TropSOC Database

2.6. Forest – Parent Material

When using these data, please cite the database and the key publication in ESSD:

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Introduction

The dataset comprises a unique sample identifier, a comment regarding rock type, 62 variables measured to quantify elemental concentrations in unweathered rock samples of TropSOC's soil parent material using total combustion, ICPOES and XRF. Missing values are indicated by -9999.

Data structure

No.	Variable	Explanation	Unit
1	sampleID	unique identifier of any soil or vegetation sample taken in the field	-
2	rock_type_comment	first classification based on field samples; information partly missing when unclear; partly a "?" indicates somewhat unclear / uncertain classification estimates	-
3	N	nitrogen content in mass percent (total combustion)	%
4	C	organic carbon content in mass percent (total combustion)	%
5	Ca_ICPOES	mass percent of Ca in the bulk soil	%
6	Cu_ICPOES	mass percent of Cu in the bulk soil	%
7	K_ICPOES	mass percent of K in the bulk soil	%
8	Mg_ICPOES	mass percent of Mg in the bulk soil	%
9	Na_ICPOES	mass percent of Na in the bulk soil	%
10	P_ICPOES	mass percent of P in the bulk soil	%
11	Ti_ICPOES	mass percent of Ti in the bulk soil	%
12	Zn_ICPOES	mass percent of Zn in the bulk soil	%
13	Al_ICPOES	mass percent of Al in the bulk soil	%
14	Fe_ICPOES	mass percent of Fe in the bulk soil	%
15	Mn_ICPOES	mass percent of Mn in the bulk soil	%
16	Na_XRF	mass percent of Na in the bulk soil	%
17	Mg_XRF	mass percent of Mg in the bulk soil	%
18	Al_XRF	mass percent of Al in the bulk soil	%

19	Si_XRF	mass percent of Si in the bulk soil	%
20	P_XRF	mass percent of P in the bulk soil	%
21	S_XRF	mass percent of Si in the bulk soil	%
22	Cl_XRF	mass percent of Cl in the bulk soil	%
23	K_XRF	mass percent of K in the bulk soil	%
24	Ca_XRF	mass percent of Ca in the bulk soil	%
25	Sc_XRF	mass percent of Sc in the bulk soil	%
26	Ti_XRF	mass percent of Ti in the bulk soil	%
27	Cr_XRF	mass percent of Cr in the bulk soil	%
28	Mn_XRF	mass percent of Mn in the bulk soil	%
29	Fe_XRF	mass percent of Fe in the bulk soil	%
30	Co_XRF	mass percent of Co in the bulk soil	%
31	Ni_XRF	mass percent of Ni in the bulk soil	%
32	Cu_XRF	mass percent of Cu in the bulk soil	%
33	Zn_XRF	mass percent of Zn in the bulk soil	%
34	As_XRF	mass percent of As in the bulk soil	%
35	Se_XRF	mass percent of Se in the bulk soil	%
36	Br_XRF	mass percent of Br in the bulk soil	%
37	Rb_XRF	mass percent of Rb in the bulk soil	%
38	Sr_XRF	mass percent of Sr in the bulk soil	%
39	Y_XRF	mass percent of Y in the bulk soil	%
40	Zr_XRF	mass percent of Zr in the bulk soil	%
41	Mo_XRF	mass percent of Mo in the bulk soil	%
42	Ag_XRF	mass percent of Ag in the bulk soil	%
43	Cd_XRF	mass percent of Cd in the bulk soil	%
44	In_XRF	mass percent of In in the bulk soil	%
45	Sn_XRF	mass percent of Sn in the bulk soil	%
46	Sb_XRF	mass percent of Sb in the bulk soil	%
47	Te_XRF	mass percent of Te in the bulk soil	%
48	I_XRF	mass percent of I in the bulk soil	%
49	Cs_XRF	mass percent of Cs in the bulk soil	%
50	Ba_XRF	mass percent of Ba in the bulk soil	%
51	La_XRF	mass percent of La in the bulk soil	%
52	Ce_XRF	mass percent of Ce in the bulk soil	%
53	Pr_XRF	mass percent of Pr in the bulk soil	%
54	Nd_XRF	mass percent of Nd in the bulk soil	%
55	Hf_XRF	mass percent of Hf in the bulk soil	%
56	Ta_XRF	mass percent of Ta in the bulk soil	%
57	W_XRF	mass percent of W in the bulk soil	%
58	Au_XRF	mass percent of Au in the bulk soil	%
59	Hg_XRF	mass percent of Hg in the bulk soil	%
60	Tl_XRF	mass percent of Tl in the bulk soil	%
61	Pb_XRF	mass percent of Pb in the bulk soil	%
62	Bi_XRF	mass percent of Bi in the bulk soil	%

63	Th_XRF	mass percent of Th in the bulk soil	%
64	U_XRF	mass percent of U in the bulk soil	%

Methods

Nitrogen and Carbon [Variable 3 and 4]: Bulk C and N content of rock samples was measured using 1 g of ground subsamples with a dry combustion analyzer (Variomax CN, Elementar GmbH, Hanau, Germany) and a measuring range of 0.2 - 400 mg g^{-1} soil (to determine the absolute C or N mass in a sample) and a reproducibility of < 0.5 % (relative deviation). Recovery rates exceeding 97 % and 91 % were obtained across all samples for the rock masses as well as C and N concentrations. None of the soil samples showed any reaction when treated with 10 % HCl and are therefore considered free of carbonates. Consequently, total soil CN content is interpreted as fossile organic carbon (FOC) and fossile organic nitrogen (FON) content. This interpretation is also applied to samples showing geogenic C residues from sediment sources.

Total element composition based on ICP-OES measurements [variables 5 to 15 of the Data structure table]: Total elemental composition was determined using inductively coupled plasma optical emission spectrometry (ICP-OES) (5100 ICP-OES Agilent Technologies, USA) for the determination of calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), phosphorous (P), aluminium (Al), iron (Fe) and manganese (Mn). 1 g of powdered sample material was placed in a digestion tube and was boiled for 90 minutes at 120 °C in aqua regia (2 ml bi-distilled water, 2 ml 70 % nitric acid (HNO_3), 6 ml 37 % hydrochloric acid (HCl)) using a DigiPREP digestion system (DigiPREP MS SCP Science, Canada). All extracts including calibration standards were then filtered through a 41 grade Whatman filter and diluted with a dilution ratio of 1:2 for Ca, Mg, Na, K, P, and 1:1000 for Al, Fe, Mn using a diluting system (Hamilton 100, USA) before ICP-OES measurements. All extracts, including calibration standards, were then transferred into 50 ml PE-Tubes and digestion tubes rinsed three times bi-distilled water to remove potential residues before measurement of the extract.

Total element composition based on XRF measurements [variables 16 to 64]: Total elemental composition of unweathered rock samples of TropSOC's soil parent material was conducted using X-ray fluorescence (XRF) for Silica (Si), Titanium (Ti) and Zirkonium (Zr) following the procedure of Karathanasis & Hajek (1996). 4 g of powdered sample material and 1 g of CEROX wax were mixed for approximately 2 minutes using a vibrating mill (Mixer Mill MM 200 Retsch, Germany) before producing a pellet by applying pressure of 25 tons per cm^2 on the samples using a manual hydraulic press (Specac, USA). The stable and mixed pellet is then subsequently analysed using a XEPOS SEP03 XRF (Spectro Analytical Instruments GmbH).

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