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Supplement of

A probabilistic approach to quantifying soil physical properties via time-integrated energy and mass input

Christopher Shepard et al.

Correspondence to: Christopher Shepard (cbs8h@email.arizona.edu)

Supplementary Table 1. List of included chronosequence studies.

Authors	Citation	Year	Included # of Profiles	Dating Method	Location	MAP (cm)	MAT (°C)	Parent Material	General Rock Type	Geomorphic Surface	Notes
Ajmone, Marsan	Geoderma, 42: 51-64	1988	3	Not reported	Italy	129.3	10.1	Gneiss, quartzite, granite, rhyolite	Metamorphic	Fluvial Terrace	
Alexander, Burt	Geoderma, 72: 1-17	1996	6	Tree Cores/ Dendochronolgy	Alaska, USA	136.7 - 235.2	4.4 - 6.1	Granitic	Igneous	Glacial Moraine	
Amit, Gerson, Yaalon	Geoderma, 57: 295-324	1993	9	Radiocarbon/ Relative Age Dating	Israel	3.0 - 6.0	23.0 - 25.0	Limestone, dolomite, chert	Sedimentary	Alluvial	
Aniku, Singer	SSSAJ, 54: 147-152	1990	4	see, Hank et al., 1984	California, USA	78.0	14.0	Granite, gneisses, schist	Metamorphic	Marine terrace	MAP and MAT for Santa Cruz, CA from http://www.wrcc.dri.edu/
Barrett	Catena, 44: 163-186	2001	6	Tree Ring, Radicocarbon	Michigan, USA	80.6	10.5	Eolian sand	Sedimentary	Beach Ridges	
Barrett, Schaetzl	Can. J. Soil Sci., 72: 527-541	1992	5	Not reported	Michigan, USA	73.0	5.2	Sand/ Lacustrine deposits	Sedimentary	Lake Terrace	
Bilzi, Ciolkosz	SSSAJ, 41: 122-127	1977	4	Radiocarbon	Pennsylvania, USA	Not Reported	Not Reported	Shale, Limestone, Sandstone	Sedimentary	Alluvial	
Birkeland	Geoderma, 34: 115-134	1984	14	Weathering rind thicknesses, Radiocarbon dating	South Island, New Zealand	100.0 - 400.0	4.0 - 8.0	Greywacke	Sedimentary	Glacial Moraine	
Birkeland, Burke, Shroba	USGS Bulletin 1590-E	1987	8	See, Benedict, 1985	Colorado, USA	102.0	-3.8	Gneiss, granodiorite, eolian	Metamorphic	Glacial Moraine	
Busacca, Singer	Geoderma, 44: 43-75	1989	18	Paleomagnetic, Radiocarbon, K-Ar Dating, Tephrochronology	California, USA	55.0	16.7	Metashale, granite	Metamorphic	Alluvial	
Busacca, Singer, Verosub	USGS Bulletin 1590-G	1989									

Calero, Delgado,Delgado, Martin-Garcia	Geoderma, 145: 278-287	2008	4	See, Calero et al., 2008	Spain	65.0	18.0	Quartzite, limestone, shale	Metamorphic	Fluvial Terrace
Calero, Martin-Garcia, Delgado, Aranda, Delgado	Eur J. Soil Sci., 64: 192-209	2013								
Caner, Joussein, Salvador-Blanes, Hubert, Schlicht, Duigou	J.Plant. Nutr. Soil Sci., 173: 591-600	2010	4	Human landmarks, beach erosion	France	75.0	13.0	Eolian sand	Sedimentary	Anthropogenic
D'Amico, Freppaz, Filippa, Zanini	Catena, 113: 122-137	2014	15	Relative/Not dicussed	Italy	120.0	-1.0 - 2.0	Granitic	Igneous	Glacial Moraine
Deither	USGS Bulletin 1590-F	1988	11	Tree ring, Relative, Topography	Washington, USA	125.0 - 150.0	11.0	Andesite	Igneous	Fluvial Terrace
Dorronsoro, Alonso	SSSAJ, 58: 910-925	1994	8	Archaeological, Stratigraphical	Spain	41.2	11.0	Granite, slate, quartzite	Igneous	Floodplain/ Fluvial Terrace
Eger, Almond, Condron	Geoderma, 163: 185-196	2011	4	Tree ring, Earthquake correlation, Radiocarbon, Relative	South Island, New Zealand	345.5	11.3	Schist, Gneiss	Metamorphic	Beach Ridges
Egli,Fitze, Mirabella	Catena, 45: 19-47	2001	3	see, Zumbühl and Holzhauser, 1988; Radiocarbon	Switzerland	200.0	1.2	Granite, Gneiss	Metamorphic	Glacial Moraine
Evans, Cameron	Can. J. Soil Sci., 59: 203-210	1979	4	Relative	Nunavut, Canada	30.0	-11.2	Granite, Gneiss	Metamorphic	Glacial Moraine
Harden	USGS Bulletin 1590-A	1987	22	See Marchand and Allwardt, 1981, Uranium, Radiocarbon	California, USA	30.0	16.0	Granite	Igneous	Alluvial
Harden, Sarna-Wojcicki, Dembroff	USGS Bulletin 1590-B	1986	11	Radiocarbon, U-Series, Amino acid analyses, Cool-water fauna	California, USA	36.0	15.0	Sandstone, conglomerate, marine sediments	Sedimentary	Marine/ Fluvial Terraces
He, Tang	Catena, 72: 259-269	2008	6	Tree ring, plant community succession, distance from glacier	China	194.9	~ 4.0	Biotite schist, granodiorite, quartzite	Metamorphic	Glacial Moraine

Howard, Amos, Daniels	Quarternary Research, 39: 201-213	1993	8	Relative	Virginia, USA	~110.0	14.5	High grade metamorphic, granite	Metamorphic	Fluvial Terrace/ Uplands	MAP and MAT for Richmond, VA from http://www.sercc.com/
Howard, Clawson, Daniels	Geoderma, 179-180: 81-95	2012	9	Radiocarbon	Michigan, USA	99.0	9.0	Glacial	Sedimentary	Floodplain/ Fluvial Terrace/ Paleochannel/ Lake Terrace	
Huang, Tsai, Tsai, Hseu, Chen	SSSAJ, 74: 1271-1283	2010	13	Radiocarbon/Uplift Rates	Taiwan	180.0	22.5	Conglomerate/ Tuff	Sedimentary	Marine Terrace	
Maejima, Matsuzaki, Higashi	Geoderma, 126: 389-399	2005	6	Cosmogenic Be	Japan	227.7	22.3	Coral limestones, siltsontes	Sedimentary	Coral reef terrace	
McDonald, Pierson, Flerchinger, McFadden	Geoderma, 74: 167-192	1996	4	see McDonald 1994, McDonald and McFadden, 1994	California, USA	15.0	Not Reported	Granite	Igneous	Alluvial	
McFadden, Hendricks	Quarternary Research, 23: 189-204	1985	20	Radiocarbon, Relative	California, USA	40.0 - 78.0	15.5 - 16.6	Plutonic/ Metamorphic	Metamorphic	Alluvial	
McFadden, Weldon	GSA Bulletin, 98: 280-293	1987	10	Radiocarbon, Magnetic Stratigraphy, Fossils	California, USA	63.0 - 73.0	Not Reported	Schist, Granite	Metamorphic	Fluvial Terrace	
Merritts, Chadwick, Hendricks	Geoderma, 51: 241-275	1991	6	Radiometric dating, Altudinal spacing analysis	California, USA	100.0 - ~200.0	12.0 - 14.0	Eolian silt/arkosic sandstone, siltstone, shale	Sedimentary	Marine Terrace	
Muhs	Geoderma, 28: 257-283	1982	13	Uplift Rate Estimate, Radiocarbon	California, USA	16.5	16.0	Andesite	Igneous	Marine Terrace	
Muhs	Quaternary Research, 56: 66-78	2001	11	Uplift rate estimate, U-Series dating	Barbados	110.0 - 212.0	24.0 - 28.0	Limestone	Sedimentary	Coral reef terrace	
Rasmussen	Unpublished	2015	20	K-Ar Dating, Paleomagnetic, Morphological	Arizona, USA	~ 58.0	~ 8.0	Basalt	Igneous	Volcanic	MAP and MAT for Flagstaff, AZ from http://drought.unl.edu/
Reheis	USGS Bulletin 1590-C	1987a	13	Incision rates, Obsidian hydration, Volcanic eruptions, Megafaunal presence	Wyoming, USA	16.5	7.2	Limestone, dolomite	Sedimentary	Alluvial	

Reheis	USGS Bulletin 1590-D	1987b	35	Correlation with dated deposits, tephrochronology, Incision rates, Marine Oxygen Isotope	Montana, USA	37 - 64	5.6 - 8.3	Granitic gneiss	Metamorphic	Alluvial	
Rodbell	Arctic and Alpine Research, 22, 4: 355-365	1990	12	Lichenometric, Weathering rinds, Radiocarbon	South Island, New Zealand	320.0	8.5	Greywacke	Sedimentary	Glacial Moraine	Particle Size Fractions as: Sand 2.0mm - 62.5µ, Silt 62.5µ - 3.9µ, Clay ≤3.9µ
Sauer, Schellmann, Stahr	Catena, 71: 382-393	2007	7	Radiocarbon	Argentia	28.7	12.6	Gravel	Sedimentary	Beach Ridges	
Shepard	Unpublished	2012	4	Relative	Arizona, USA	24.0	~ 20.0	Granite	Igneous	Alluvial	
Singleton, Lavkulich	Can J. Soil Sci. 67: 795-810	1987	7	Tree Ring, Beach Building Rate	British Columbia, Canada	320.0	Not Reported	Sand	Sedimentary	Beach Ridges	
Suther	University of Georgia, MS Thesis	2006	7	Optical Stimulated Luminescence	North Carolina, USA	117.9	16.9	Sandstone/siltstone	Sedimentary	Alluvial	
Tsai, Maejima, Hseu	Quaternary International, 188: 185-196	2009	3	Meteoric ^{10}Be	Taiwan	~ 170.0	~ 23.0	Quartzite, sandstone, shale, slate	Sedimentary	Lateritic	
VandenBygaart, Protz	Can. J. Soil Sci., 63-72	1995	6	Radiocarbon, Topographic	Ontario, Canada	85.6	8.0	Limestone	Sedimentary	Dunes	
Vidic, Lobnik	Geoderma, 76: 35-64	1997	22	Topographic position, 10Be, Paleomagnetic analyses	Slovenia	140.0 - 170.0	9.5	Limestone	Sedimentary	Fluvial Terrace	

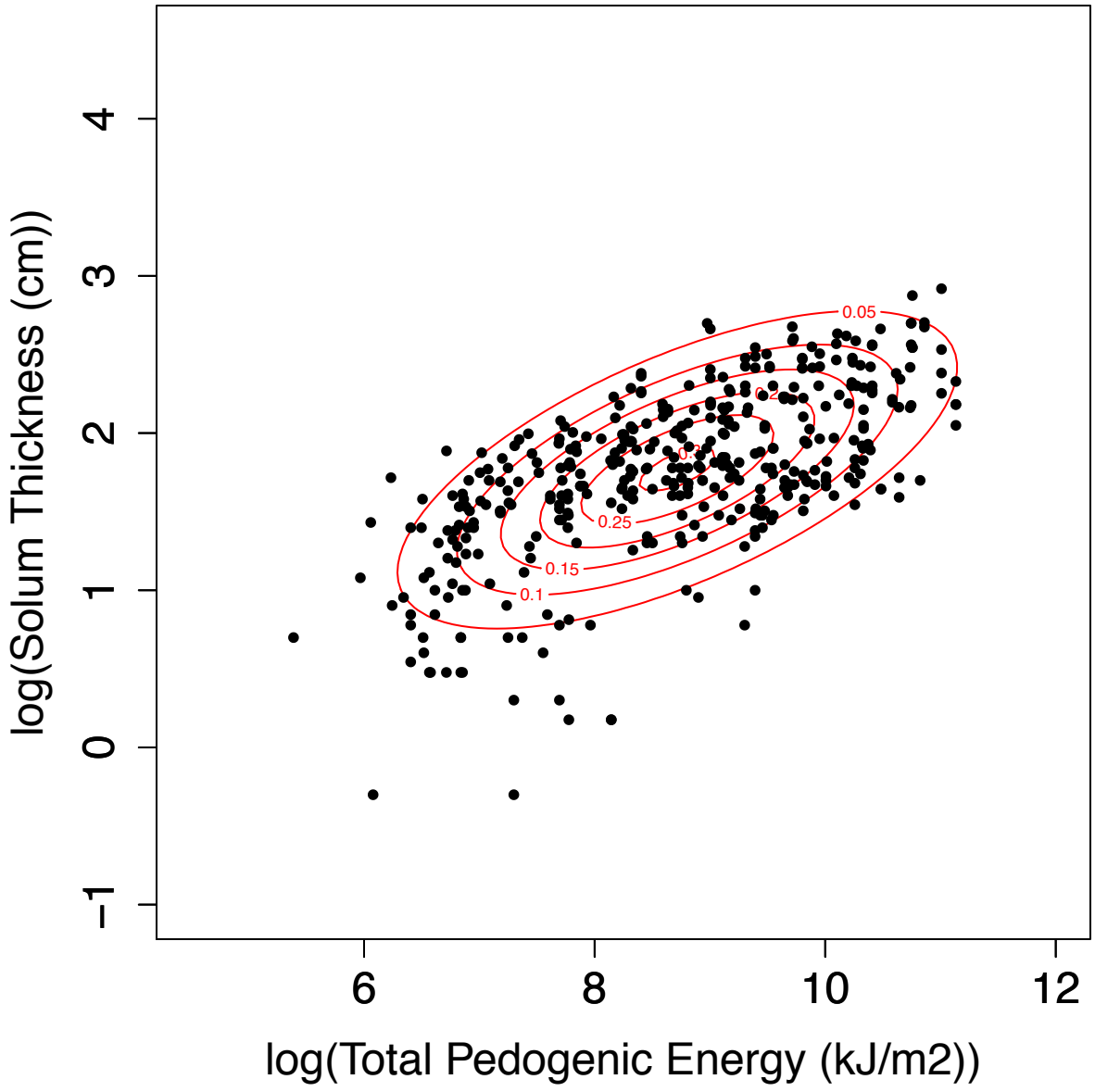

Figure S1 Bivariate normal distribution between TPE and solum thickness.

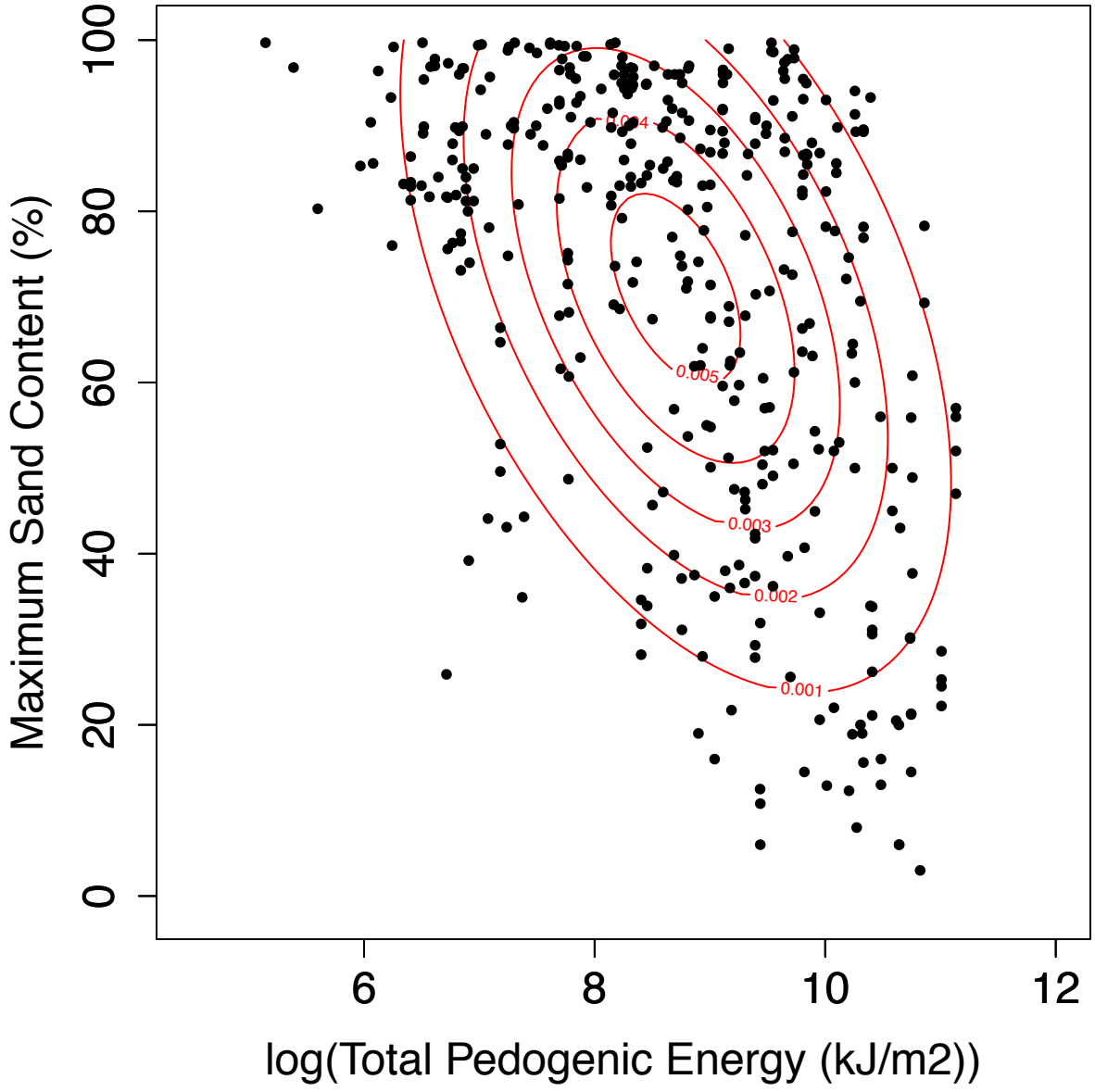

Figure S2 Bivariate normal distribution between TPE and max sand content.

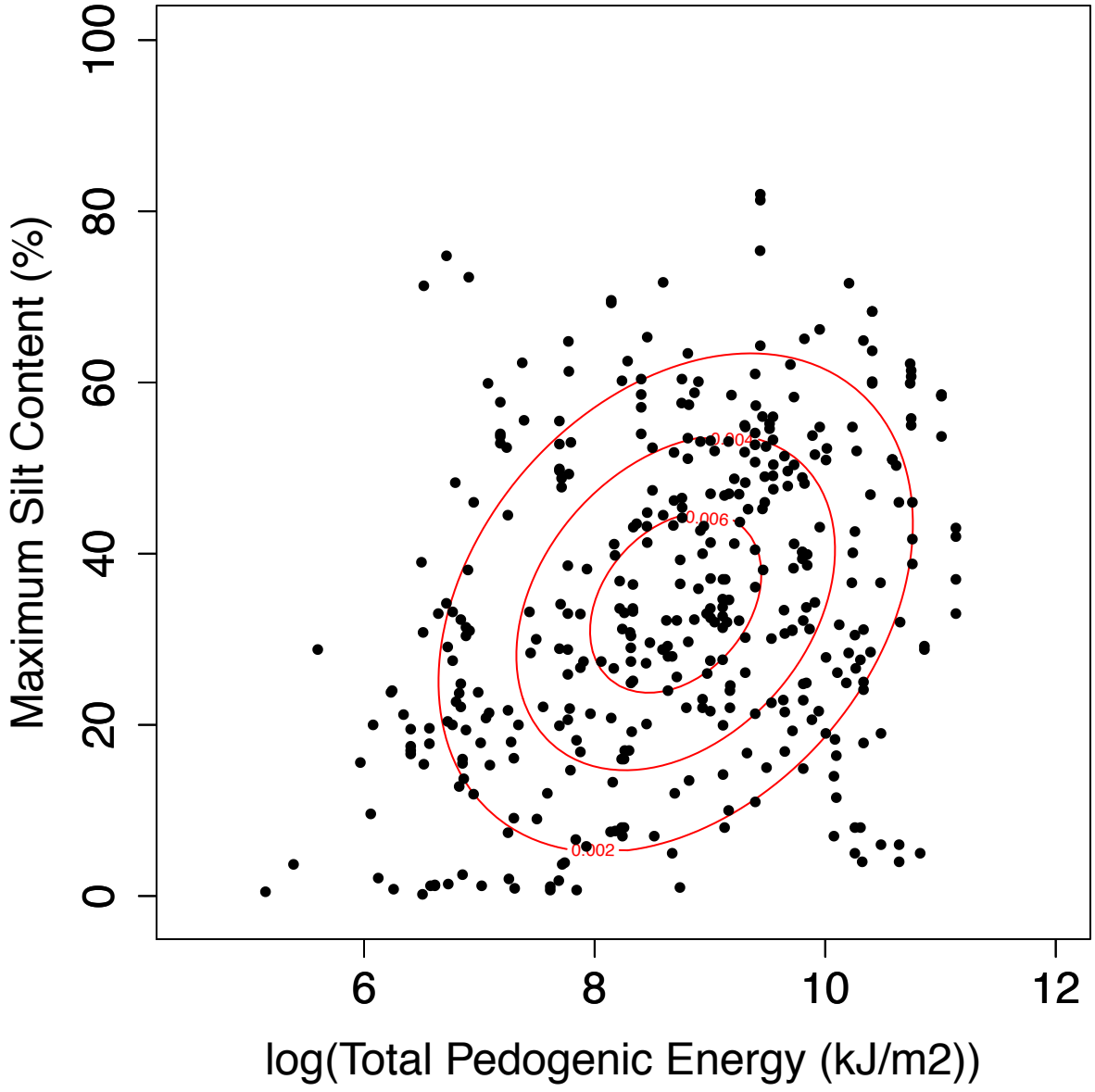

Figure S3 Bivariate normal distribution between TPE and max silt content.

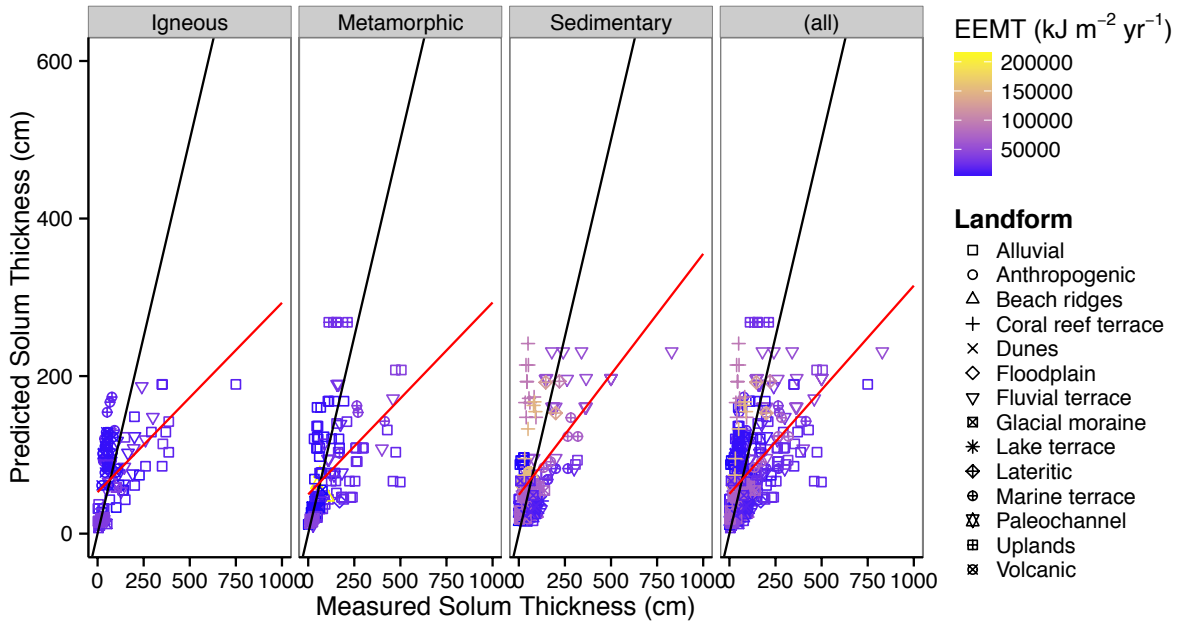

Figure S4 LOOCV results for solum thickness.

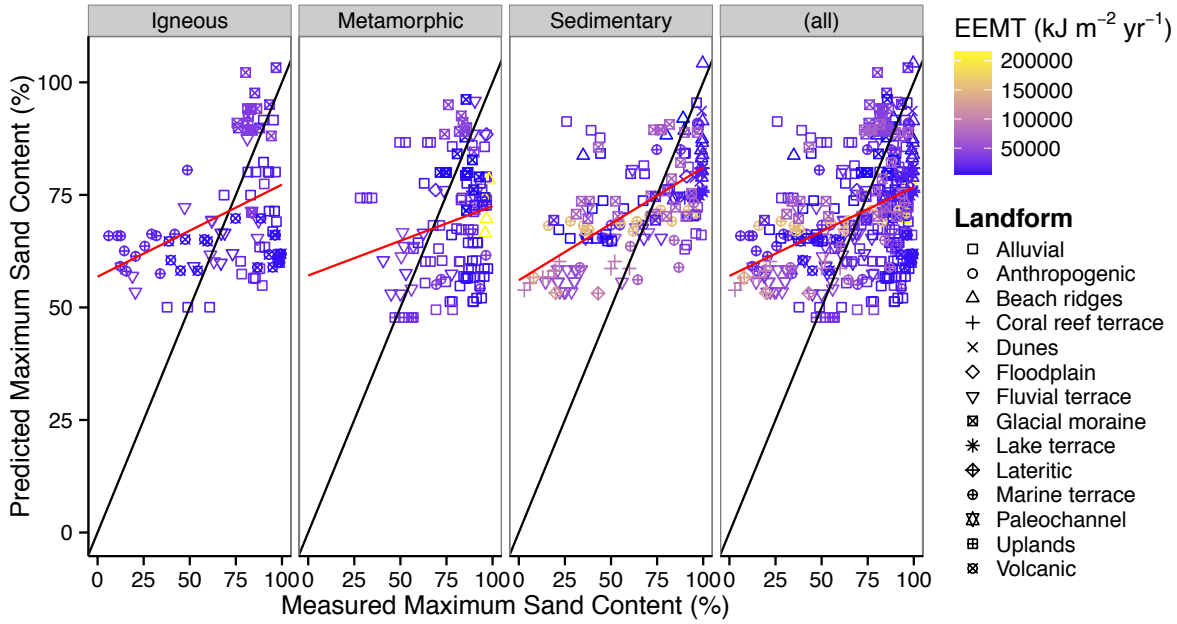

Figure S5 LOOCV results for max sand content.

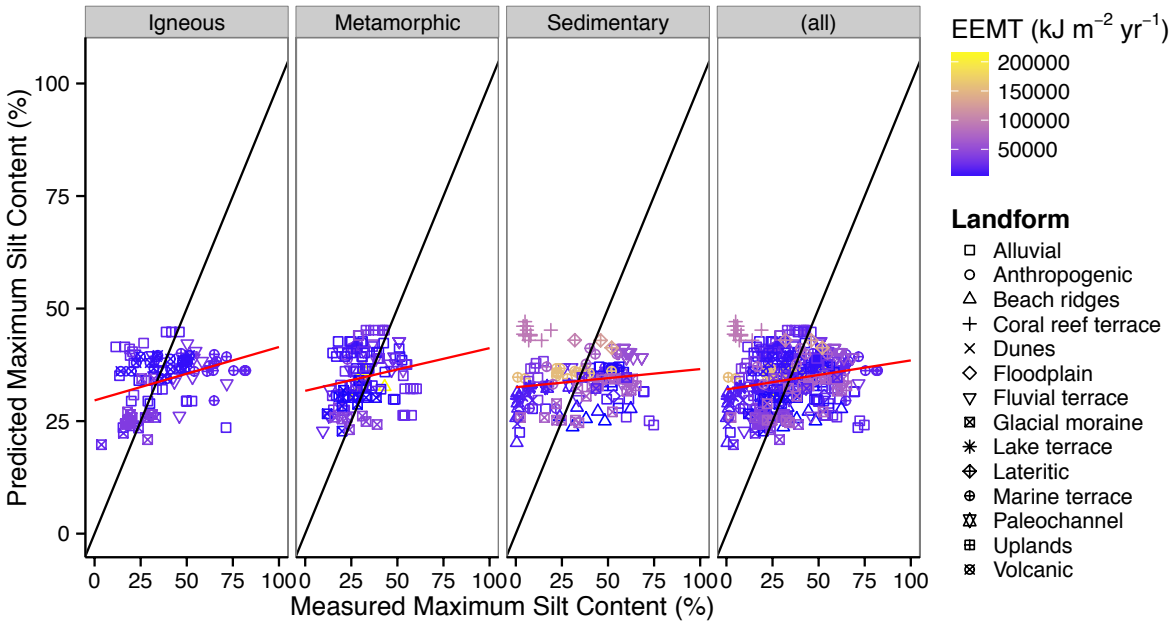

Figure S6 LOOCV results for max silt content.