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Soil and biomass carbon storage is much higher in Central American than Andean montane forests

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Supplementary Material

Tables S1-S6, and Figures S1-S7.

Table S1. Data use to compare AGB among other Neotropical studies. Aboveground biomass in Mg ha-1. EM: Studies that report ectomycorrhizal trees. y = presence; n = absence

Elevation (m asl)	Forest type	AGB	Country	Study	EM-dominance
100	lowland	180.87	Brazil	Alves et al., 2011	n
100	lowland	190.05	Brazil	Alves et al., 2011	n
100	lowland	210.81	Brazil	Alves et al., 2011	n
100	lowland	221.92	Brazil	Alves et al., 2011	n
400	lowland	223.72	Brazil	Alves et al., 2011	n
400	lowland	233.38	Brazil	Alves et al., 2011	n
400	lowland	257.07	Brazil	Alves et al., 2011	n
400	lowland	260.31	Brazil	Alves et al., 2011	n
1000	lowland	242.36	Brazil	Alves et al., 2011	n
1000	lowland	243.71	Brazil	Alves et al., 2011	n
1000	lowland	277.79	Brazil	Alves et al., 2011	n
1000	lowland	322.89	Brazil	Alves et al., 2011	n
41	lowland	225.28	Colombia	González-Caro et al., 2020	y
59	lowland	272.32	Colombia	González-Caro et al., 2020	y
128	lowland	218.6	Colombia	González-Caro et al., 2020	y
166	lowland	217.08	Colombia	González-Caro et al., 2020	y
167	lowland	201.52	Colombia	González-Caro et al., 2020	y
171	lowland	321.16	Colombia	González-Caro et al., 2020	y
190	lowland	181.08	Colombia	González-Caro et al., 2020	y
203	lowland	109.92	Colombia	González-Caro et al., 2020	y
232	lowland	296.6	Colombia	González-Caro et al., 2020	y
234	lowland	187.4	Colombia	González-Caro et al., 2020	y
234	lowland	200.56	Colombia	González-Caro et al., 2020	y
235	lowland	221.2	Colombia	González-Caro et al., 2020	y
241	lowland	124.04	Colombia	González-Caro et al., 2020	y
248	lowland	290.2	Colombia	González-Caro et al., 2020	y
250	lowland	160.28	Colombia	González-Caro et al., 2020	y
261	lowland	79.68	Colombia	González-Caro et al., 2020	y
265	lowland	280.04	Colombia	González-Caro et al., 2020	y
266	lowland	128.04	Colombia	González-Caro et al., 2020	y
266	lowland	394.12	Colombia	González-Caro et al., 2020	y
267	lowland	259.6	Colombia	González-Caro et al., 2020	y

272	lowland	223.32	Colombia	González-Caro et al., 2020	y
273	lowland	110.88	Colombia	González-Caro et al., 2020	y
276	lowland	175.56	Colombia	González-Caro et al., 2020	y
278	lowland	317.12	Colombia	González-Caro et al., 2020	y
279	lowland	267.32	Colombia	González-Caro et al., 2020	y
285	lowland	140	Colombia	González-Caro et al., 2020	y
288	lowland	162.56	Colombia	González-Caro et al., 2020	y
288	lowland	175.72	Colombia	González-Caro et al., 2020	y
296	lowland	97.36	Colombia	González-Caro et al., 2020	y
296	lowland	142	Colombia	González-Caro et al., 2020	y
296	lowland	265.76	Colombia	González-Caro et al., 2020	y
296	lowland	319.36	Colombia	González-Caro et al., 2020	y
299	lowland	203.6	Colombia	González-Caro et al., 2020	y
302	lowland	319.6	Colombia	González-Caro et al., 2020	y
304	lowland	128.52	Colombia	González-Caro et al., 2020	y
304	lowland	200.76	Colombia	González-Caro et al., 2020	y
304	lowland	321.96	Colombia	González-Caro et al., 2020	y
304	lowland	371.56	Colombia	González-Caro et al., 2020	y
312	lowland	223.76	Colombia	González-Caro et al., 2020	y
312	lowland	353.32	Colombia	González-Caro et al., 2020	y
314	lowland	373	Colombia	González-Caro et al., 2020	y
318	lowland	301.68	Colombia	González-Caro et al., 2020	y
329	lowland	122.32	Colombia	González-Caro et al., 2020	y
330	lowland	265.52	Colombia	González-Caro et al., 2020	y
338	lowland	242.44	Colombia	González-Caro et al., 2020	y
349	lowland	137.4	Colombia	González-Caro et al., 2020	y
359	lowland	126.92	Colombia	González-Caro et al., 2020	y
449	lowland	279.04	Colombia	González-Caro et al., 2020	y
473	lowland	344.04	Colombia	González-Caro et al., 2020	y
510	lowland	241.16	Colombia	González-Caro et al., 2020	y
586	lowland	167.92	Colombia	González-Caro et al., 2020	y
691	lowland	217.4	Colombia	González-Caro et al., 2020	y
749	lowland	214.36	Colombia	González-Caro et al., 2020	y
764	lowland	232	Colombia	González-Caro et al., 2020	y
772	lowland	280.04	Colombia	González-Caro et al., 2020	y
928	lowland	285.8	Colombia	González-Caro et al., 2020	y
941	lowland	230.68	Colombia	González-Caro et al., 2020	y
960	lowland	250.2	Colombia	González-Caro et al., 2020	y
972	lowland	383.6	Colombia	González-Caro et al., 2020	y
977	lowland	191.48	Colombia	González-Caro et al., 2020	y

1037	montane	286.08	Colombia	González-Caro et al., 2020	y
1065	montane	313.44	Colombia	González-Caro et al., 2020	y
1068	montane	324.8	Colombia	González-Caro et al., 2020	y
1119	montane	297.84	Colombia	González-Caro et al., 2020	y
1370	montane	283.84	Colombia	González-Caro et al., 2020	y
1412	montane	315.48	Colombia	González-Caro et al., 2020	y
1414	montane	192.8	Colombia	González-Caro et al., 2020	y
1483	montane	295.4	Colombia	González-Caro et al., 2020	y
1642	montane	380.44	Colombia	González-Caro et al., 2020	y
1658	montane	625.04	Colombia	González-Caro et al., 2020	y
1663	montane	421.28	Colombia	González-Caro et al., 2020	y
1701	montane	561.48	Colombia	González-Caro et al., 2020	y
1740	montane	225.24	Colombia	González-Caro et al., 2020	y
1793	montane	561.96	Colombia	González-Caro et al., 2020	y
1800	montane	246.16	Colombia	González-Caro et al., 2020	y
1810	montane	245.88	Colombia	González-Caro et al., 2020	y
1848	montane	398.88	Colombia	González-Caro et al., 2020	y
1903	montane	209.64	Colombia	González-Caro et al., 2020	y
1937	montane	493.32	Colombia	González-Caro et al., 2020	y
1949	montane	589.12	Colombia	González-Caro et al., 2020	y
2013	montane	211.4	Colombia	González-Caro et al., 2020	y
2027	montane	173.08	Colombia	González-Caro et al., 2020	y
2056	montane	177	Colombia	González-Caro et al., 2020	y
2083	montane	185.36	Colombia	González-Caro et al., 2020	y
2111	montane	264.28	Colombia	González-Caro et al., 2020	y
2314	montane	193.92	Colombia	González-Caro et al., 2020	y
2364	montane	136.4	Colombia	González-Caro et al., 2020	y
2527	montane	358.48	Colombia	González-Caro et al., 2020	y
2646	montane	272.36	Colombia	González-Caro et al., 2020	y
2647	montane	160.76	Colombia	González-Caro et al., 2020	y
2802	montane	98.12	Colombia	González-Caro et al., 2020	y
2928	montane	218.56	Colombia	González-Caro et al., 2020	y
100	lowland	182.9	Costa Rica	Clark et al., 2002	n
101	lowland	160.5	Costa Rica	Clark et al., 2002	n
102	lowland	186.1	Costa Rica	Clark et al., 2002	n
115	lowland	297	Costa Rica	Hofhansl et al., 2020*	n
210	lowland	240	Costa Rica	Hofhansl et al., 2020*	n
253	lowland	224	Costa Rica	Hofhansl et al., 2020*	n
315	lowland	370	Costa Rica	Hofhansl et al., 2020*	n
355	lowland	267	Costa Rica	Hofhansl et al., 2020*	n

100	lowland	278	Costa Rica	Lieberman et al., 1996	n
300	lowland	325	Costa Rica	Lieberman et al., 1996	n
500	lowland	261	Costa Rica	Lieberman et al., 1996	n
750	lowland	346	Costa Rica	Lieberman et al., 1996	n
1000	lowland	261	Costa Rica	Lieberman et al., 1996	n
1250	montane	145	Costa Rica	Lieberman et al., 1996	n
1500	montane	215	Costa Rica	Lieberman et al., 1996	n
1750	montane	268	Costa Rica	Lieberman et al., 1996	n
2000	montane	271	Costa Rica	Lieberman et al., 1996	n
2300	montane	349	Costa Rica	Lieberman et al., 1996	n
2600	montane	362	Costa Rica	Lieberman et al., 1996	n
1240	montane	159	Costa Rica	Tanner et al., 2016	n
1490	montane	457	Costa Rica	Tanner et al., 2016	n
960	lowland	391.57	Ecuador	Homeier & Leuschner, 2021	n
970	lowland	555.75	Ecuador	Homeier & Leuschner, 2021	n
1000	lowland	391.63	Ecuador	Homeier & Leuschner, 2021	n
1000	lowland	183.17	Ecuador	Homeier & Leuschner, 2021	n
1020	montane	211.57	Ecuador	Homeier & Leuschner, 2021	n
1020	montane	451.42	Ecuador	Homeier & Leuschner, 2021	n
1026	montane	338.67	Ecuador	Homeier & Leuschner, 2021	n
1044	montane	202.27	Ecuador	Homeier & Leuschner, 2021	n
1046	montane	270.27	Ecuador	Homeier & Leuschner, 2021	n
1049	montane	171.55	Ecuador	Homeier & Leuschner, 2021	n
1050	montane	310.39	Ecuador	Homeier & Leuschner, 2021	n
1050	montane	339.33	Ecuador	Homeier & Leuschner, 2021	n
1054	montane	154.71	Ecuador	Homeier & Leuschner, 2021	n
1056	montane	218.53	Ecuador	Homeier & Leuschner, 2021	n
1060	montane	217.59	Ecuador	Homeier & Leuschner, 2021	n
1066	montane	84.27	Ecuador	Homeier & Leuschner, 2021	n
1069	montane	122.02	Ecuador	Homeier & Leuschner, 2021	n
1072	montane	89.37	Ecuador	Homeier & Leuschner, 2021	n
1075	montane	154.04	Ecuador	Homeier & Leuschner, 2021	n
1080	montane	286.16	Ecuador	Homeier & Leuschner, 2021	n
1080	montane	304.24	Ecuador	Homeier & Leuschner, 2021	n
1080	montane	560.12	Ecuador	Homeier & Leuschner, 2021	n
1090	montane	488.16	Ecuador	Homeier & Leuschner, 2021	n
1090	montane	586.32	Ecuador	Homeier & Leuschner, 2021	n
1110	montane	231.01	Ecuador	Homeier & Leuschner, 2021	n
1129	montane	160.51	Ecuador	Homeier & Leuschner, 2021	n
1130	montane	224.37	Ecuador	Homeier & Leuschner, 2021	n

1132	montane	156.34	Ecuador	Homeier & Leuschner, 2021	n
1140	montane	259.92	Ecuador	Homeier & Leuschner, 2021	n
1165	montane	202.43	Ecuador	Homeier & Leuschner, 2021	n
1170	montane	179.84	Ecuador	Homeier & Leuschner, 2021	n
1180	montane	318.38	Ecuador	Homeier & Leuschner, 2021	n
1190	montane	337.46	Ecuador	Homeier & Leuschner, 2021	n
1195	montane	146.24	Ecuador	Homeier & Leuschner, 2021	n
1210	montane	893.95	Ecuador	Homeier & Leuschner, 2021	n
1257	montane	226.05	Ecuador	Homeier & Leuschner, 2021	n
1266	montane	142.34	Ecuador	Homeier & Leuschner, 2021	n
1268	montane	143.11	Ecuador	Homeier & Leuschner, 2021	n
1450	montane	343.35	Ecuador	Homeier & Leuschner, 2021	n
1490	montane	370.56	Ecuador	Homeier & Leuschner, 2021	n
1490	montane	286.5	Ecuador	Homeier & Leuschner, 2021	n
1490	montane	229.08	Ecuador	Homeier & Leuschner, 2021	n
1550	montane	469.88	Ecuador	Homeier & Leuschner, 2021	n
1557	montane	296.53	Ecuador	Homeier & Leuschner, 2021	n
1560	montane	305.02	Ecuador	Homeier & Leuschner, 2021	n
1560	montane	451.96	Ecuador	Homeier & Leuschner, 2021	n
1570	montane	255.79	Ecuador	Homeier & Leuschner, 2021	n
1570	montane	174.16	Ecuador	Homeier & Leuschner, 2021	n
1580	montane	287.58	Ecuador	Homeier & Leuschner, 2021	n
1580	montane	272.36	Ecuador	Homeier & Leuschner, 2021	n
1590	montane	393.05	Ecuador	Homeier & Leuschner, 2021	n
1590	montane	670.66	Ecuador	Homeier & Leuschner, 2021	n
1590	montane	439.45	Ecuador	Homeier & Leuschner, 2021	n
1590	montane	254.85	Ecuador	Homeier & Leuschner, 2021	n
1597	montane	235.28	Ecuador	Homeier & Leuschner, 2021	n
1600	montane	537.08	Ecuador	Homeier & Leuschner, 2021	n
1610	montane	286.8	Ecuador	Homeier & Leuschner, 2021	n
1610	montane	528.21	Ecuador	Homeier & Leuschner, 2021	n
1913	montane	29.83	Ecuador	Homeier & Leuschner, 2021	n
1920	montane	239.26	Ecuador	Homeier & Leuschner, 2021	n
1927	montane	132.24	Ecuador	Homeier & Leuschner, 2021	n
1931	montane	356.77	Ecuador	Homeier & Leuschner, 2021	n
1933	montane	423.87	Ecuador	Homeier & Leuschner, 2021	n
1940	montane	168.32	Ecuador	Homeier & Leuschner, 2021	n
1940	montane	458.75	Ecuador	Homeier & Leuschner, 2021	n
1950	montane	132.93	Ecuador	Homeier & Leuschner, 2021	n
1950	montane	129.13	Ecuador	Homeier & Leuschner, 2021	n

1954	montane	147.86	Ecuador	Homeier & Leuschner, 2021	n
1971	montane	104.3	Ecuador	Homeier & Leuschner, 2021	n
1980	montane	168.89	Ecuador	Homeier & Leuschner, 2021	n
1980	montane	221.89	Ecuador	Homeier & Leuschner, 2021	n
1990	montane	227.73	Ecuador	Homeier & Leuschner, 2021	n
1993	montane	272.54	Ecuador	Homeier & Leuschner, 2021	n
1995	montane	121.53	Ecuador	Homeier & Leuschner, 2021	n
2000	montane	113.87	Ecuador	Homeier & Leuschner, 2021	n
2000	montane	535.74	Ecuador	Homeier & Leuschner, 2021	n
2000	montane	317.1	Ecuador	Homeier & Leuschner, 2021	n
2000	montane	294.81	Ecuador	Homeier & Leuschner, 2021	n
2000	montane	268.77	Ecuador	Homeier & Leuschner, 2021	n
2002	montane	61.5	Ecuador	Homeier & Leuschner, 2021	n
2015	montane	907.54	Ecuador	Homeier & Leuschner, 2021	n
2020	montane	191.14	Ecuador	Homeier & Leuschner, 2021	n
2020	montane	94.62	Ecuador	Homeier & Leuschner, 2021	n
2026	montane	142.2	Ecuador	Homeier & Leuschner, 2021	n
2027	montane	229.94	Ecuador	Homeier & Leuschner, 2021	n
2034	montane	119.3	Ecuador	Homeier & Leuschner, 2021	n
2039	montane	274.45	Ecuador	Homeier & Leuschner, 2021	n
2039	montane	152.56	Ecuador	Homeier & Leuschner, 2021	n
2054	montane	112.28	Ecuador	Homeier & Leuschner, 2021	n
2055	montane	407.38	Ecuador	Homeier & Leuschner, 2021	n
2063	montane	139.32	Ecuador	Homeier & Leuschner, 2021	n
2070	montane	259.4	Ecuador	Homeier & Leuschner, 2021	n
2080	montane	312.37	Ecuador	Homeier & Leuschner, 2021	n
2080	montane	440	Ecuador	Homeier & Leuschner, 2021	n
2085	montane	189.73	Ecuador	Homeier & Leuschner, 2021	n
2089	montane	83.38	Ecuador	Homeier & Leuschner, 2021	n
2409	montane	155.32	Ecuador	Homeier & Leuschner, 2021	n
2409	montane	216.95	Ecuador	Homeier & Leuschner, 2021	n
2420	montane	158.26	Ecuador	Homeier & Leuschner, 2021	n
2798	montane	182.7	Ecuador	Homeier & Leuschner, 2021	n
2805	montane	96.76	Ecuador	Homeier & Leuschner, 2021	n
2818	montane	166.36	Ecuador	Homeier & Leuschner, 2021	n
2844	montane	103.76	Ecuador	Homeier & Leuschner, 2021	n
2859	montane	79.77	Ecuador	Homeier & Leuschner, 2021	n
2865	montane	157.91	Ecuador	Homeier & Leuschner, 2021	n
2869	montane	71.3	Ecuador	Homeier & Leuschner, 2021	n
2872	montane	80.74	Ecuador	Homeier & Leuschner, 2021	n

2875	montane	49.66	Ecuador	Homeier & Leuschner, 2021	n
2878	montane	98.82	Ecuador	Homeier & Leuschner, 2021	n
2880	montane	89.36	Ecuador	Homeier & Leuschner, 2021	n
2885	montane	97.1	Ecuador	Homeier & Leuschner, 2021	n
2885	montane	49.03	Ecuador	Homeier & Leuschner, 2021	n
2886	montane	51.49	Ecuador	Homeier & Leuschner, 2021	n
2890	montane	68.69	Ecuador	Homeier & Leuschner, 2021	n
2890	montane	164.52	Ecuador	Homeier & Leuschner, 2021	n
2891	montane	74.67	Ecuador	Homeier & Leuschner, 2021	n
2893	montane	45.39	Ecuador	Homeier & Leuschner, 2021	n
2900	montane	45.04	Ecuador	Homeier & Leuschner, 2021	n
3098	montane	300.1	Ecuador	Homeier & Leuschner, 2021	n
3098	montane	115.7	Ecuador	Homeier & Leuschner, 2021	n
1050	montane	285.1	Ecuador	Moser et al., 2008	n
1540	montane	167.1	Ecuador	Moser et al., 2008	n
1890	montane	169.6	Ecuador	Moser et al., 2008	n
2380	montane	98.92	Ecuador	Moser et al., 2008	n
3060	montane	103.4	Ecuador	Moser et al., 2008	n
880	lowland	232.1	Panama	This study	y
1100	montane	177.6	Panama	This study	y
1100	montane	346.6	Panama	This study	y
155	montane	369.1	Panama	This study	y
1215	montane	254.5	Panama	This study	y
1330	montane	448.5	Panama	This study	y
1987	montane	387.6	Panama	This study	y
2248	montane	468.3	Panama	This study	y
2599	montane	576.1	Panama	This study	y
2923	montane	518.3	Panama	This study	y
171	lowland	281	Panama	Chave et al., 2003	n
120	lowland	130	Peru	Malhi et al., 2017	n
150	lowland	89	Peru	Malhi et al., 2017	n
215	lowland	112	Peru	Malhi et al., 2017	n
223	lowland	142	Peru	Malhi et al., 2017	n
595	lowland	97	Peru	Malhi et al., 2017	n
848	lowland	67	Peru	Malhi et al., 2017	n
1000	lowland	92	Peru	Malhi et al., 2017	n
1527	montane	107	Peru	Malhi et al., 2017	n
1776	montane	144.3	Peru	Malhi et al., 2017	n
1885	montane	64.22	Peru	Malhi et al., 2017	n
2020	montane	50.65	Peru	Malhi et al., 2017	n

2758	montane	88.52	Peru	Malhi et al., 2017	n
2863	montane	65.03	Peru	Malhi et al., 2017	n
3044	montane	59.08	Peru	Malhi et al., 2017	n
3045	montane	81.32	Peru	Malhi et al., 2017	n
3537	montane	81.9	Peru	Malhi et al., 2017	n
800	lowland	70	Venezuela	Delaney et al., 1997	n
1400	montane	173	Venezuela	Delaney et al., 1997	n
1500	montane	148	Venezuela	Delaney et al., 1997	n
2136	montane	157	Venezuela	Delaney et al., 1997	n
2500	montane	179	Venezuela	Delaney et al., 1997	n
50	lowland	47.66	Venezuela	Vilanova et al., 2018	n
60	lowland	70.749	Venezuela	Vilanova et al., 2018	n
100	lowland	96.122	Venezuela	Vilanova et al., 2018	n
105	lowland	183.288	Venezuela	Vilanova et al., 2018	n
105	lowland	201.301	Venezuela	Vilanova et al., 2018	n
138	lowland	135.579	Venezuela	Vilanova et al., 2018	n
140	lowland	150.246	Venezuela	Vilanova et al., 2018	n
140	lowland	151.633	Venezuela	Vilanova et al., 2018	n
141	lowland	113.5	Venezuela	Vilanova et al., 2018	n
142	lowland	77.786	Venezuela	Vilanova et al., 2018	n
143	lowland	102.64	Venezuela	Vilanova et al., 2018	n
144	lowland	206.23	Venezuela	Vilanova et al., 2018	n
165	lowland	80.404	Venezuela	Vilanova et al., 2018	n
168	lowland	114.254	Venezuela	Vilanova et al., 2018	n
169	lowland	150.581	Venezuela	Vilanova et al., 2018	n
171	lowland	115.821	Venezuela	Vilanova et al., 2018	n
173	lowland	117.096	Venezuela	Vilanova et al., 2018	n
176	lowland	113.483	Venezuela	Vilanova et al., 2018	n
180	lowland	133.051	Venezuela	Vilanova et al., 2018	n
180	lowland	174.418	Venezuela	Vilanova et al., 2018	n
220	lowland	234.506	Venezuela	Vilanova et al., 2018	n
220	lowland	237.089	Venezuela	Vilanova et al., 2018	n
244	lowland	266.224	Venezuela	Vilanova et al., 2018	n
283	lowland	128.517	Venezuela	Vilanova et al., 2018	n
312	lowland	226.454	Venezuela	Vilanova et al., 2018	n
316	lowland	125.518	Venezuela	Vilanova et al., 2018	n
318	lowland	225.897	Venezuela	Vilanova et al., 2018	n
350	lowland	144.203	Venezuela	Vilanova et al., 2018	n
366	lowland	156.565	Venezuela	Vilanova et al., 2018	n
380	lowland	81.251	Venezuela	Vilanova et al., 2018	n

404	lowland	136.338	Venezuela	Vilanova et al., 2018	n
760	lowland	204.805	Venezuela	Vilanova et al., 2018	n
1000	lowland	176.848	Venezuela	Vilanova et al., 2018	n
1150	montane	237.27	Venezuela	Vilanova et al., 2018	n
1320	montane	257.185	Venezuela	Vilanova et al., 2018	n
1500	montane	159.029	Venezuela	Vilanova et al., 2018	n
2040	montane	205.316	Venezuela	Vilanova et al., 2018	n
2060	montane	204.674	Venezuela	Vilanova et al., 2018	n
2310	montane	136.293	Venezuela	Vilanova et al., 2018	n
2312	montane	140.132	Venezuela	Vilanova et al., 2018	n
2318	montane	173.818	Venezuela	Vilanova et al., 2018	n
2320	montane	113.619	Venezuela	Vilanova et al., 2018	n
2321	montane	190.334	Venezuela	Vilanova et al., 2018	n
2421	montane	224.87	Venezuela	Vilanova et al., 2018	n
2430	montane	184.798	Venezuela	Vilanova et al., 2018	n
2430	montane	179.899	Venezuela	Vilanova et al., 2018	n
2449	montane	170.767	Venezuela	Vilanova et al., 2018	n
2450	montane	154.846	Venezuela	Vilanova et al., 2018	n
2450	montane	185.327	Venezuela	Vilanova et al., 2018	n
2452	montane	171.071	Venezuela	Vilanova et al., 2018	n

* For Hofhansl et al., 2020 values are the mean values by five sites in table S1.

Table S2. Linear regressions for carbon pools with environmental factors.

	AGB		D_CWD		S_CWD		Total_CWD		Soil C	
Variable	**r**	**P**	**r**	**P**	**r**	**P**	**r**	**P**	**r**	**P**
BD	0.16	0.13	0.05	0.253	-0.08	0.614	-0.104	0.712	0.02	0.305
pH	0.09	0.204	-0.06	0.508	0.15	0.141	0.135	0.159	0.15	0.143
ResinP‡	0.71	0.001*	0.3	0.055 *	0.03	0.287	-0.02	0.398	0.39	0.03*
NH4‡	0.1	0.194	-0.12	0.918	-0.04	0.47	-0.04	0.466	-0.08	0.598
NO3‡	-0.11	0.779	-0.05	0.498	-0.11	0.801	-0.12	0.865	-0.12	0.928
Al§	-0.07	0.554	-0.12	0.989	-0.07	0.54	-0.06	0.527	0.06	0.243
Ca§	-0.02	0.413	-0.1	0.725	0	0.352	-0.00	0.365	0.24	0.084
Fe§	0.14	0.149	-0.05	0.498	-0.11	0.779	-0.11	0.842	0.02	0.308
K§	0.02	0.292	-0.09	0.67	0.31	0.054	0.30	0.056*	0	0.33
Mg§	-0.12	0.873	-0.1	0.725	-0.05	0.488	-0.04	0.447	-0.05	0.479
Mn§	-0.1	0.716	0.04	0.263	-0.07	0.569	-0.04	0.4633	0.14	0.15
Na§	-0.07	0.566	0.5	0.012*	0	0.334	-0.05	0.485	0	0.342
ECEC§	-0.08	0.582	-0.12	0.928	0	0.366	-0.00	0.359	0.12	0.171
Total.N †	-0.04	0.452	-0.11	0.757	-0.11	0.805	0.11	0.832	0.12	0.17
Total.P †	-0.02	0.4	-0.1	0.731	0	0.357	-0.01	0.37	-0.01	0.38
MAT	0.76	0*	0.68	0.001*	0	0.361	-0.07	0.542	0.77	0*
MAP	0.16	0.13	0.2	0.107	0.22	0.093	0.156	0.146	-0.02	0.403
MPwe	-0.12	0.976	-0.08	0.595	-0.08	0.586	-0.06	0.528	-0.02	0.392
MPdry	0.22	0.093	0.39	0.03*	-0.01	0.378	-0.06	0.521	0.41	0.025*
MDR	0.49	0.013*	0.12	0.173	0.06	0.233	0.02	0.302	0.31	0.054
ISO	0.1	0.184	0.31	0.053	-0.1	0.728	-0.12	0.899	0.29	0.061
TS	0.08	0.216	0.3	0.058	-0.09	0.66	-0.11	0.823	0.25	0.078
MATmax	0.76	0*	0.68	0.001*	0	0.359	-0.07	0.54	0.77	0*
MATmin	0.76	0*	0.68	0.001*	0	0.351	-0.06	0.531	0.77	0*
MATvar	0.56	0.007*	0.5	0.012*	0.01	0.321	-0.04	0.47	0.74	0*
WC	0.36	0.039*	0.13	0.16	-0.11	0.802	-0.12	0.935	0.41	0.025*

‡units μg cm^{-3}; †units mg cm^{-3}; §units $C_M L^{-1}$

Table S3. Correlation between variables used for the SEM analysis.

	MAT	ResinP‡	NH4‡	Soil paraments	Climate parameter	% EM	AGB	DCWD	Soil C
ResinP‡	-0.89***								
NH4‡	-0.21	0.43							
Soil paraments	-0.95***	0.89***	0.14						
Climate parameter	0.17	-0.29	-0.60	0.0					
% EM	-0.76*	0.79**	0.31	0.73*	0.0				
AGB	-0.85***	0.87**	0.45	0.81**	-0.36	0.74*			
DCWD	-0.89**	0.62	-0.04	0.80**	-0.08	0.70*	0.72*		
Soil C	-0.89***	0.68*	0.19	0.86**	-0.11	0.54	0.71*	0.81**	

Table S4. Environmental characteristics of ten 1ha plots along an elevational gradient in Panama. Soil data are means (±1 SE) of 13 samples of 0-10 cm depth per plot. Superscripts report significant differences among sites, based on one-way ANOVA. Climate data are from the CHELSA database.

Plot	PaloSeco	Alto Frio	ChorroA	HondaA	Samudio	Hornito	Mirador	CasaA	Quetzal	Copete
Plot code	PS	AF	CA	HA	SAM	HOR	MIR	CASA	QUE	COP
Edaphic										
BD	0.41±0.03^{cde}	0.65±0.02^{ab}	0.12±0.01^{f}	0.29±0.02^{def}	0.39±0.0^{cde}	0.25±0.02^{ef}	0.43±0.03^{cb}	0.74±0.04^{a}	0.54±0.05^{bc}	0.51±0.05^{bc}
pH	4.37±0.09^{cde}	5.6±0.06ab	3.67±0.08^{e}	3.58±0.05^{3}	4.18±0.13^{de}	5.03±0.18^{bcd}	5.98±0.11^{a}	5.0±0.15^{bc}	5.08±0.19^{bc}	4.81±0.14^{cd}
ResinP‡	0.43±0.06^{d}	1.39±0.13^{cd}	0.08±0.02^{d}	0.22±0.05^{d}	0.41±0.08^{d}	2.22±0.15^{bcd}	3.67±0.33^{bc}	7.01±1.08^{a}	6.51±0.93^{a}	4.57±0.67^{ab}
NH_4‡	0.78±0.06^{b}	3.75±0.66^{a}	0.81±0.06^{b}	2.24±0.46^{ab}	0.63±0.1^{b}	1.81±0.25^{ab}	1.8±0.2^{ab}	2.81±1.09^{ab}	2.58±0.26^{ab}	1.29±0.25^{b}
NO_3‡	0.81±0.12^{cd}	2.56±0.23^{a}	0.2±0.06^{d}	1.19±0.29^{bcd}	1.17±0.14^{bcd}	1.18±0.17^{bcd}	1.55±0.13^{bc}	0.23±0.15^{d}	1.96±0.4^{ab}	0.28±0.13^{d}
Al§	1.1±0.15^{ab}	0.03±0.0^{c}	0.82±0.13^{abc}	1.13±0.13^{ab}	1.59±0.3^{a}	0.48±0.22^{abc}	0.06±0.01^{c}	1.31±0.19^{a}	0.44±0.15^{bc}	0.8±0.18^{abc}
Ca§	1.08±0.2^{c}	8.47±0.28^{b}	0.54±0.13^{c}	0.04±0.0^{c}	1.12±0.15^{c}	4.93±0.74^{bc}	16.33±0.96^{a}	2.44±0.42^{c}	7.02±1.24^{b}	3.55±1.11^{bc}
Fe§	0.01±0.0^{bc}	<0.01^{c}	0.05±0.0^{ab}	0.02±0.0^{abc}	0.06±0.02^{a}	<0.01^{c}	<0.01^{c}	0.02±0.0 ^{bc}	0.01±0.0^{bc}	0.01±0.0^{c}
K§	0.06±0.0^{ab}	0.12±0.0^{ab}	0.07±0.0^{ab}	0.02±0.0^{b}	0.07±0.0^{ab}	0.18±0.01^{a}	0.16±0.02^{a}	0.11 0±0.02^{ab}	0.1±0.01^{ab}	0.11±0.01^{ab}
Mg§	0.33±0.03^{bc}	2.29±0.14^{a}	0.28±0.03^{bc}	0.04±0.0^{c}	0.32±0.03^{bc}	1.01±0.14^{b}	1.96±0.25^{a}	0.44±0.04^{bc}	0.77±0.1^{bc}	0.41±0.1^{bc}
Mn§	0.19±0.05^{bc}	0.42±0.06^{b}	0.01±0.0^{c}	<0.01^{c}	0.14±0.04^{c}	0.71±0.1^{a}	<0.01^{c}	<0.0^{c}	0.02±0.0^{c}	0.01±0.0^{c}
Na§	0.04±0.0 ^{b}	0.02±0.0 ^{b}	0.03±0.0 ^{b}	0.01±0.0 ^{b}	0.05±0.0 ^{b}	0.03±0.0 ^{b}	0.01±0.0 ^{b}	0.02±0 ^{b}	0.02±0.0 ^{b}	0.11±0.01^{a}
ECEC§	2.83±0.17^{d}	11.37±0.36^{b}	1.82±0.07^{d}	1.29±0.14^{d}	3.37±0.13^{cd}	7.39±0.69^{bcd}	18.47±1.16^{a}	3.03±0.45^{b}	7.93±1.34^{bc}	4.2±1.19^{cd}
TEB§	1.52±0.23^{d}	10.91±0.33^{b}	0.93±0.16^{d}	0.13±0.0^{d}	1.57±0.18^{d}	6.17±0.87^{bcd}	18.55±1.15^{a}	4.37±0.33^{cd}	8.41±1.23^{bc}	5.03±1.13^{cd}
Total N†	2.28±0.23^{cd}	4.71±0.22^{a}	1.76±0.15^{d}	2.91±0.19^{bc}	3.6±0.17^{b}	2.86±0.13^{bc}	5.51±0.25^{bc}	3.2±0.2^{bc}	3.66±0.25^{b}	2.98±0.29^{bc}
Total P*	369.21±23.2^{ab}	503.02±27.02^{a}	57.16±8.64^{d}	180.6±11.3^{cd}	269.11±9.8^{bc}	280.1±20.1^{bc}	512.34±42.01^{a}	371.82±44.7^{ab}	376.73±54.6^{ab}	276.1±60.5^{bc}
Climate										
MAT	20.8	19.4	19.4	18.9	18.5	18.1	14.4	13.9	10.9	10.9
MAP	2972	2901	2573	2708	3142	3024	2948	2937	3102	3102
MPwe	367	447	326	343	393	439	345	343	365	365
MPdry	71	31	51	54	58	38	90	89	88	88
MDR	43	42	43	43	43	42	42	42	42	42
ISO	605	592	601	603	600	595	607	606	608	608
TS	48.2	53.3	49.6	49.3	50.1	52.1	47.8	47.9	47.2	47.2
MTmax	25	23.6	23.6	23.1	22.7	22.3	18.4	17.9	14.9	14.9
MTmin	17.8	16.5	16.4	16	15.6	15.1	11.5	11	8	8
MATvar	7.1	7.1	7.1	7.1	7.1	7.1	6.9	6.9	6.9	6.9
WD	0	-0.62	-1.66	-75.16	-1.66	-42.16	-225.08	-225.08	-117.83	-117.8

‡units μg cm^{-3}; §units C_M L^{-1}; †units mg cm^{-3}; *units μg cm^{-3}

Table S5. Total estimated carbon pools in Mg ha^{-1} with 95% confidence intervals for ten 1ha plots in an elevational gradient for trees and CWD samples with diameter ≥10 cm. AGB = Aboveground biomass; AGC = Aboveground carbon, CWD = Coarse wood debris

Plot	Plot code	Elevation	AGB	AGC	CWD			Soil C	Total Carbon
					Downed	Standing	Total CWD		
PaloSeco	PS	880	232.1 (213.1, 253.9)	109.3 (99.5, 119.3)	12.14 (8.72,15.59)	9.03 (1.68,19.09)	21.17	119.0 (76.2, 170.8)	249.5
AltoFrio	AF	1100	346.6 (320.5, 375.5)	163.2 (152.1, 176.6)	10.35 (7.14,14.1)	86.06 (17.56,178.98)	96.41	260.5 (215.5, 307.2)	520.1
ChorroA	CA	1100	177.6 (166.2, 186.1)	83.6 77.5, 89.8)	7.35 (5.79,9.1)	52.72 (15.28,119.86)	60.07	233.4 (143.6, 296.7)	377.0
HondaA	HA	1155	369.1 (332.2, 420)	173.8 (156.1, 194.0)	13.49 (10.48,17.08)	313.02 (20.69,757.09)	326.51	241.3 (138.7, 318.5)	741.6
Samudio	SAM	1215	254.5 (239.3, 273.8)	120.0 (113.1, 128.5)	16.1 (13.39,18.98)	39.64 (2.27,103.53)	55.74	193.3 (115.3, 274.9)	369.0
Hornito	HOR	1330	448.5 (411.0, 490.6)	211.2 (176.8, 212.2)	11.38 (7.77,15.37)	3.37 (0.92,5.83)	14.75	174.3 (133.6, 213.8)	400.2
Mirador	MIR	1987	387.6 (346.9, 425.2)	182.6 (165.1, 202.4)	20.37 (15.7,25.94)	13.83 (0.66,31.13)	34.2	524.7 (428.7, 640.6)	741.5
CasitaA	CASA	2248	468.3 (432.4, 512.8)	220.5 (203.2, 239.8)	21.32 (16.94,26.23)	50.4 (3.78,108.02)	71.72	317.3 (273.4, 361.2)	609.6
Quetzal	QUE	2599	576.1 (520.7, 630.8)	271.3 (246.7, 299.5)	26.97 (21.06,33.87)	7.9 (2.97,14.49)	34.87	473.1 (400.2, 544)	779.3
Copete	COP	2923	518.3 (482.8, 559.1)	244.2 (227.0, 262.9)	48.9 (35.81,63.01)	11.08 (1.83,26.02)	59.98	577.9 (474.2, 642.9)	882.1

Table S6. Correlations of soil and climate variables with elevation.

Variable	r	P	Variable	r	P
BD	0.49	0.1492	MAT	-0.99	<0.001***
pH	0.41	0.2339	MAP	0.48	0.1636
ResinP‡	0.88	0.0008***	MPwe	-0.26	0.4635
NH4‡	0.19	0.6061	MPdry	0.77	0.0092**
NO3‡	-0.16	0.6685	MDR	-0.67	0.0331*
Al§	-0.14	0.6904	ISO	0.66	0.0381*
Ca§	0.31	0.3847	TS	-0.65	0.0429*
Fe§	-0.3	0.408	MTmax	-0.99	<0.001***
K§	0.34	0.3372	MTmin	-0.99	<0.001***
Mg§	0	0.9948	MATvar	-0.93	<0.001***
Mn§	-0.41	0.2369	WC	-0.72	0.0196*
Na§	0.43	0.2113	A. Cloud	-0.51	0.133
ECEC§	0.19	0.5913			
Total.N †	0.23	0.518	EM %	0.80	0.005**
Total.P †	0.22	0.532			

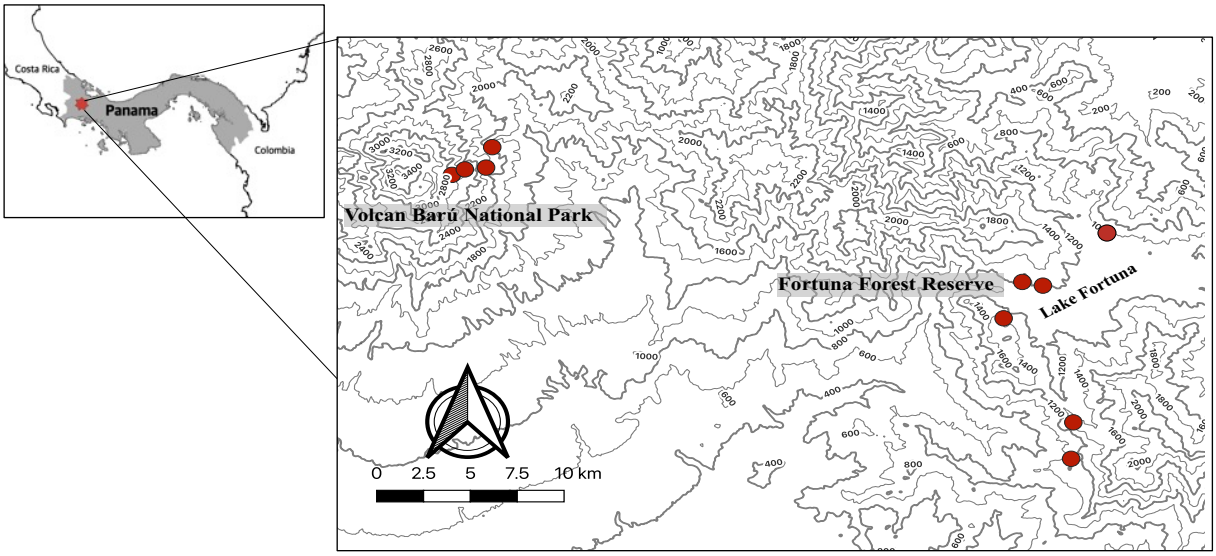

Figure S1. Map showing the location of 10 permanent 1-ha plots within Volcán Barú National Park and the Fortuna Forest Reserve in western Panama. Each point indicates the precise location of a permanent forest plot.

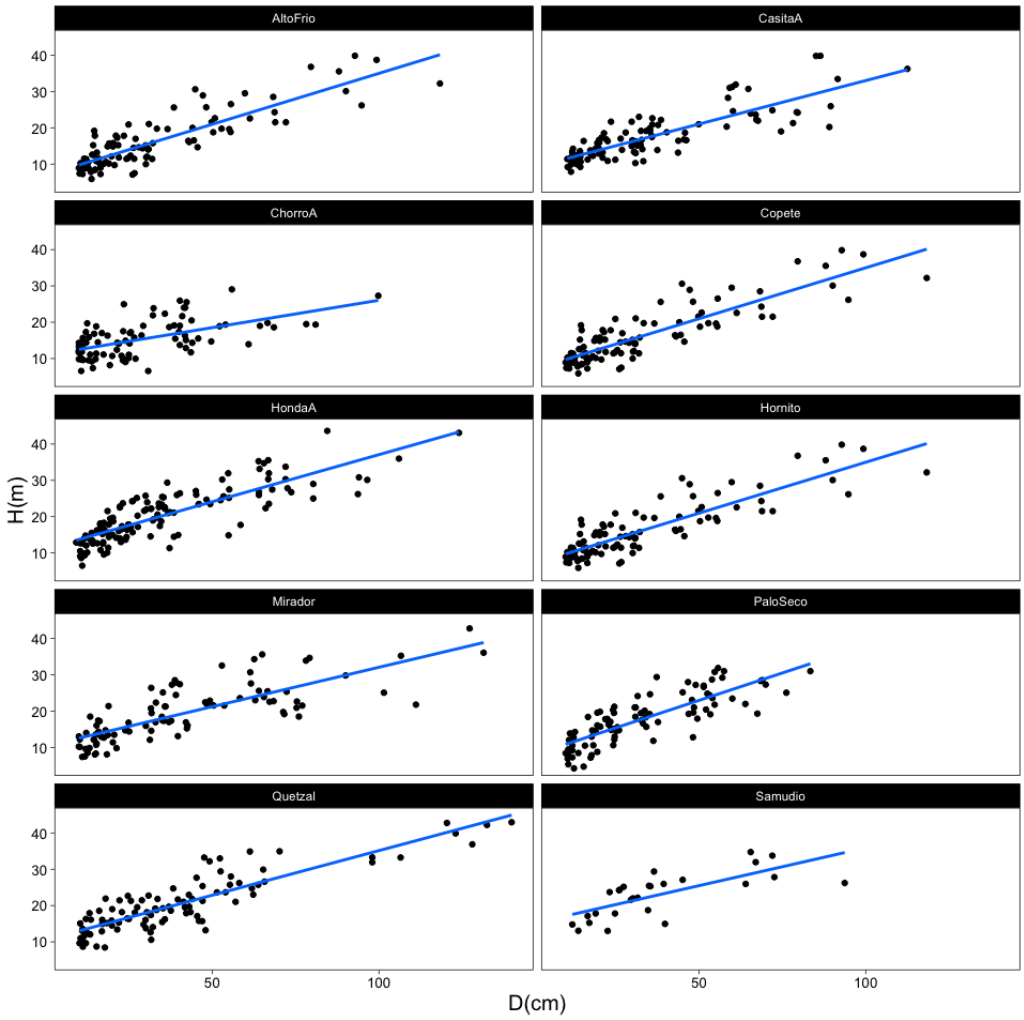

Figure S2. Data used to estimate the height-diameter relationship for each plot using a power model. Line represents the model *log 1* ($H = a + b * D$). Note: Because we do not have height measurements for small trees in the Samudio, AltoFrio, and Hornito plots, we used a height-DBH relationship from three sources: 1) plots samples with DBH greater than 50 cm, 2) nearby plots with similar soil characteristics, and 3) pooled height-DBH data from all plots. We applied the Akaike Information Criterion (AIC) to select the best height-DBH model for estimating AGB in each plot. For the Samudio and AltoFrio plots, the best model was the one based on nearby plots with similar soil characteristics (HondaA and Copete respectively). For the Hornito plot, the best model was the one using a pooled height-DBH approach.

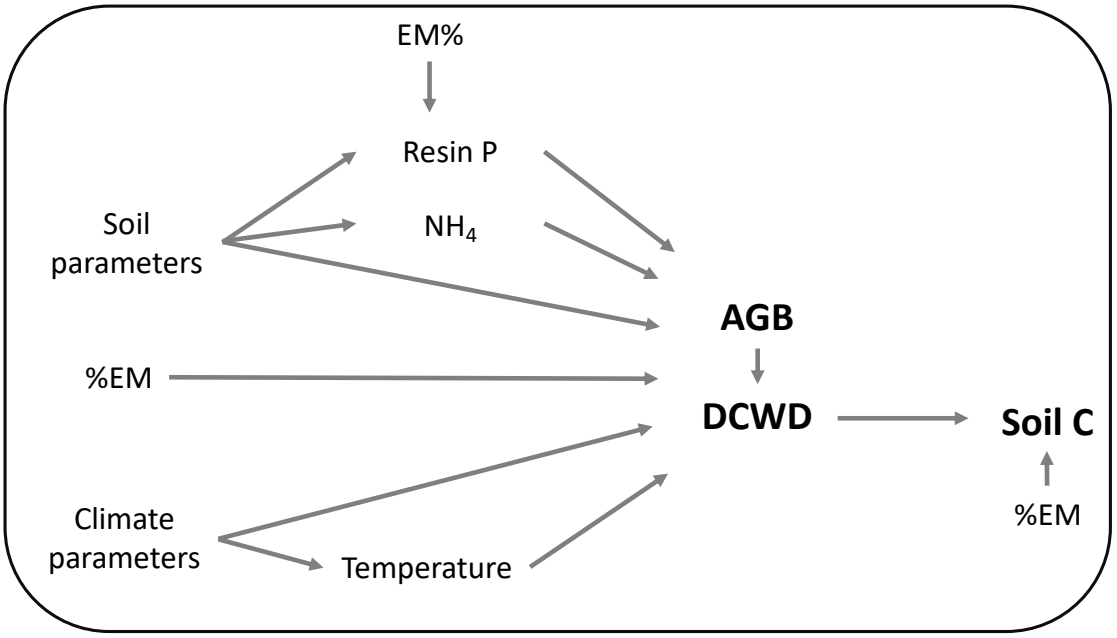

Figure S3. *A priori* structural equation model based on predicted relationships among environmental variables to evaluate the effect of climate and edaphic variables on the different carbon pools in a montane forest.

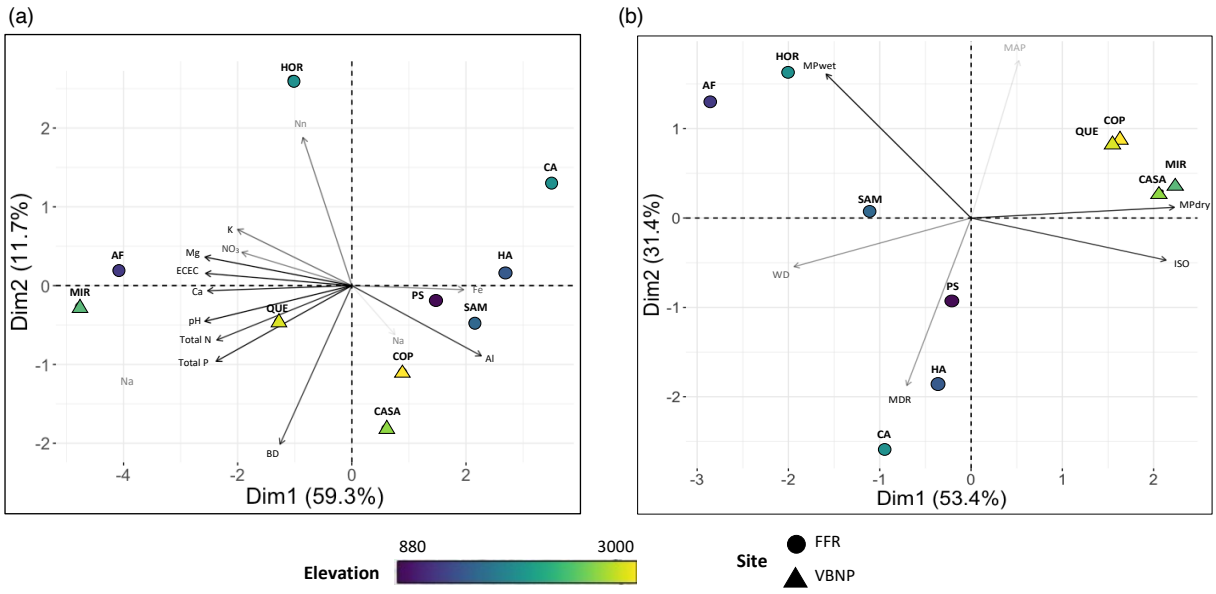

Figure S4. Principal component analysis (PCA) used for structural equation model (SEM) for (a). soil parameters 0-10 cm depth excluding resin P and NH4 and (b). climate parameters excluding variables related to temperature. Direction and length of vectors indicates the effect of the variable. Black arrows represent significant effects ($p<0.05$) and gray arrows non-significant effects. Color represents the elevation of the plot and the symbols represent the site. For abbreviations see Fig. 1 caption.

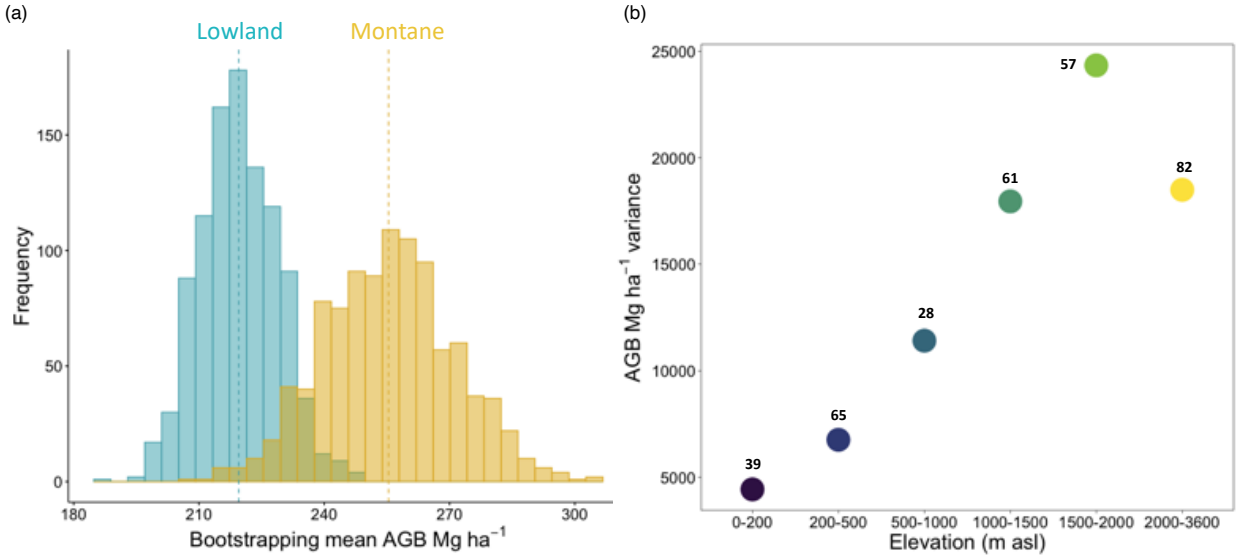

Figure S5. Variation in AGB by bootstrapping the mean AGB of 332 plots across thirteen studies in Neotropical forests. Variation in AGB (a) between lowland forests and Montane forests and (b) across elevation categories. Numbers above data points represent the number of plots in each elevation category. Distributions were assessed by bootstrapping of 1000 resamples.

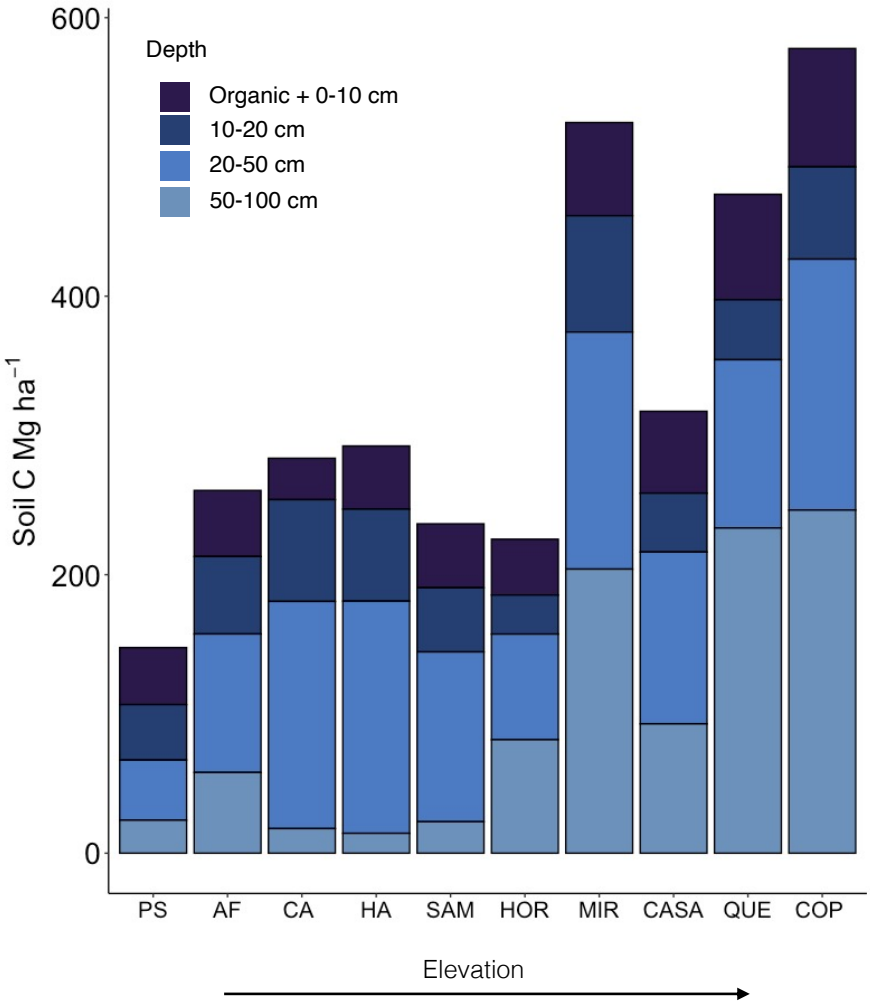

Figure S6. Variation in soil C at different depths among ten 1-ha plots in western Panama.

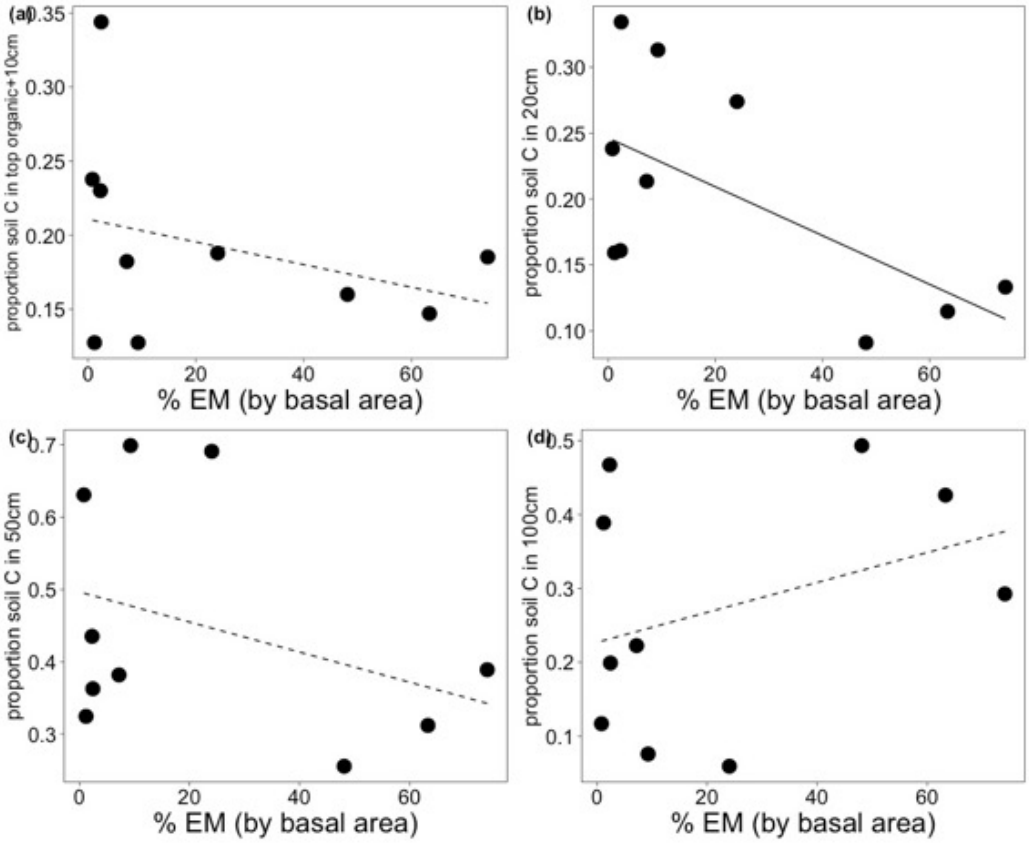

Figure S7. Relationship between the percent of basal area contributed by EM associated tree species and soil C accumulation for ten 1-ha plots. Each point represents plot soil C at each depth. The solid line represents a significant basal area effect.