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Soil Research

Supplementary Material

Influence of parent rock on soil clay mineralogy and physicochemical properties: a case study from the O'Higgins region, central Chile

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Separation of the soil clay-sized fraction (<2 µm)
Specifically, 40 g of each soil sample was placed in a 1 L plastic bottle, followed by the addition of 100 mL of distilled water. Then 10 mL of 1 M $NaHCO_3$ solution was added, and the mixture was stirred for 5 minutes. After stirring, ultrasonic dispersion was performed for 20 min using an ultrasonic bath (Elma, model Elmasonic S40H) according to the protocol of Kaiser and Berhe (2014). The bottle was then completely filled with water, and the soil suspension was allowed to settle under gravity for 8 hours at ambient temperature. Separation of the clay-sized fraction was performed using a flexible plastic tube as a siphon, which was inserted into the bottle at a depth of 10 cm. The clay fraction obtained was flocculated by the addition of 10 mL of 1 M $MgSO_4$ solution, followed by the removal of excess water through the siphon. This procedure was repeated until visual separation of the entire clay fraction was achieved. The resulting clay fraction was rinsed twice with distilled water and then with alcohol and finally dried at room temperature.

Supplementary Table S1. Comparison of certified reference material values with measured values. Recovery is the certified value divided by the measured value and multiplied by 100. Electrical conductivity (EC) is expressed in µS cm^{-1}, organic carbon (C_{org}) is in g kg^{-1}, while cations (Ca, Mg, Na, K), the sum of bases, and cation exchange capacity (CEC) are expressed in $cmol_+$ kg^{-1}.

Sample	Certified value						Measured value						Recovery, %					
	Ca	Mg	Na	K	Bases	CEC	Ca	Mg	Na	K	Bases	CEC	Ca	Mg	Na	K	Bases	CEC
859	64	5.1	0.99	0.65	71	42	66	5.5	1.0	0.67	73	40	97	93	96	97	97	104
973	1.2	0.39	0.070	0.47	2.1	5.8	1.4	0.34	0.08	0.49	2.3	5.2	86	115	88	96	92	111
979	30	0.23	0.095	0.16	31	11	28	0.25	0.07	0.18	29	11	107	92	136	89	107	97

Sample	Certified value			Measured value			Recovery, %		
	C_{org}	EC	pH $CaCl_2$	C_{org}	EC	pH $CaCl_2$	C_{org}	EC	pH $CaCl_2$
859	110	2,320	6.9	105	2,275	6.62	105	102	104
973	n.d.	76	5.1	17	83	5.05	n.d.	92	101
979	n.d.	177	7.5	19	166	7.54	n.d.	107	99

n.d. = no data.

Supplementary Table S2. Minerals identified by X-Ray Diffraction (XRD) in bulk rock samples. Amp: amphibole, Bio: biotite, Chl-Kao: chlorite or kaolinite, CPx: clinopyroxene, Ep: epidote, Feld-K: potassium feldspar, Goe: goethite, Grt: garnet, Hem: hematite, Ms: muscovite, Plag: plagioclase, Py: pyrite, Qtz: quartz. Chlorite or kaolinite (Chl-Kao) cannot be differentiated with certainty due to the lack of resolution of higher-order basal reflections.

Sample	Rock type	Lithology	Minerals
ENH1r	Lithic tuff	Volcanoclastic	Qtz, Plag, Zeo, Chl-Kao, Hem*, Amp*
ENH26	Andesite	Volcanic	Plag, Qtz, CPx, Chl-Kao*
ENH104	Ash tuff	Volcanoclastic	Qtz, Plag, Feld-K, Chl-Kao*, Py*
ENH113	Breccia flow	Volcanoclastic	Qtz, Plag, Feld-k, Chl-Kao, Bio*, CPx*, Ep*
ENH92	Granite	Plutonic	Qtz, Plag, Feld-K, Ms, Chl-Kao*
ENH74	Quartz schist	Metamorphic	Qtz, Plag, Ms, Grt
ENH78	Muscovite schist	Metamorphic	Qtz, Ms, Chl-Kao, Goe*

*The identification of this mineral is unsure due to low peak intensities.

Reference

Kaiser, M., Berhe, A.A., 2014. How does sonication affect the mineral and organic constituents of soil aggregates? A review. Journal of Plant Nutrition and Soil Science 177, 479-495.