



Supplement of

Remapping carbon storage change in retired farmlands on the Loess Plateau in China from 2000–2021 in high spatiotemporal resolution

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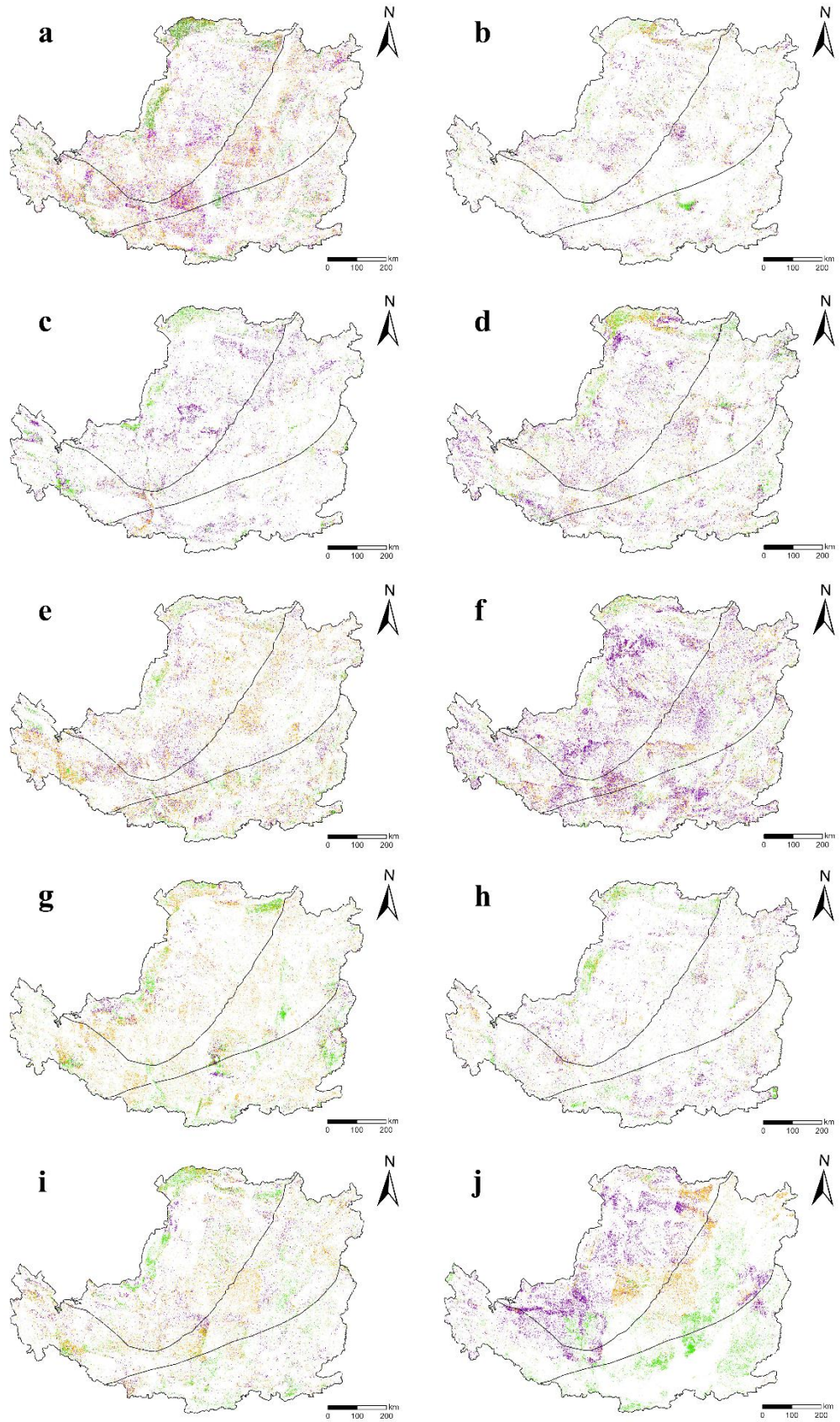


Figure S1. Spatial distribution of annually retired farmlands on the Loess Plateau from 1999 to 2021, in (a) 2001, (b) 2002, (c) 2003, (d) 2004, (e) 2006, (f) 2007, (g) 2008, (h) 2009, (i) 2011, (j) 2013, (k) 2014, (l) 2016, (m) 2017, (n) 2018, (o) 2019, (p) 2020.

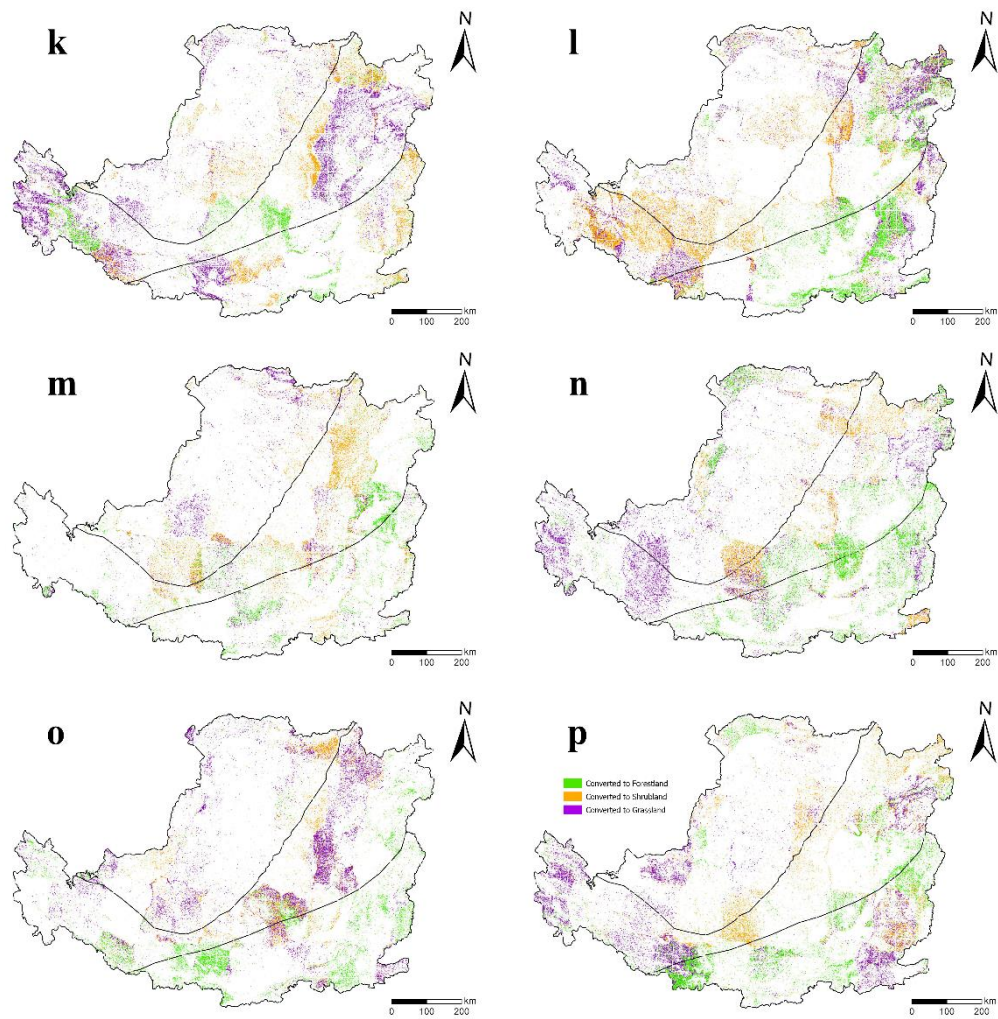


Figure S1. Spatial distribution of annually retired farmlands on the Loess Plateau from 1999 to 2021, in (a) 2001, (b) 2002, (c) 2003, (d) 2004, (e) 2006, (f) 2007, (g) 2008, (h) 2009, (i) 2011, (j) 2013, (k) 2014, (l) 2016, (m) 2017, (n) 2018, (o) 2019, (p) 2020 (Continued).

Table S1 Area of retired farmlands per year in the provinces on the Loess Plateau (km²).

Province	Gansu			Shanxi			Shaanxi			Henan		
Ecosystem	forestland	shrubland	grassland	forestland	shrubland	grassland	forestland	shrubland	grassland	forestland	shrubland	grassland
2000	1624.69	1663.71	3487.51	2734.24	1686.73	3806.15	1835.94	1144.41	4521.20	168.92	259.87	412.98
2001	1804.25	8400.13	8281.22	2853.73	6400.14	5084.43	2294.81	7563.15	7415.16	439.23	843.56	666.29
2002	590.80	1297.00	2447.92	1030.10	1635.83	2059.80	1704.63	1705.96	3315.22	176.07	395.38	546.42
2003	1566.63	1555.24	3709.03	1417.27	1093.72	2820.15	957.87	592.84	4802.83	234.07	103.28	294.91
2004	1650.29	2531.65	5357.85	3224.01	2027.39	4419.02	1417.49	2393.48	4577.75	316.14	582.62	704.51
2005	1398.42	1407.29	5473.12	2180.97	2537.18	10478.90	1976.91	1900.05	5335.78	335.43	380.57	644.40
2006	1371.22	5330.24	5280.47	1952.01	4709.66	3960.94	2274.46	6986.68	4048.03	546.03	983.59	709.80
2007	1121.79	4532.08	10670.24	2409.82	4406.32	9732.06	1456.73	4578.58	10403.95	193.82	566.29	1696.12
2008	1985.31	6117.99	1165.87	4377.12	3425.64	2117.46	3097.55	4825.19	1479.67	365.48	834.67	312.31
2009	1292.09	1098.43	2823.33	1303.43	1970.32	4203.99	1084.60	1048.89	2924.25	316.93	192.90	673.37
2010	1178.64	3945.60	11492.16	2042.09	2451.71	7676.50	2383.80	4221.02	10420.54	76.44	83.44	862.62
2011	2106.19	5189.30	2496.87	2713.54	3294.85	2805.89	2482.45	5118.40	2062.34	703.84	322.32	365.51
2013	1781.36	500.56	6646.60	6473.28	1280.78	2394.21	5434.87	6244.60	1395.87	708.24	31.74	25.26
2014	3131.70	2361.80	6093.67	2000.58	5091.85	11394.74	3523.88	7021.49	2903.62	635.68	594.92	7.96
2015	991.60	9170.07	10221.33	2056.63	2187.66	2458.33	2633.52	4271.56	3920.23	413.59	47.94	61.14
2016	844.66	15028.19	5388.85	15072.74	5620.77	10218.32	3204.02	3377.51	1049.55	2363.91	361.26	517.96
2017	2350.92	2105.68	1618.59	6058.27	6581.38	1700.58	2302.27	2345.29	1353.26	405.94	296.21	193.37
2018	1614.17	4074.99	8216.44	11685.74	2210.18	4679.54	4689.17	2001.59	2025.19	788.24	800.76	250.04
2019	4148.76	1323.99	3018.50	4287.79	1791.89	7412.45	4679.48	4133.15	4472.21	1329.15	209.72	823.95
2020	5272.69	4139.46	6532.69	8323.14	6176.06	5676.27	3728.44	2455.69	1155.52	643.54	249.61	2255.52
2021	1306.24	1589.24	8638.73	1399.18	4484.30	13927.73	3100.69	3057.90	7181.95	298.63	365.30	1495.68

Table S1 Area of retired farmlands per year in the provinces on the Loess Plateau (km²) (Continued).

Province	Ningxia			Inner Mongolia			Qinghai		
Ecosystem	forestland	shrubland	grassland	forestland	shrubland	grassland	forestland	shrubland	grassland
2000	1453.85	1645.63	1600.22	1678.93	2126.07	4601.19	802.87	615.99	1015.13
2001	2329.88	3235.29	2407.21	4453.21	4641.48	4735.28	1114.47	1470.25	1033.51
2002	687.74	573.53	893.19	1527.51	2891.15	3240.50	328.37	415.44	540.73
2003	1577.49	617.25	2454.47	2172.49	814.93	5249.43	742.58	246.98	1320.73
2004	1066.66	1261.52	2807.82	3729.42	4019.22	5868.52	216.29	590.67	2258.98
2005	1203.60	709.80	1265.85	1866.66	1166.24	4662.59	202.82	285.65	669.04
2006	945.62	1800.33	1436.44	1249.09	4673.97	3720.39	571.28	2148.73	1140.24
2007	843.61	1065.46	4287.79	1885.04	3255.08	11679.40	425.89	672.07	2399.36
2008	1730.75	2154.62	1007.15	2318.53	4656.05	1330.06	601.01	752.89	228.38
2009	1395.32	870.17	1063.80	2125.56	976.83	2016.06	360.88	844.41	555.38
2010	741.11	2255.35	4165.61	1463.54	4094.86	7803.57	341.50	1896.99	1879.26
2011	1844.37	1638.05	1179.44	4248.61	3824.74	2817.26	382.41	1159.15	915.43
2013	1657.11	692.64	5783.13	507.14	4374.54	8534.79	409.37	157.68	1198.96
2014	126.57	761.84	779.61	666.76	2678.35	2551.69	1239.82	493.14	5794.44
2015	167.21	593.18	5409.27	534.86	3699.09	3865.71	423.81	1437.04	3456.63
2016	324.97	2686.75	983.12	1475.10	3389.61	3883.94	34.47	1212.48	1615.31
2017	311.11	1607.56	1614.85	187.22	2399.75	2527.32	234.20	0.32	203.38
2018	903.84	706.97	1384.66	1505.58	3161.87	1960.43	555.11	15.55	3098.08
2019	119.38	907.64	1986.70	203.14	2676.48	4279.92	547.94	25.66	667.29
2020	525.56	844.32	1717.20	1006.44	1709.11	984.77	608.51	200.75	3930.59
2021	723.34	1014.22	3559.16	2042.38	1986.89	3315.76	366.89	420.37	948.45

Table S2 The Δ SOC in Retired Farmlands in Different Climate Zones on the Loess Plateau (kg C/m²).

Climate zone	MT-SA						WT-SA					
Ecosystem	forestland		shrubland		grassland		forestland		shrubland		grassland	
Length	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
1	-25.17	25.60	-25.78	26.75	-21.07	15.89	-8.31	10.17	-6.50	7.43	-8.04	7.95
2	-14.01	24.74	-22.10	25.80	-16.61	18.09	-7.36	7.18	-7.89	6.62	-7.98	8.93
3	-20.06	15.42	-24.32	29.92	-17.71	26.27	-6.38	7.57	-6.42	18.60	-6.97	9.78
4	-12.81	18.07	-23.17	27.80	-18.95	21.26	-6.26	8.33	-8.74	8.04	-7.96	9.66
5	-14.45	20.73	-24.02	28.42	-17.68	20.72	-5.73	7.47	-10.14	10.05	-8.00	10.45
6	-15.11	16.89	-25.17	26.28	-16.96	20.99	-6.73	7.43	-11.41	8.72	-9.38	9.00
7	-20.28	16.19	-25.77	21.60	-23.57	17.13	-6.49	7.80	-11.03	8.36	-8.20	9.29
8	-19.83	15.02	-25.63	26.99	-21.58	24.60	-6.20	7.04	-11.66	9.06	-7.01	9.01
9	-21.27	17.01	-25.72	27.95	-24.38	23.21	-5.31	7.16	-7.77	9.01	-7.43	9.68
11	-16.54	15.50	-24.38	29.57	-21.97	20.36	-6.26	6.97	-9.35	9.43	-7.62	9.02
12	-16.67	17.71	-25.56	28.78	-19.73	27.31	-5.94	6.83	-6.81	8.66	-7.72	9.78
13	-14.50	14.92	-23.51	27.97	-14.88	22.50	-6.13	7.18	-6.54	8.72	-7.51	9.01
14	-19.12	13.05	-23.56	27.40	-14.29	21.07	-5.87	7.55	-7.36	7.77	-7.95	9.89
15	-17.14	15.45	-22.78	26.74	-19.58	21.74	-6.39	6.94	-6.04	8.27	-7.26	9.80
16	-20.26	14.25	-23.20	27.80	-25.20	24.11	-6.17	7.18	-8.05	7.82	-7.70	8.85
17	-15.95	18.58	-22.75	30.21	-14.33	24.01	-6.07	7.01	-8.15	8.85	-7.96	9.52
18	-16.19	13.66	-22.57	25.43	-17.31	22.28	-5.38	7.18	-6.62	8.32	-7.88	9.02
19	-16.23	16.27	-22.51	30.31	-21.68	22.55	-6.39	7.60	-6.42	10.75	-7.49	9.67
20	-14.79	13.41	-23.86	27.90	-13.82	21.45	-3.65	7.32	-6.21	15.85	-7.89	9.45
21	-15.39	16.43	-22.57	30.08	-19.57	25.83	-4.50	7.47	-7.99	12.28	-7.42	9.91
22	-14.79	17.43	-23.39	26.71	-15.44	22.19	-6.42	8.09	-6.42	8.48	-7.66	9.95

Table S2 The Δ SOC in Retired Farmlands in Different Climate Zones on the Loess Plateau (kg C/m²) (Continued).

Climate zone		WT-SH				
Ecosystem	forestland		shrubland		grassland	
Length	minimum	maximum	minimum	maximum	minimum	maximum
1	-26.29	25.49	-21.13	25.49	-22.35	25.08
2	-23.99	22.17	-25.69	24.56	-23.39	31.12
3	-13.20	21.50	-11.95	25.49	-21.21	25.49
4	-17.37	21.65	-20.11	25.49	-18.06	24.01
5	-20.82	19.91	-11.77	26.10	-20.65	31.20
6	-22.09	24.26	-21.40	26.10	-23.54	29.27
7	-14.41	20.12	-14.76	25.49	-14.59	26.48
8	-26.00	20.84	-24.77	25.49	-26.02	25.03
9	-19.39	21.34	-17.14	25.49	-20.72	26.75
11	-23.69	20.54	-24.12	26.10	-25.53	31.91
12	-25.01	21.48	-23.86	25.49	-26.23	31.29
13	-22.24	21.05	-19.85	25.92	-24.87	28.93
14	-21.53	21.30	-15.40	25.49	-21.34	31.07
15	-26.13	21.34	-21.50	25.49	-25.87	31.68
16	-23.86	20.26	-20.80	26.10	-22.41	29.42
17	-25.78	21.85	-21.94	25.49	-26.30	27.81
18	-24.05	23.80	-20.58	26.10	-25.25	30.01
19	-15.00	21.08	-9.53	25.49	-18.42	26.37
20	-16.17	22.39	-13.67	26.10	-16.02	31.68
21	-25.72	22.42	-20.33	25.49	-24.76	31.68
22	-15.36	25.49	-10.80	26.10	-20.53	31.83

Table S3 The Δ SOC in Retired Farmlands in Different Provinces on the Loess Plateau (kg C/m²).

Province	Gansu						Henan					
Ecosystem	forestland		grassland		shrubland		forestland		grassland		shrubland	
Length	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
1	-16.00	21.34	-14.39	9.66	-15.97	18.33	-12.27	25.49	-12.09	26.51	-11.97	21.65
2	-14.01	11.57	-13.97	21.34	-14.77	21.80	-11.86	21.34	-11.49	28.08	-11.56	24.90
3	-13.97	10.32	-14.35	18.33	-14.38	23.80	-11.92	18.74	-11.72	27.58	-11.64	24.56
4	-12.26	11.45	-13.26	21.80	-14.47	21.34	-10.25	11.76	-10.52	24.01	-9.66	25.49
5	-13.47	11.73	-15.12	13.88	-15.59	21.80	-11.41	17.19	-11.93	31.16	-11.76	24.59
6	-14.82	10.11	-14.87	18.73	-15.57	21.80	-12.12	18.85	-12.21	29.27	-12.11	24.56
7	-13.90	11.19	-13.70	21.34	-14.46	21.34	-10.14	12.25	-10.67	26.68	-9.65	22.97
8	-13.44	10.53	-13.46	18.73	-13.77	24.26	-10.57	15.29	-9.57	27.03	-9.47	25.49
9	-14.82	9.39	-13.50	12.11	-14.78	21.65	-10.77	15.85	-10.52	26.59	-9.44	25.49
11	-13.12	10.35	-13.48	18.73	-15.57	21.34	-12.17	21.34	-12.25	31.91	-11.71	24.64
12	-13.55	11.05	-13.61	18.73	-15.60	21.80	-10.17	20.44	-11.42	28.58	-10.23	28.57
13	-12.71	10.32	-12.35	14.03	-14.74	21.80	-11.82	14.38	-11.60	28.93	-10.33	25.49
14	-13.25	9.15	-12.45	18.33	-14.18	21.80	-12.20	16.38	-12.27	31.07	-11.95	23.80
15	-14.26	12.01	-13.46	18.33	-14.66	21.34	-12.05	24.94	-12.21	29.26	-11.55	25.12
16	-14.00	18.33	-12.24	18.33	-14.66	21.34	-11.60	15.74	-12.01	29.61	-11.12	26.43
17	-10.52	10.69	-14.29	18.33	-14.56	18.73	-11.49	21.10	-11.91	27.17	-9.73	25.49
18	-11.20	12.92	-12.47	18.73	-13.71	21.34	-11.22	12.70	-11.59	30.15	-10.50	24.00
19	-13.06	13.27	-12.80	13.17	-13.66	18.60	-9.80	14.38	-11.01	26.58	-8.66	23.80
20	-12.70	15.85	-12.41	15.85	-15.97	21.34	-11.74	18.53	-11.67	31.68	-10.29	25.49
21	-12.32	20.84	-13.21	18.86	-13.96	21.34	-10.23	21.89	-12.07	31.68	-9.87	25.09
22	-12.74	24.26	-14.39	21.95	-13.09	25.49	-10.46	23.80	-10.47	29.74	-11.54	28.00

Table S3 The Δ SOC in Retired Farmlands in Different Provinces on the Loess Plateau (kg C/m²) (Continued).

Province	Inner Mongolia						Ningxia					
Ecosystem	forestland		grassland		shrubland		forestland		grassland		shrubland	
Length	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
1	-19.52	25.60	-16.75	16.69	-18.50	20.10	-25.20	18.06	-21.65	16.21	-25.24	17.29
2	-15.46	21.35	-17.25	19.99	-17.81	22.90	-20.15	10.82	-20.43	16.68	-21.16	13.60
3	-16.57	18.32	-16.77	26.57	-17.54	27.55	-20.82	9.21	-19.62	17.18	-23.91	18.06
4	-17.08	16.78	-14.25	20.63	-16.29	26.96	-14.34	12.40	-18.86	17.85	-20.81	18.17
5	-14.12	20.73	-15.13	23.33	-17.22	28.42	-17.43	11.24	-18.98	13.90	-21.99	17.46
6	-14.49	16.32	-14.69	22.49	-15.17	26.28	-15.80	11.98	-17.77	15.62	-20.74	18.02
7	-18.00	16.19	-16.96	16.91	-18.48	22.09	-19.33	11.87	-18.50	17.79	-22.41	17.95
8	-17.47	20.01	-16.85	24.52	-16.69	26.64	-21.90	12.04	-21.83	13.95	-23.40	18.02
9	-15.90	17.82	-16.62	22.34	-18.49	27.95	-17.81	10.67	-23.91	13.88	-22.47	17.83
11	-16.08	16.24	-15.94	22.40	-17.75	29.15	-19.83	8.75	-21.97	14.51	-23.40	17.14
12	-15.81	17.71	-17.00	24.11	-18.00	26.19	-12.17	10.05	-14.21	15.63	-20.46	18.05
13	-12.99	22.41	-14.66	22.93	-16.44	27.07	-12.47	9.09	-14.88	14.29	-22.83	14.32
14	-15.92	15.07	-14.07	23.77	-14.55	25.06	-11.63	11.15	-15.59	15.77	-18.36	16.53
15	-17.14	22.29	-17.25	24.53	-16.16	26.74	-12.48	12.97	-19.10	14.18	-22.47	15.41
16	-11.25	17.64	-12.12	23.58	-17.43	25.83	-19.12	12.25	-25.20	14.10	-20.74	18.18
17	-9.56	18.72	-11.84	27.31	-16.50	30.21	-12.31	13.87	-12.72	14.78	-20.40	15.71
18	-16.19	15.97	-14.41	26.22	-16.30	28.08	-12.53	14.28	-19.10	15.16	-17.54	17.02
19	-16.11	20.59	-15.61	28.30	-17.83	30.31	-12.88	11.22	-13.17	17.60	-22.44	16.10
20	-10.50	15.63	-12.99	28.78	-15.13	26.33	-11.33	14.26	-12.67	17.21	-16.03	18.01
21	-13.18	21.54	-13.78	29.92	-15.17	30.08	-12.42	17.29	-18.31	18.18	-18.91	18.18
22	-15.78	17.23	-8.71	25.78	-15.81	26.71	-12.08	12.82	-12.99	18.13	-18.96	18.20

Table S3 The Δ SOC in Retired Farmlands in Different Provinces on the Loess Plateau (kg C/m²) (Continued).

Province	Qinghai						Shaanxi					
Ecosystem	forestland		grassland		shrubland		forestland		grassland		shrubland	
Length	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
1	-3.72	7.03	-3.72	6.83	-3.71	6.82	-25.78	26.10	-17.68	18.63	-24.39	22.42
2	-3.49	7.02	-3.69	6.82	-3.49	6.82	-15.98	20.67	-19.10	21.34	-24.08	24.56
3	-3.21	6.81	-3.69	6.39	-3.29	6.03	-22.60	22.18	-18.70	23.95	-24.53	25.49
4	-3.11	6.56	-3.45	6.57	-3.30	6.82	-15.34	19.95	-13.52	22.57	-20.81	25.49
5	-1.58	6.21	-2.67	6.83	-2.46	6.68	-17.00	19.91	-20.51	25.49	-24.02	25.49
6	-3.39	6.82	-3.71	8.66	-3.49	8.66	-12.12	21.19	-17.60	25.49	-22.79	25.49
7	-3.49	6.80	-3.69	7.25	-3.30	6.56	-17.54	19.79	-23.57	21.95	-24.32	25.49
8	-3.71	6.83	-3.71	6.97	-3.45	6.56	-18.21	19.59	-21.91	23.80	-21.89	25.49
9	-3.71	6.46	-3.51	6.51	-3.30	6.12	-19.73	20.19	-19.86	21.89	-24.41	25.49
11	-2.57	6.57	-3.72	6.54	-2.56	6.04	-17.51	21.34	-15.65	22.57	-22.21	24.56
12	-2.52	6.82	-3.72	6.56	-3.26	8.66	-17.17	21.06	-16.75	22.57	-19.81	25.49
13	-3.25	6.82	-3.62	8.05	-3.25	8.66	-13.68	20.89	-12.73	22.57	-21.29	25.49
14	-2.19	6.83	-3.45	6.68	-2.43	6.83	-12.23	24.56	-17.33	22.57	-19.23	25.49
15	-2.41	6.83	-3.72	7.53	-2.43	6.97	-12.97	21.29	-13.75	22.57	-22.78	23.80
16	-1.92	6.46	-3.49	8.10	-2.89	7.82	-11.06	20.65	-23.58	25.49	-22.36	25.49
17	-1.96	6.82	-3.38	7.54	-2.07	6.54	-14.23	21.85	-15.84	22.57	-22.80	25.49
18	-2.48	6.92	-3.49	6.37	-3.30	6.50	-12.05	21.50	-17.49	22.57	-22.61	25.49
19	-1.81	6.85	-3.49	8.10	-2.03	8.10	-12.56	22.57	-15.44	22.57	-18.17	25.49
20	-2.70	6.92	-3.38	7.78	-2.29	6.27	-12.15	22.67	-14.56	22.57	-19.71	25.49
21	-2.52	6.82	-3.30	8.68	-2.89	8.68	-13.77	22.42	-14.68	22.57	-19.16	25.49
22	-2.43	7.02	-3.30	8.33	-2.43	6.92	-12.19	26.10	-15.64	25.49	-23.40	26.10

Table S3 The Δ SOC in Retired Farmlands in Different Provinces on the Loess Plateau (kg C/m²) (Continued).

Province	Shanxi					
Ecosystem	forestland		grassland		shrubland	
Length	minimum	maximum	minimum	maximum	minimum	maximum
1	-26.30	24.26	-26.21	18.33	-25.78	23.80
2	-26.06	18.47	-20.91	21.34	-25.69	24.26
3	-13.61	18.60	-21.21	24.51	-12.62	24.60
4	-20.28	18.33	-18.03	23.80	-22.15	26.10
5	-15.59	14.47	-20.65	21.65	-19.78	24.35
6	-21.45	18.60	-23.54	23.80	-23.31	25.49
7	-12.94	18.47	-14.59	21.49	-14.76	23.80
8	-26.00	13.16	-26.02	23.80	-24.77	24.55
9	-18.93	12.27	-20.72	21.65	-19.93	24.33
11	-23.69	18.33	-25.53	21.65	-25.65	26.10
12	-24.45	16.91	-26.30	23.80	-25.97	23.80
13	-23.98	12.86	-24.87	23.80	-24.28	23.80
14	-20.76	18.60	-21.24	21.65	-17.94	23.80
15	-23.92	17.30	-26.04	23.80	-23.33	23.98
16	-18.91	18.60	-22.93	21.65	-20.80	24.34
17	-23.79	13.76	-23.86	23.80	-25.63	24.92
18	-23.48	14.22	-25.25	23.80	-22.34	23.80
19	-18.21	14.38	-18.42	21.34	-16.00	23.80
20	-14.57	17.64	-16.00	23.80	-16.02	25.49
21	-16.41	20.84	-18.52	23.80	-15.51	28.42
22	-15.36	25.49	-20.53	26.10	-15.80	26.10

