Supplementary Material

Table S1. Mineral compositions of selected soil samples.

Horizon	Q	Pl	K-F	Micas	Hb	Px	Ov	K	Ill	Ch	Ch/Sm	Ch/Vc	Gb	Hm/Gt	Mg
	(wt.%)														
Noro															
A	22.0	22.6	8.9	-	-	2.8	1.5	3.3	9.2	4.9	-	-	8.9	14.4	2.2
BA	20.2	16.1	3.4	-	-	6.0	3.4	4.7	7.9	5.2	-	-	17.8	15.3	2.2
Bw	10.9	16.6	4.0	-	2.0	5.7	9.5	0.7	5.4	3.0	-	-	19.5	16.8	5.9
C	1.7	33.4	9.6	-	1.8	13.0	11.5	0.4	4.8	3.5	-	-	4.4	11.2	4.7
Pyeongdae															
A	29.3	12.4	9.0	-	-	5.0	8.0	4.0	9.4	-	6.7	-	3.2	7.1	5.9
AB	23.2	17.5	7.8	-	-	6.8	10.0	1.2	7.2	-	8.4	-	3.5	3.9	6.6
Bw1	19.4	11.8	7.9	-	-	8.5	4.1	3.7	9.7	-	6.3	-	17.4	5.4	5.9
Bw2	20.6	11.1	6.8	-	-	8.2	4.2	3.9	8.8	-	6.4	-	18.6	5.3	6.1
BC	22.8	11.5	6.0	-	-	6.2	5.5	1.4	12.0	-	6.4	-	17.1	3.2	7.8
Jeju															
Ap	54.7	8.8	1.6	-	-	10.7	-	1.7	8.6	-	-	6.3	1.3	4.1	2.3
AB	49.1	9.0	11.5	-	-	7.5	-	2.5	5.1	-	-	9.3	1.5	2.2	2.3
Bt1	51.2	7.9	4.9	-	-	6.8	-	2.6	7.5	-	-	12.3	2.2	3.3	1.4
Bt2	48.4	5.2	2.4	-	-	9.7	-	3.9	10.3	-	-	11.6	3.1	3.5	2.1
Bt3	48.3	5.4	7.0	-	-	5.2	-	3.8	11.1	-	-	12.8	3.2	2.4	1.0
Gangjeong															
Ap	53.6	10.5	-	-	-	7.2	-	4.0	11.6	-	-	6.3	2.6	3.4	0.9
BAt	45.5	16.6	7.0	-	-	8.9	0.4	3.1	7.4	-	-	8.2	1.9	1.0	-
Bt1	45.8	15.6	4.5	-	-	7.3	1.5	3.1	8.8	-	-	8.1	1.8	3.5	-
Bt2	51.7	10.8	4.5	-	-	5.5	-	4.7	9.3	-	-	9.9	1.0	2.5	-
Bt3	45.6	15.1	7.7	-	-	6.0	-	3.5	10.8	-	-	6.6	1.4	3.1	-
Samgag															
A	13.2	26.6	39.5	14.7	-	-	-	3.3	-	-	-	2.6	-	-	-
BA	9.0	29.4	25.9	22.6	-	-	-	6.8	-	-	-	6.3	-	-	-
Bt1	18.1	26.2	24.1	19.0	-	-	-	7.4	-	-	-	5.2	-	-	-
Bt2	11.9	33.3	23.3	15.9	-	-	-	8.2	-	-	-	7.4	-	-	-
Bt3	9.5	37.0	16.9	17.5	-	-	-	12.7	-	-	-	6.2	-	-	-

Q: quartz; Pl: plagioclase; K-F: K-feldspars; Mi/Ill: micas/illite; Hb: hornblende; Px: pyroxene; Ov: olivine; K: kaolinite; Ch/Sm: chlorite/smectite; Gb: gibbsite; Hm: hematite; Gt: goethite; Mg: magnetite.

Table S2. Results of the sequential silicon, aluminum, and iron extraction of analyzed soils.

		Si_m	Si_{ad}	Si_{org}	Al_{org}	Si_{occ}	Al_{occ}	Fe_{occ}	Si_{ma}	Si_{res}	Si_t
		*u*g g^{-1}		mg g^{-1}							
Noro											
A	0-22	12.4	20.1	0.55	6.90	9.89	34.8	15.5	4.76	122	138
BA	22-44	17.5	47.5	0.61	2.10	24.5	57.5	16.2	2.62	100	128
Bw	44-87	43.9	252	0.83	0.41	33.8	72.0	9.4	3.85	82.0	121
C	87-160	57.1	432	0.73	0.10	36.4	74.2	4.8	17.8	74.8	130
Pyeongdae											
A	0-18	10.6	22.4	0.55	5.23	10.0	50.1	42.9	5.34	124	140
AB	18-44	12.1	35.2	0.78	3.68	12.5	55.9	39.9	4.37	128	146
Bw1	44-73	18.6	129	1.03	1.46	13.0	38.2	35.8	5.47	147	167
Bw2	73-100	20.6	185	1.00	0.44	17.2	34.1	30.7	5.58	129	153
BC	100-160	27.6	397	1.08	0.25	24.7	45.3	36.7	11.7	113	151
Jeju											
Ap	0-20	12.3	19.2	0.32	1.47	0.61	5.01	9.5	13.0	270	284
AB	20-41	14.0	20.6	0.27	0.73	0.59	3.82	5.1	15.0	275	291
Bt1	41-65	15.5	21.8	0.25	0.27	0.40	3.09	4.4	17.9	281	300
Bt2	65-92	20.6	24.3	0.30	0.20	0.41	2.84	5.3	21.4	279	301
Bt3	92-160	25.8	28.7	0.38	0.13	0.39	3.17	8.8	24.0	276	300
Gangjeong											
Ap	0-24	21.2	24.0	0.47	0.76	0.61	10.8	15.7	18.8	274	294
BAt	24-38	21.5	25.9	0.50	0.17	0.26	9.25	13.5	19.3	285	305
Bt1	38-53	28.9	23.4	0.57	0.08	0.20	5.82	11.2	18.6	293	312
Bt2	53-85	39.2	28.2	0.73	0.06	0.23	5.62	10.6	18.4	294	313
Bt3	85-160	52.9	34.8	0.89	0.04	0.38	4.87	9.02	19.8	297	318
Samgag											
A	0-15	6.91	9.44	0.27	0.17	0.04	0.61	0.53	5.03	266	271
BA	15-32	6.96	5.02	0.22	0.08	0.04	0.71	0.37	5.21	268	274
Bw	32-50	9.58	5.36	0.25	0.07	0.04	0.79	0.39	5.94	267	273
C1	50-78	15.5	9.7	0.34	0.05	0.05	0.88	0.38	7.69	270	278
C2	78-180	21.1	16.1	0.45	0.03	0.06	1.09	0.39	10.5	251	262
Oesan											
A	0-15	15.1	10.8	0.30	2.06	0.21	4.25	6.18	6.31	264	271
BA	15-34	19.7	18.0	0.32	0.82	0.34	5.38	5.58	6.78	298	305
Bw	34-63	22.2	22.4	0.32	0.35	0.32	4.33	4.00	8.00	310	319
C	63-98	21.9	23.5	0.31	0.16	0.22	2.88	2.94	5.56	312	319

Si_m: mobile Si; Si_{ad}: adsorbed Si; Si_{org}, Al_{org}: Si and Al in soil organic matter; Si_{occ}, Al_{occ}, and Fe_{occ}: Si, Al, and Fe occluded in pedogenic oxides; Si_{ma}: Si from amorphous silica; Si_{res}: Si in the residual soil sample after the sequential extraction; Si_{ta}: total Si.

Table S3. Spearman's rank correlation between different Si fractions of analyzed soils.

	Si_m	**Si_{ad}**	**Si_{org}**	**Al_{org}**	**Si_{occ}**	**Al_{occ}**	**Fe_{occ}**	**Si_{ma}**	**Si_{res}**	**Si_t**
Si_m	1.000	0.661**	0.539**	-0.400	0.256	0.344	0.125	0.514**	0.216	0.287
Si_{ad}		1.000	0.814**	0.128	0.782**	0.757**	0.629**	0.116	-0.286	-0.230
Si_{org}			1.000	0.127	**0.651****	0.800**	0.737**	-0.066	-0.405*	-0.359
Al_{org}				1.000	0.578**	0.533**	0.611**	-0.462*	-0.374	-0431*
Si_{occ}					1.000	0.849**	0.690**	-0.147	-0.570**	-0.557**
Al_{occ}						1.000	0.811**	-0.211	-0.523**	-0.510**
Fe_{occ}							1.000	-0.099	-0.351	-0.334
Si_{ma}								1.000	0.565**	0.640**
Si_{res}									1.000	0.989**
Si_t										1.000

Si_m: mobile Si; Si_{ad}: adsorbed Si; Si_{org}, Al_{org}: Si and Al in soil organic matter; Si_{occ}, Al_{occ}, and Fe_{occ}: Si, Al, and Fe occluded in pedogenic oxides; Si_{ma}: Si from amorphous silica; Si_{res}: Si in the residual soil sample after the sequential extraction; Si_{ta}: total Si.

*,**: significant difference at 0.05 and 0.01 probability levels, respectively.

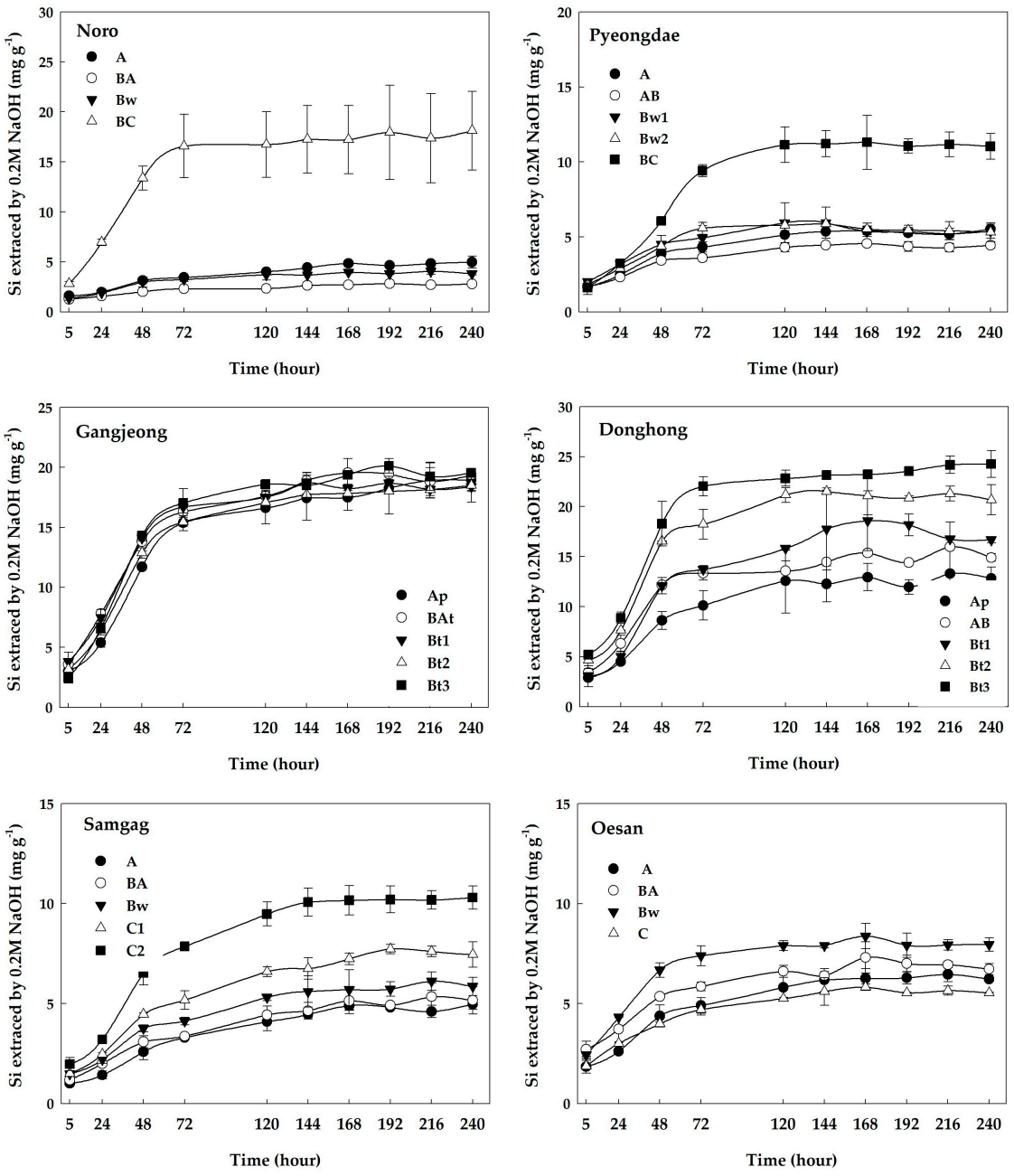

Figure S1. Silicon released by extraction with 0.2 M NaOH at a soil:solution ratio of 1:400 at 20–25℃.

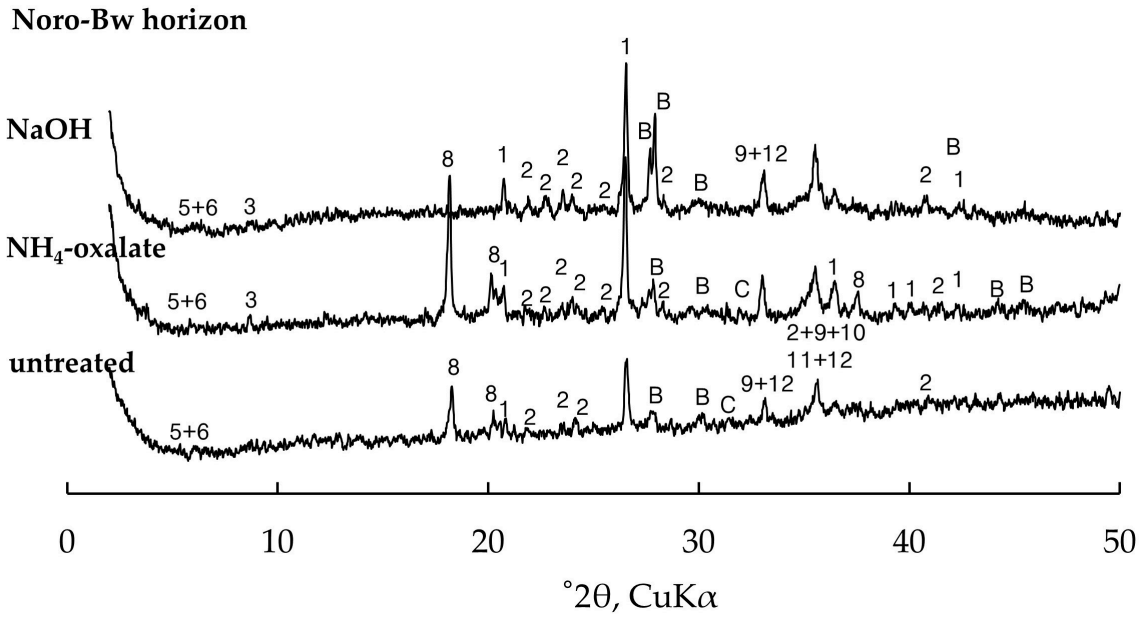

Figure S2. X-ray diffraction pattern after sequential extraction from the Bw horizon of the Noro series.

1: Quartz, 2: Feldspars, 3: Micas/Illite, 4: Hornblende, 5: Kaolinite, 6: Chlorite, 7: Vermiculite/Smectite, 8: Gibbsite 9: Hematite, 10: Magnetite, 11: Pyrozene, 12: Olivine, B: 2+11. C: 2+12.