$)		−0.33 ± 0.70	−0.17	
	Maize	1.59 ± 1.47	2.75	
	Cotton	−1.56 ± 0.46	−1.63	
		−1.05 ± 0.57	−1.07	
CH_4	W-M	1.59 ± 0.08	1.50	
(kg C ha^{-1} yr^{-1})		1.56 ± 0.08	1.58	
		1.51 ± 0.18	1.63	
		1.69 ± 0.20	1.67	
		1.79 ± 0.14	1.88	
	Cotton	2.33 ± 0.16	2.24	
		1.73 ± 0.16	1.71	
N_2O	W-M	4.40 ± 1.40	3.88	
(kg N ha^{-1} yr^{-1})		3.50 ± 0.80	3.00	
		4.40 ± 1.40	3.88	
		2.90 ± 0.80	3.06	
		2.69 ± 0.80	2.79	
		2.09 ± 0.40	1.84	
		2.59 ± 0.66	3.56	
		3.51 ± 0.52	4.48	
		5.12 ± 1.56	5.77	
		5.57 ± 1.36	6.85	
	Cotton	2.56 ± 0.30	2.37	
		1.57 ± 0.2	1.82	
NO	W-M	2.50 ± 1.00	2.41	
(kg N ha^{-1} yr^{-1})		2.40 ± 0.80	2.33	
		2.20 ± 0.80	2.57	
		0.85 ± 0.40	1.13	
		0.81 ± 0.40	1.01	
		0.91 ± 0.44	1.04	
		1.21 ± 0.28	1.20	
		1.75 ± 0.26	2.02	
		2.23 ± 0.44	2.54	
		2.64 ± 0.98	3.21	
	Cotton	0.72 ± 0.18	0.85	
		0.76 ± 0.16	0.79	For calibration
NH_3	Wheat	5.3 ± 0.5	5.50	

(kg N ha^{-1})		4.3 ± 0.4	3.92
	Cotton	3.6	3.75

Table S7 The results of Figure 3 for the 18-year simulation of each rotation pattern baseline.

Cotton yield	R_0	R_1	R_2	R_3	R_4	R_5
			(Mg dry matter ha^{-1})			
1st year	–	3.9	3.9	3.9	3.9	3.9
2nd year	–	–	6.5	6.5	6.5	6.5
3rd year	–	–	–	10.5	10.6	10.6
4th year	–	–	–	–	14.2	14.2
5th year	–	–	–	–	–	17.4
6th year	–	–	–	–	–	–
7th year	–	7.4	10.0	14.0	17.7	20.8
8th year	–	–	13.4	17.4	21.1	24.2
9th year	–	–	–	21.1	24.7	27.9
10th year	–	–	–	–	27.9	31.1
11th year	–	–	–	–	–	34.7
12th year	–	–	–	–	–	–
13th year	–	10.8	16.9	24.5	31.4	38.1
14th year	–	–	20.7	28.3	35.2	42.0
15th year	–	–	–	31.8	38.7	45.4
16th year	–	–	–	–	41.7	48.5
17th year	–	–	–	–	–	51.5
18th year	–	–	–	–	–	–

Wheat yield	R_0	R_1	R_2	R_3	R_4	R_5
			(Mg dry matter ha^{-1})			
1st year	3.1	–	–	–	–	–
2nd year	6.7	4.0	–	–	–	–
3rd year	11.5	8.7	4.7	–	–	–
4th year	16.7	14.0	9.9	5.2	–	–
5th year	21.5	18.7	14.7	9.9	4.7	–
6th year	26.4	23.6	19.6	14.8	9.6	4.9
7th year	31.4	–	–	–	–	–
8th year	36.7	28.9	–	–	–	–
9th year	42.0	34.1	24.8	–	–	–
10th year	47.4	39.4	30.2	20.1	–	–
11th year	52.4	44.5	35.2	25.2	14.7	–
12th year	57.6	49.7	40.4	30.4	19.8	10.0
13th year	62.4	–	–	–	–	–
14th year	67.4	54.6	–	–	–	–
15th year	71.3	58.5	44.3	–	–	–
16th year	75.3	62.4	48.1	34.6	–	–

17th year	80.1	66.8	52.4	38.9	24.6	–
18th year	85.0	71.6	57.2	43.6	29.4	14.8

Maize yield	R_0	R_1	R_2	R_3	R_4	R_5
	(Mg dry matter ha^{-1})					
1st year	6.7	–	–	–	–	–
2nd year	12.2	5.3	–	–	–	–
3rd year	19.0	12.0	6.7	–	–	–
4th year	25.6	18.7	13.3	6.6	–	–
5th year	32.6	25.6	20.3	13.6	6.9	–
6th year	39.3	31.9	27.0	20.2	13.6	6.6
7th year	45.3	–	–	–	–	–
8th year	51.3	37.9	–	–	–	–
9th year	57.9	44.3	33.3	–	–	–
10th year	64.3	50.7	39.7	26.6	–	–
11th year	70.9	57.3	46.2	33.1	20.0	–
12th year	78.3	64.7	53.7	40.5	27.4	13.9
13th year	84.5	–	–	–	–	–
14th year	90.8	70.9	–	–	–	–
15th year	97.9	78.0	60.7	–	–	–
16th year	104.7	84.8	67.5	47.3	–	–
17th year	111.5	91.6	74.3	54.0	34.1	–
18th year	118.6	98.6	81.3	61.0	41.0	20.8

ΔSOC	R_0	R_1	R_2	R_3	R_4	R_5
	(Mg C ha^{-1})					
1st year	0.96	−0.27	0.56	0.82	0.88	0.75
2nd year	1.64	−0.27	−1.42	−0.49	−0.09	0.13
3rd year	2.42	0.40	−0.94	−1.11	−0.38	−0.04
4th year	3.22	1.25	0.01	−0.61	−0.89	−0.22
5th year	3.86	2.11	1.00	0.30	−0.41	−0.74
6th year	4.47	2.70	1.66	0.96	0.32	−0.43
7th year	5.05	1.74	1.84	1.46	0.85	0.08
8th year	5.62	1.83	0.24	0.46	0.15	−0.30
9th year	6.29	2.52	0.65	−0.34	−0.22	−0.51
10th year	6.90	3.34	1.52	0.14	−0.80	−0.76
11th year	7.47	4.15	2.44	1.03	−0.31	−1.18
12th year	7.95	4.68	3.10	1.72	0.33	−0.89
13th year	8.56	3.87	3.29	2.25	0.99	−0.30
14th year	9.15	3.97	1.70	1.29	0.34	−0.64
15th year	9.79	4.68	2.13	0.44	−0.12	−0.93
16th year	10.54	5.59	3.08	1.01	−0.74	−1.18

17th year	11.05	6.33	3.90	1.79	−0.31	−1.63
18th year	11.42	7.01	4.66	2.56	0.40	−1.30

CH_4	R_0	R_1	R_2	R_3	R_4	R_5
	(kg C ha^{-1})					
1st year	−1.6	−1.6	−1.6	−1.6	−1.6	−1.6
2nd year	−3.6	−3.7	−3.7	−3.7	−3.7	−3.7
3rd year	−5.4	−5.5	−5.5	−5.6	−5.6	−5.6
4th year	−7.4	−7.5	−7.5	−7.6	−7.6	−7.6
5th year	−9.1	−9.3	−9.3	−9.4	−9.4	−9.5
6th year	−11.0	−11.1	−11.2	−11.3	−11.3	−11.4
7th year	−12.9	−13.1	−13.2	−13.3	−13.3	−13.4
8th year	−14.9	−15.1	−15.2	−15.3	−15.3	−15.4
9th year	−16.6	−16.9	−17.0	−17.2	−17.1	−17.2
10th year	−18.4	−18.7	−18.8	−19.0	−19.0	−19.1
11th year	−20.3	−20.6	−20.7	−20.9	−20.9	−21.0
12th year	−22.0	−22.4	−22.5	−22.7	−22.7	−22.8
13th year	−23.8	−24.2	−24.3	−24.5	−24.6	−24.7
14th year	−25.6	−26.0	−26.1	−26.3	−26.4	−26.5
15th year	−27.3	−27.7	−27.9	−28.1	−28.2	−28.3
16th year	−29.1	−29.5	−29.7	−30.0	−30.1	−30.2
17th year	−30.9	−31.3	−31.5	−31.8	−32.0	−32.1
18th year	−32.9	−33.3	−33.5	−33.8	−34.0	−34.2

N_2O	R_0	R_1	R_2	R_3	R_4	R_5
	(kg N ha^{-1})					
1st year	3.9	6.5	7.0	5.6	4.9	4.2
2nd year	6.7	8.6	10.4	10.3	8.9	6.6
3rd year	10.6	11.8	13.4	11.2	11.3	8.8
4th year	14.2	15.4	16.9	14.5	12.9	11.6
5th year	21.0	20.4	21.0	17.9	15.9	13.2
6th year	25.2	24.8	25.0	21.6	19.3	16.3
7th year	32.0	30.6	31.3	29.2	24.9	20.6
8th year	37.4	32.3	33.8	32.8	28.1	23.4
9th year	42.2	36.1	37.2	33.7	30.1	25.3
10th year	47.1	40.5	40.8	36.6	31.5	27.5
11th year	50.5	43.9	43.9	39.3	33.9	28.7
12th year	56.5	49.6	48.5	43.1	37.1	31.8
13th year	60.0	55.2	54.1	47.9	41.0	35.6
14th year	66.0	58.4	57.5	53.1	45.5	38.1
15th year	69.6	61.6	60.4	54.1	47.7	40.1
16th year	74.6	66.1	64.4	57.8	49.5	42.7

17th year	78.8	70.2	68.2	61.2	52.8	43.9
18th year	83.3	73.6	71.2	63.9	55.0	47.0

NEGE	R_0	R_1	R_2	R_3	R_4	R_5
			(Mg CO_2 ha^{-1})			
1st year	−1.78	3.93	1.16	-0.46	-1.01	-0.88
2nd year	−3.06	4.81	9.89	6.44	4.30	2.41
3rd year	−4.15	3.82	9.49	9.05	6.40	3.95
4th year	−5.48	2.29	7.52	8.68	8.93	5.81
5th year	−4.71	1.42	5.70	6.84	8.47	8.38
6th year	−5.09	1.21	5.10	6.05	7.30	8.63
7th year	−4.12	7.38	7.31	7.71	7.94	8.69
8th year	−3.78	7.74	14.26	12.96	11.89	11.32
9th year	−4.06	6.90	14.26	16.23	14.13	12.89
10th year	−4.05	5.88	12.66	15.76	16.79	14.76
11th year	−4.65	4.39	10.68	13.70	16.05	16.77
12th year	−3.69	5.03	10.31	12.85	15.13	17.06
13th year	−4.40	10.57	12.14	13.06	14.45	16.61
14th year	−3.81	11.60	19.50	18.92	18.82	18.92
15th year	−4.55	10.41	19.21	22.45	21.44	20.86
16th year	−5.03	9.09	17.54	21.99	24.52	22.93
17th year	−5.03	8.24	16.22	20.69	24.41	25.04
18th year	−4.38	7.27	14.73	19.01	22.75	25.19

NO	R_0	R_1	R_2	R_3	R_4	R_5
			(kg N ha^{-1})			
1st year	2.8	2.6	1.9	1.5	1.3	1.2
2nd year	4.3	4.0	2.9	2.5	2.1	1.7
3rd year	7.0	6.6	5.5	3.2	2.7	2.3
4th year	9.5	8.9	7.7	5.3	3.7	3.1
5th year	12.7	11.5	10.2	7.6	5.9	4.0
6th year	15.2	13.8	12.4	9.7	8.0	6.0
7th year	17.1	16.6	14.8	11.6	9.5	7.1
8th year	18.7	17.5	16.0	12.6	10.4	8.0
9th year	21.6	20.0	18.4	13.4	11.0	8.6
10th year	23.7	21.9	20.1	15.0	11.9	9.3
11th year	25.8	23.8	21.9	16.7	13.4	10.1
12th year	28.9	26.7	24.6	19.2	15.9	12.6
13th year	31.5	28.8	26.1	20.4	16.9	13.6
14th year	34.8	31.4	27.4	21.5	17.8	14.2
15th year	37.4	33.6	29.6	22.3	18.4	14.8
16th year	40.1	36.1	32.0	24.6	19.3	15.5

17th year	42.5	38.3	34.2	26.7	21.5	16.1
18th year	45.9	40.9	36.5	28.9	23.5	18.8

NH_3	R_0	R_1	R_2	R_3	R_4	R_5
			(kg N ha^{-1})			
1st year	48	26	20	18	17	17
2nd year	134	97	72	51	48	46
3rd year	204	171	153	95	66	63
4th year	289	260	246	199	94	83
5th year	363	335	322	277	182	108
6th year	449	418	406	365	278	183
7th year	534	472	436	394	306	209
8th year	617	544	485	423	334	236
9th year	688	618	571	451	352	253
10th year	766	702	660	553	383	273
11th year	844	783	744	641	481	314
12th year	906	835	797	696	539	382
13th year	981	878	821	719	561	403
14th year	1040	949	859	747	588	429
15th year	1102	1015	941	787	613	454
16th year	1197	1086	1016	873	644	479
17th year	1277	1176	1109	970	720	503
18th year	1336	1240	1173	1034	787	584

NO_3^-	R_0	R_1	R_2	R_3	R_4	R_5
			(kg N ha^{-1})			
1st year	166	133	53	47	45	64
2nd year	176	143	119	95	86	107
3rd year	311	203	241	204	153	171
4th year	367	247	295	261	241	230
5th year	500	350	387	304	378	335
6th year	537	376	409	327	424	366
7th year	600	498	448	360	463	397
8th year	672	580	533	425	526	446
9th year	743	659	631	510	599	504
10th year	871	768	746	628	737	578
11th year	897	787	763	647	765	649
12th year	1116	849	817	697	820	751
13th year	1140	919	860	735	855	800
14th year	1258	1049	978	824	929	874
15th year	1378	1197	1127	955	1013	952
16th year	1522	1313	1178	1013	1172	1068

17th year	1543	1329	1193	1026	1189	1104
18th year	1571	1349	1210	1042	1203	1135

Table S8 The results of Figure 4.

		R_0	R_1	R_2	R_3	R_4	R_5
−ΔSOC	Sim	−0.63	−0.39	−0.26	−0.14	−0.02	0.07
(Mg C ha^{-1} yr^{-1})	ε_{input}	0.010	0.014	0.016	0.018	0.013	0.079
	ε_s	0.15	0.09	0.06	0.03	−0.02	−0.02
	SD of ε_s	0.09	0.06	0.04	0.02	0.01	0.01
CH_4	Sim	−1.83	−1.85	−1.86	−1.88	−1.89	−1.90
(kg C ha^{-1} yr^{-1})	ε_{input}	0.005	0.005	0.005	0.005	0.005	0.005
	ε_s	0.003	0.004	0.004	0.004	0.004	0.004
	SD of ε_s	0.031	0.032	0.032	0.032	0.032	0.032
N_2O	Sim	4.63	4.09	2.95	3.55	3.06	2.61
(kg N ha^{-1} yr^{-1})	ε_{input}	0.66	0.46	0.45	0.37	0.28	0.24
	ε_s	0.37	0.33	0.32	0.28	0.24	0.21
	SD of ε_s	0.19	0.17	0.16	0.15	0.13	0.11
NEGE	Sim	−0.24	0.40	0.82	1.06	1.26	1.40
(Mg CO_2eq ha^{-1} yr^{-1})	ε_{input}	0.31	0.23	0.21	0.18	0.14	0.13
	ε_s	−0.05	0.08	0.17	0.22	0.33	0.29
	SD of ε_s	0.04	0.06	0.12	0.15	0.24	0.20
NH_3	Sim	74	69	65	57	44	32
(kg N ha^{-1} yr^{-1})	ε_{input}	5.5	5.9	5.4	4.3	4.2	3.8
	ε_s	−0.30	−0.29	−0.26	−0.23	−0.18	−0.13
	SD of ε_s	5.5	5.1	4.8	4.2	3.2	2.4
NO	Sim	2.55	2.27	2.03	1.60	1.31	1.04
(kg N ha^{-1} yr^{-1})	ε_{input}	0.06	0.05	0.04	0.04	0.04	0.03
	ε_s	0.23	0.21	0.19	0.15	0.12	0.10
	SD of ε_s	0.07	0.07	0.06	0.05	0.04	0.03
NL	Sim	87	75	67	58	69	63
(kg N ha^{-1} yr^{-1})	ε_{input}	4.9	5.5	5.1	3.4	5.0	4.8
	ε_s	−36	−31	−28	−24	−28	−26
	SD of ε_s	4.3	3.7	3.3	2.9	3.3	3.1
NIP	Sim	610	556	519	453	395	324
(US$ ha^{-1} yr^{-1})	ε_{input}	16	15	14	14	10	9
	ε_s	−66	−63	−59	−41	−58	−55
	SD of ε_s	29	26	24	22	17	13