Table S1 Location of sampling sites and vegetation.

Site number	Location	Dominant tree species
C-1	53°6'29.63"N, 124° 24' 33.88" E	*Pinus sylvestris var. mongholica Litv.*, | *Betula platyphylla Sukaczev*, | *Larixgmelinii (Rupr.) Kuzen.*
C-2	52°24'24.41"N, 125° 29' 4.38" E	*Pinus sylvestris var. mongholica Litv.*, | *Larix gmelinii* (Rupr.) Kuzen., | *Betula platyphylla Sukaczev*.
M-3	48°15'7.49"N, 129° 17' 36.92" E	*Pinus koraiensis* Siebold & Zucc., | *Picea jezoensis* (Siebold & Zucc.) Carrière, | *Picea koraiensis* Nakai, | *Tilia mandshurica* Rupr. & Maxim., | *Acer pictum* subsp. *mono* (Maxim.) H. Ohashi, | *Ulmus pumila* L., | *Fraxinus mandshurica* Rupr.
M-4	48°7'18.70"N, 129° 13' 50.38" E	*Pinus koraiensis* Siebold & Zucc., | *Abies nephrolepis* (Trautv. ex Maxim.) Maxim., | *Picea jezoensis* (Siebold & Zucc.) Carrière, | *Picea koraiensis* Nakai, | *Tilia tuan* Szyszyl., | *Betula costata* Trautv., | *Acer tegmentosum* Maxim.
M-5	47°53'19.86"N, 129° 2' 8.99" E	*Picea koraiensis* Nakai, | *Abies nephrolepis* (Trautv. ex Maxim.) Maxim., | *Pinus koraiensis* Siebold & Zucc., | *Betula platyphylla* Sukaczev.
M-6	47°39'42.88"N, 128° 49' 45.55" E	*Betula platyphylla* Sukaczev, | *Pinus koraiensis* Siebold & Zucc., | *Pinus sylvestris* var. *mongholica* Litv.
M-7	47°10'59.20"N, 128° 52' 57.90" E	*Picea koraiensis* Naka, | *Picea jezoensis* (Siebold & Zucc.) Carrière, | *Abies nephrolepis* (Trautv. ex Maxim.) Maxim, | *Betula platyphylla Sukaczev*, | *Betula costata* Trautv., | *Pinus koraiensis* Siebold & Zucc., | *Acer tegmentosum* Maxim., | *Acer ukurunduense* Trautv. & C. A. Mey., | *Acer pictum* subsp. *mono* (Maxim.) H. Ohashi, | *Ulmus davidiana var. japonica* (Rehd.) Naka.
M-8	47°9'11.48"N, 128° 53' 7.62" E	*Picea koraiensis* Nakai, | *Picea jezoensis* (Siebold & Zucc.) Carrière, | *Pinus koraiensis* Siebold & Zucc.
M-9	45°31'5.20"N, 127° 30' 10.15" E	*Pinus koraiensis* Siebold & Zucc., | *Betula platyphylla* Sukaczev, | *Quercus mongolica* Fisch. ex Ledeb.
M-10	45°19'33.31"N, 127° 32' 7.73" E	*Betula platyphylla* Sukaczev, | *Quercus mongolica* Fisch. ex Ledeb., | *Populus davidiana* Dode.
M-11	45°19'27.05"N, 127° 49' 37.67" E	*Larix gmelinii* (Rupr.) Kuzen., | *Quercus mongolica* Fisch. ex Ledeb., | *Betula platyphylla* Sukaczev.
M-12	45°17'28.79"N, 127° 30' 13.82" E	*Pinus koraiensis* Siebold & Zucc., | *Quercus mongolica* Fisch. ex Ledeb., | *Phellodendron amurense* Rupr.
M-13	45°17'14.86"N, 127° 33' 59.51" E	*Pinus sylvestris* var. *mongholica* Litv., | *Larix gmelinii* (Rupr.) Kuzen., | *Betula platyphylla* Sukaczev.
M-14	42°23'46.57"N, 128° 13' 58.48" E	*Larix gmelinii* (Rupr.) Kuzen., | *Pinus sylvestris* var. *mongholica* Litv., | *Betula platyphylla* Sukaczev.
M-15	42°10'25.00"N, 127° 27' 17.75" E	*Pinus koraiensis* Siebold & Zucc., | *Quercus mongolica* Fisch. ex Ledeb., | *Betula platyphylla* Sukaczev.
W-16	40°33'41.20"N, 117° 28' 14.90" E	*Pinus tabuliformis* Carrière, | *Betula platyphylla* Sukaczev, | *Firmiana simplex* (Linnaeus) W. Wight, | *Populus* L., | *Zabelia biflora* (Turcz.) Makino.
W-17	40°11'38.20"N, 113° 32' 35.30" E	*Pinus tabuliformis* Carrière, | *Hippophae rhamnoides* L., | *Caragana korshinskii* Kom.
W-18	40°10'19.00"N, 113° 33' 42.70" E	*Populus* L., | *Larix gmelinii* var. *principis-rupprechtii* (Mayr) Pilger.
W-19	39°11'6.80"N, 113° 35' 7.20" E	*Populus davidiana* Dode, | *Larix gmelinii* var. *principis-rupprechtii* (Mayr) Pilger.
W-20	38°59'5.30"N, 113° 35' 8.50" E	*Betula platyphylla* Sukaczev, | *Pinus tabuliformis* Carrière, *Larix gmelinii* (Rupr.) Kuzen., | *Populus cathayana* Rehder.
W-21	36°54'11.50"N, 117° 23' 0.30" E	*Populus davidiana* Dode, | *Larix gmelinii* var. *principis-rupprechtii* (Mayr) Pilger.
W-22	36°50'13.50"N, 117° 23' 47.00" E	*Populus davidiana* Dode, | *Larix gmelinii* var. *principis-rupprechtii* (Mayr) Pilger.
W-23	32°7'13.44"N, 119° 12' 17.70" E	*Castanea seguinii* Dode, | *Castanopsis sclerophylla* (Lindl.) Schottky, | *Quercus variabilis* Blume.
S-24	32°4'42.90"N, 118° 48' 58.86" E	*Pinus thunbergii* Parl., | *Robinia pseudoacacia* L., | *Quercus acutissim*a Carruth.
S-25	34°7'12.42"N, 117° 23' 6.72" E	*Populus* L., | *Larix gmelinii* var. *principis-rupprechtii* (Mayr) Pilger.
S-26	33°0'39.60"N, 120° 50' 50.10" E	*Robinia pseudoacacia* L., | Salicaceae Mirb., | *Tamarix chinensis* Lour.
S-27	31°12'53.94"N, 119° 6' 49.14" E	*Pinus massoniana* Lamb., | *Cunninghamia lanceolata* (Lamb.) Hook., | *Quercus glauca* Thunb.
S-28	31°5'7.50"N, 119° 9' 4.86" E	*Pinus massoniana* Lamb., | *Quercus glauca* Thunb., | *Dicranopteris pedata* (Houtt.) Nakaike.
S-29	30°54'40.92"N, 119° 4' 50.22" E	*Pinus massoniana* Lamb., | *Cunninghamia lanceolata* (Lamb.) Hook.
S-30	26°20'27.00N, 117° 14' 40.56" E	*Cunninghamia lanceolata* (Lamb.) Hook., | *Pinus massoniana* Lamb.
S-31	26°20'26.10N, 117° 14' 39.78" E	*Cunninghamia lanceolata* (Lamb.) Hook., | *Pinus massoniana* Lamb.
S-32	24°36'47.46N, 118° 6' 56.48" E	*Eucalyptus* spp., | *Pinus massoniana* Lamb.

Table S2 Soil stratification at sampling sites.

Site number	Horizon	SOC ($g\ kg^{-1}$)	STN ($g\ kg^{-1}$)	Soil depth (cm)	Soil bulk density ($g\ cm^{-3}$)	> 2mm Rock content (%)
C-1	A	37.78	0.85	0−10	0.61	1.88
	AB	21.26	0.76	10−30	1.06	4.88
	B	4.42	0.39	30−75	1.73	32.43
	C	1.40	0.10	> 75	1.71	39.93
C-2	A	38.64	0.97	0−7	0.73	2.23
	AB	28.04	0.80	7−15	1.19	14.88
	B	6.16	0.47	15−45	1.54	16.23
	C	1.86	0.11	> 45	1.81	44.17
M-3	A	43.96	3.82	0−18	0.82	2.79
	B	17.40	1.56	18−40	1.43	11.65
	BC	10.44	1.10	40−60	1.48	19.01
	C	8.10	0.39	> 60	1.79	51.04
M-4	A	47.80	3.65	0−18	0.86	3.68
	AB	16.88	1.68	18−35	1.21	12.46
	B	9.60	1.08	35−55	1.67	21.25
	BC	7.12	0.60	55−68	1.76	35.24
	C	1.72	0.30	> 68	1.93	43.81
M-5	At1	35.88	2.35	0−22	0.93	2.35
	At2	15.68	1.05	22−45	1.12	9.88
	Ab	3.64	0.60	45−60	1.24	10.23
	Bb	3.22	0.49	60−90	1.56	18.54
	C	8.64	0.61	> 90	1.65	45.92
M-6	At1	31.92	3.07	0−18	0.88	3.68
	At2	11.62	1.24	18−40	1.02	9.01
	AB	9.44	0.79	40−45	1.1	13.01
	B	5.54	0.21	45−60	1.38	16.54
	C1	3.14	0.21	60−75	1.37	24.76
M-7	A	26.50	2.05	28−40	1.15	6.12
	G	6.20	0.60	40−56	1.29	10.00
	C1	4.14	0.51	56−75	1.32	14.89
	C2	6.98	0.60	> 75	1.36	20.42
M-8	At1	54.98	4.18	0−8	0.71	5.35
	At2	20.23	1.97	8−30	1.07	8.65
	At3	16.96	1.10	30−45	1.11	13.35
	Ab	12.64	1.01	45−60	1.21	24.98
	C	4.44	0.20	> 60	1.65	39.05
M-9	At1	45.12	3.72	0−15	0.89	3.12
	At2	19.64	1.82	15−35	1.08	9.65
	At3	14.62	1.11	35−55	1.21	9.89
	Ab	12.46	0.80	55−75	1.37	14.23
	C	9.96	0.50	75−100	1.61	32.65
M-10	A	50.48	4.10	0−12	1.03	9.68
	AB	18.50	1.75	12−30	1.17	14.43
	B	14.88	0.86	30−50	1.33	13.46
	BC	11.32	0.48	50−65	1.45	17.88
	C	2.58	0.19	65−100	1.66	28.63
M-11	A	34.68	4.61	0−15	1.13	6.00
	W	3.56	0.87	15−38	1.22	7.43
	WB	2.88	0.70	38−55	1.31	19.46
	B	2.92	0.62	> 55	1.47	29.40
M-12	At1	25.96	2.16	0−15	0.94	6.79
	At2	22.86	1.90	15−30	1.18	7.23
	At3	18.72	1.69	30−55	1.23	7.89
	AB	3.12	0.261	55−70	1.38	9.35
	B	2.54	0.21	70−100	1.44	19.12
M-13	At1	45.14	2.80	0−5	0.88	5.65
	At2	25.68	1.41	5−15	1.17	11.68
	W	4.54	0.39	15−30	1.23	11.88
	WB	2.78	0.37	30−60	1.37	13.12
	Bt1	2.70	0.31	60−75	1.45	25.40
	Bt2	1.28	0.30	75−100	1.46	30.10

M-14	A1	34.30	4.16	0−15	0.91	6.54
	A2	30.27	4.02	15−30	1.08	9.46
	W	3.12	0.66	30−55	1.13	10.35
	Bw	2.72	0.59	55−65	1.28	15.43
	B1	1.54	0.50	65−85	1.31	16.43
	B2	1.26	0.50	85−105	1.40	24.51
M-15	A1	44.52	2.78	0−10	0.73	8.99
	A2	36.78	2.48	10−25	1.01	7.35
	Aw	5.38	0.40	25−40	1.19	8.99
	AwB	4.38	0.29	40−60	1.24	13.89
	B	2.18	0.30	60−95	1.41	24.65
W-16	A	9.96	0.74	0−29	0.92	9.46
	B1	6.50	0.78	29−53	1.28	12.79
	B2	2.67	0.22	53−109	1.41	18.57
	C	1.23	0.12	> 109	1.50	30.10
W-17	A	7.61	0.47	0−27	1.07	5.35
	B	4.66	0.32	27−64	1.37	14.10
	C	0.56	0.08	> 64	1.42	30.00
W-18	A	5.98	0.65	0−35	1.06	8.00
	Bt1	3.88	0.39	35−61	1.19	12.10
	Bt2	1.85	0.13	61−97	1.28	19.10
	C	1.06	0.09	> 97	1.46	31.28
W-19	A	11.45	0.78	0−7	0.98	4.10
	Bt1	7.36	0.52	7−32	1.13	13.46
	Bt2	5.24	0.32	32−48	1.26	18.10
	BC	4.63	0.82	48−81	1.40	16.79
	C	1.59	0.27	> 81	1.45	24.88
W-20	A	11.05	0.62	0−32	0.89	6.79
	B	8.72	0.49	32−52	1.21	17.57
	C	6.76	0.54	52−72	1.41	19.79
	R	6.08	0.38	> 72	1.97	61.15
W-21	A	9.19	0.46	0−14	1.12	6.37
	AB	2.10	0.27	14−30	1.36	13.68
	B1	1.96	0.19	30−63	1.46	16.68
	B2	2.65	0.23	63−109	1.54	19.43
	C	1.72	0.15	> 109	1.60	29.38
W-22	A	8.70	0.36	0−25	0.92	5.35
	B1	7.37	0.21	25−50	1.15	10.54
	B2	2.49	0.12	50−87	1.31	17.35
	C	1.42	0.08	> 87	1.46	25.50
S-23	A	7.00	0.47	0−30	1.29	19.65
	AB	1.63	0.09	30−60	1.32	24.23
	B	1.18	0.12	60−100	1.33	26.00
S-24	A	3.87	0.11	0−30	1.33	16.79
	AB	2.74	0.10	30−60	1.47	17.35
	B	1.30	0.07	60−100	1.50	21.46
S-25	A	4.79	0.36	0−30	1.20	20.35
	AB	3.87	0.08	30−65	1.46	21.68
	B	0.69	0.13	65−100	1.58	22.43
S-26	A	5.94	0.44	0−25	1.27	11.32
	B	3.62	0.36	25−110	1.39	17.54
S-27	A	3.02	0.22	0−35	1.44	11.57
	AB	1.95	0.25	35−60	1.52	18.12
	B	1.94	0.13	60−130	1.65	24.35
S-28	A	8.57	0.82	0−20	1.21	19.77
	AB	2.92	0.22	20−50	1.49	22.65
	B	0.95	0.13	50−100	1.57	23.35
S-29	A	12.27	0.90	0−20	1.13	17.23
	B	1.59	0.17	20−60	1.22	21.88
S-30	A	5.60	0.39	0−20	1.20	16.35
	B	3.42	0.24	20−110	1.44	22.00
S-31	A	4.32	0.41	0−18	1.28	18.35
	B	2.64	0.17	18−70	1.46	19.00
S-32	A	9.00	0.12	0−30	1.24	20.00
	B	1.32	0.10	30−110	1.47	22.23

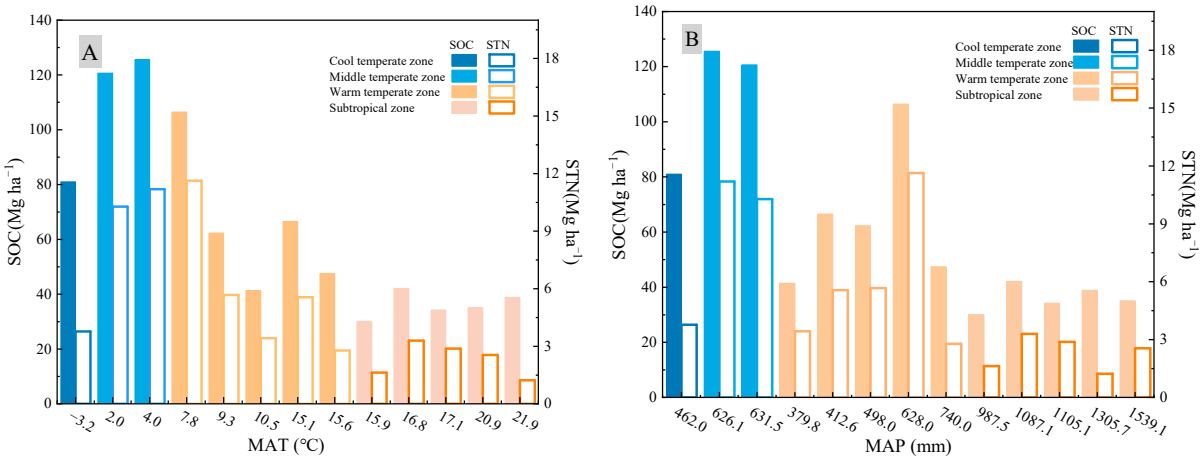
Note: A, B, and C represent the leaching horizon, material deposition or accumulation horizon, and parent

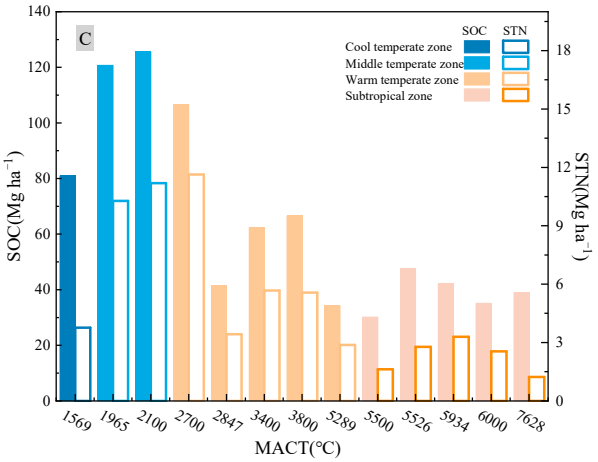
material horizon, respectively. In addition, W represents the waterloggogenic horizon (horizon W has a large amount of iron leaching and precipitation, in the grayish substrate with rust lines, rust spots, and often iron seeds, iron nodules or iron discs and other newborn bodies. Due to the long-term alternation of wet and dry, often formed smaller prismatic and prismatic block-like structure, the surface of the structural body is covered with a colloidal film formed by the infiltration of colloid, dry is very hard and has obvious angles, water is often very soft). Transitional soil horizon s, such as the transition between A and B horizons, are represented by AB. Subdivision of soil horizons is represented by A1, A2, B1, B2, etc. Soil horizon suffix symbols, such as t, w, etc., represent respectively the clay deposition horizon, transitional horizon with only color or structure development.

References

1. National Soil Census Office. Soil census technology in China, 1992.

Figure S1. MAT, MAP, MACT on SOC storages and STN storages. MAT, MAP and MACT means mean annual temperature, mean annual precipitation and mean annual accumulation temperature (≥10℃), respectively.




C
SOC
STN
Cool temperate zone
Middle temperate zone
Warm temperate zone
Subtropical zone
SOC(Mg ha-1)
STN(Mg ha-1)
MACT(℃)
0
20
40
60
80
100
120
140
0
3
6
9
12
15
18
1569
1965
2100
2700
2847
3400
3800
5289
5500
5526
5934
6000
7628