

Supplementary Material

Tab. S1 - Descriptive statistics of the data used. UM: UMAFOR, n: number of individuals, D: diameter at breast height (cm) at 1.30 m, H: total height (m), Bst: stem biomass (kg), Bbr: branch biomass (kg), AGB: total tree aboveground biomass (kg), Cst: stem carbon (kg), Cbr: branch carbon (kg), AGC: total tree aboveground carbon (kg), CO₂est: stem carbon dioxide, CO₂ebr: branch carbon dioxide, CO₂et: total carbon dioxide, Min: minimum, Mn: mean, Max: maximum, SD: standard deviation, Krt: kurtosis.

UM	n		D	H	Bst	Bbr	AGB	Cst	Cbr	AGC	CO ₂ est	CO ₂ ebr	CO ₂ et
1203	152	Min	10.20	7.62	11.11	1.01	12.15	5.00	0.46	5.47	18.35	1.67	20.06
		Mn	28.89	22.29	354.88	10.09	364.97	159.70	4.54	164.23	586.08	16.66	602.74
		Max	70.00	44.80	2416.52	47.71	2460.56	1087.44	21.47	1107.25	3990.89	78.79	4063.61
		SD	14.24	7.71	409.21	9.69	418.53	184.15	4.36	188.34	675.81	16.00	691.20
		Krt	-0.29	-0.55	5.19	2.08	5.07	5.19	2.08	5.07	5.19	2.08	5.07
1303	226	Min	9.70	10.21	17.68	1.19	18.86	7.95	0.53	8.49	29.19	1.96	31.15
		Mn	38.85	31.07	689.18	13.17	702.34	310.13	5.92	316.05	1138.18	21.74	1159.92
		Max	79.00	43.30	2104.76	78.64	2183.41	947.14	35.39	982.53	3476.02	129.88	3605.90
		SD	12.07	6.33	426.40	11.56	434.78	191.88	5.20	195.65	704.20	19.09	718.05
		Krt	0.13	1.37	0.34	8.39	0.39	0.34	8.39	0.39	0.34	8.39	0.39
1503	133	Min	8.75	7.20	11.47	1.24	13.09	5.16	0.56	5.89	18.94	2.05	21.62
		Mn	44.96	28.72	1101.43	41.09	1142.52	495.64	18.49	514.13	1819.01	67.85	1886.87
		Max	85.50	52.46	3865.32	118.57	3970.43	1739.40	53.36	1786.69	6383.58	195.82	6557.17
		SD	22.71	11.12	1065.19	34.35	1099.07	479.34	15.46	494.58	1759.16	56.73	1815.11
		Krt	-1.30	-0.99	-0.60	-0.97	-0.62	-0.60	-0.97	-0.62	-0.60	-0.97	-0.62
1508	151	Min	8.95	10.80	16.30	1.06	17.36	7.33	0.48	7.81	26.92	1.75	28.67
		Mn	45.94	27.86	1022.35	33.32	1055.68	460.06	15.00	475.05	1688.42	55.03	1743.45
		Max	86.50	44.55	3276.09	98.90	3374.99	1474.24	44.50	1518.74	5410.46	163.33	5573.79
		SD	20.32	9.12	866.88	25.02	891.36	390.10	11.26	401.11	1431.65	41.32	1472.09
		Krt	-0.95	-1.17	-0.32	-0.40	-0.33	-0.32	-0.40	-0.33	-0.32	-0.40	-0.33
1509	129	Min	14.25	8.00	23.28	1.07	24.39	10.48	0.48	10.98	38.45	1.77	40.28
		Mn	40.05	25.26	661.31	9.57	670.87	297.59	4.31	301.89	1092.15	15.80	1107.95
		Max	74.95	41.68	2763.40	29.66	2793.05	1243.53	13.34	1256.87	4563.75	48.98	4612.73
		SD	14.48	8.07	567.65	6.34	573.76	255.44	2.85	258.19	937.48	10.46	947.57
		Krt	-0.79	-0.40	1.49	0.11	1.48	1.49	0.11	1.48	1.49	0.11	1.48
1510	134	Min	8.25	10.51	15.17	1.02	16.19	6.83	0.46	7.29	25.06	1.68	26.74
		Mn	34.52	21.21	476.44	23.15	499.59	214.40	10.42	224.81	786.85	38.22	825.07
		Max	79.50	50.00	2739.49	94.39	2832.10	1232.77	42.47	1274.45	4524.26	155.88	4677.22
		SD	19.00	6.11	555.85	23.58	579.23	250.13	10.61	260.65	917.99	38.95	956.59
		Krt	-0.58	2.30	2.51	1.02	2.42	2.51	1.02	2.42	2.51	1.02	2.42
1604	142	Min	13.00	13.81	38.34	2.03	40.38	17.25	0.91	18.17	63.33	3.36	66.68
		Mn	40.91	28.28	729.59	22.14	751.73	328.32	9.96	338.28	1204.93	36.56	1241.48
		Max	72.50	46.27	2929.39	63.22	2989.17	1318.23	28.45	1345.12	4837.89	104.40	4936.61

UM	n		D	H	Bst	Bbr	AGB	Cst	Cbr	AGC	CO _{2est}	CO _{2ebr}	CO _{2et}
1605	108	SD	12.96	6.44	517.58	0.58	529.95	232.91	5.90	238.48	854.78	21.67	875.21
		Krt	-0.25	-0.33	2.00	1.44	1.94	2.00	0.58	1.94	2.00	0.58	1.94
		Min	9.00	9.80	12.25	29.42	13.69	5.51	0.65	6.16	20.24	2.38	22.62
		Mn	38.32	24.17	546.37	26.29	575.79	245.87	13.24	259.10	902.33	48.58	950.91
		Max	74.50	39.55	2467.77	13.12	2566.47	1110.50	44.41	1154.91	4075.52	163.00	4238.52
		SD	13.70	5.60	442.70	19.79	461.54	199.21	8.91	207.69	731.11	32.68	762.24
1608	132	Krt	-0.43	0.19	3.34	0.90	3.20	3.34	0.90	3.20	3.34	0.90	3.20
		Min	8.50	6.60	8.37	1.10	9.90	3.77	0.50	4.45	13.83	1.82	16.35
		Mn	42.97	26.83	823.59	33.54	857.13	370.62	15.09	385.71	1360.16	55.39	1415.55
		Max	88.15	45.40	3665.39	118.44	3783.83	1649.43	53.30	1702.72	6053.39	195.60	6248.99
		SD	18.88	9.60	783.90	26.82	809.92	352.76	12.07	364.46	1294.61	44.29	1337.58
		Krt	-0.71	-0.87	0.94	0.39	0.92	0.94	0.39	0.92	0.94	0.39	0.92
2101	144	Min	10.85	7.33	14.12	1.20	15.40	6.35	0.54	6.93	23.31	1.97	25.44
		Mn	43.55	26.86	873.55	24.11	897.66	393.10	10.85	403.95	1442.67	39.82	1482.49
		Max	94.50	50.17	3837.51	90.69	3928.20	1726.88	40.81	1767.69	6337.65	149.77	6487.42
		SD	21.93	9.19	929.74	21.64	950.96	418.38	9.74	427.93	1535.46	35.75	1570.50
		Krt	-0.84	-0.55	0.74	0.30	0.72	0.74	0.30	0.72	0.74	0.30	0.72
		Min	7.40	6.10	4.77	1.08	5.85	2.15	0.49	2.63	7.88	1.79	9.67
2105	171	Mn	41.39	26.82	821.16	42.25	863.41	369.52	19.01	388.54	1356.15	69.78	1425.93
		Max	94.00	41.30	4077.86	174.71	4252.57	1835.04	78.62	1913.66	6734.59	288.53	7023.12
		SD	20.64	8.33	813.93	37.59	851.11	366.27	16.92	383.00	1344.21	62.08	1405.60
		Krt	-0.80	-0.49	1.03	0.68	1.00	1.03	0.68	1.00	1.03	0.68	1.00
		Min	10.00	5.13	10.80	1.02	11.99	4.86	0.46	5.39	17.83	1.68	19.80
		Mn	28.39	18.04	345.99	10.16	356.15	155.70	4.57	160.27	571.40	16.78	588.18
2901	202	Max	62.30	40.57	1790.05	39.60	1822.85	805.52	17.82	820.28	2956.27	65.39	3010.44
		SD	13.83	9.12	420.76	9.37	429.66	189.34	4.22	193.35	694.89	15.47	709.58
		Krt	-0.86	-0.71	0.77	0.14	0.74	0.77	0.14	0.74	0.77	0.14	0.74
		Min	8.30	6.27	8.51	1.03	9.54	3.83	0.46	4.29	14.05	1.71	15.75
		Mn	30.93	21.30	431.38	17.59	448.97	194.12	7.92	202.04	712.42	29.06	741.48
		Max	79.00	37.25	1814.82	93.54	1908.35	816.67	42.09	858.76	2997.17	154.48	3151.65
2902	95	SD	14.82	7.91	443.26	16.90	459.57	199.47	7.60	206.81	732.04	27.91	758.98
		Krt	-0.06	-0.99	0.67	3.26	0.71	0.67	3.26	0.71	0.67	3.26	0.71

Tab. S2 - Specific parameters by UMAFOR obtained from the fitting of the system of additive equations with the WNSUR procedure and the dummy variable technique using system S2. Bst/Cst: stem biomass/carbon (kg tree⁻¹); Bbr/Cbr: branch biomass/carbon (kg tree⁻¹); AGB/AGC: total aboveground biomass/carbon (kg tree⁻¹); D: diameter at breast height (cm) at 1.30 m; H: total height (m); SE: Standard error.

UMAF OR	Biomass equation				Carbon equation			
	Equation	Param	Value	SE	Equation	Param	Value	SE
1203	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.0336	0.0067	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.8279	0.0066
		b1	1.5858	0.0027		b1	1.5862	0.0027
		c1	1.3514	0.0039		c1	1.3504	0.0040
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.2322	0.0362	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-6.0616	0.0445
		b2	0.7583	0.0033		b2	0.7602	0.0040
	AGB = Bst + Bbr				AGC = Cst + Cbr			
1303	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.3171	0.0289	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-5.1320	0.0288
		b1	1.6346	0.0075		b1	1.6334	0.0077
		c1	1.3798	0.0118		c1	1.3858	0.0122
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-7.0361	0.3625	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-7.7549	0.4588
		b2	0.8834	0.0328		b2	0.8752	0.0415
	AGB = Bst + Bbr				AGC = Cst + Cbr			
1503	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.0336	0.0067	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.8279	0.0066
		b1	1.5858	0.0027		b1	1.5862	0.0027
		c1	1.3610	0.0043		c1	1.3596	0.0044
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-4.8540	0.0498	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.6822	0.0607
		b2	0.7583	0.0033		b2	0.7602	0.0040
	AGB = Bst + Bbr				AGC = Cst + Cbr			
1508	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-3.5531	0.0212	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.3538	0.0214
		b1	1.7245	0.0080		b1	1.7219	0.0082
		c1	1.0772	0.0119		c1	1.0809	0.0123
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.0079	0.0505	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.8279	0.0620
		b2	0.7583	0.0033		b2	0.7602	0.0040
	AGB = Bst + Bbr				AGC = Cst + Cbr			
1509	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.0336	0.0067	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.8279	0.0066
		b1	1.8219	0.0100		b1	1.8197	0.0104
		c1	1.0992	0.0122		c1	1.1005	0.0127
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.9092	0.0700	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-6.7466	0.0872
		b2	0.7583	0.0033		b2	0.7602	0.0040
	AGB = Bst + Bbr				AGC = Cst + Cbr			
1510	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-3.0238	0.0258	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-3.8241	0.0259
		b1	2.0015	0.0090		b1	1.9978	0.0091
		c1	0.5622	0.0151		c1	0.5672	0.0153
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-4.7998	0.0509	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.6177	0.0626
		b2	0.7583	0.0033		b2	0.7602	0.0040
	AGB = Bst + Bbr				AGC = Cst + Cbr			

UMAF OR	Biomass equation				Carbon equation			
	Equation	Param	Value	SE	Equation	Param	Value	SE
1604	AGB = Bst + Bbr				AGC = Cst + Cbr			
	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.0336	0.0067	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.8279	0.0066
		b1	1.6037	0.0031		b1	1.6035	0.0032
		c1	1.3514	0.0039		c1	1.3504	0.0040
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.2322	0.0362	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-6.0616	0.0445
		b2	0.7583	0.0033		b2	0.7602	0.0040
1605	AGB = Bst + Bbr				AGC = Cst + Cbr			
	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.0336	0.0067	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.8279	0.0066
		b1	1.5858	0.0027		b1	1.5862	0.0027
		c1	1.3558	0.0042		c1	1.3504	0.0040
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-4.6976	0.0503	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.4420	0.0607
		b2	0.7583	0.0033		b2	0.7602	0.0040
1608	AGB = Bst + Bbr				AGC = Cst + Cbr			
	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.0336	0.0067	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.8279	0.0066
		b1	1.5858	0.0027		b1	1.5862	0.0027
		c1	1.3514	0.0039		c1	1.3504	0.0040
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-4.8689	0.0500	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.7126	0.0603
		b2	0.7583	0.0033		b2	0.7602	0.0040
2101	AGB = Bst + Bbr				AGC = Cst + Cbr			
	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-3.6792	0.0215	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.4813	0.0217
		b1	1.7014	0.0084		b1	1.6994	0.0085
		c1	1.1088	0.0127		c1	1.1119	0.0129
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.2548	0.0484	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-6.0616	0.0445
		b2	0.7583	0.0033		b2	0.7602	0.0040
2105	AGB = Bst + Bbr				AGC = Cst + Cbr			
	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.0737	0.0245	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.8760	0.0244
		b1	1.8694	0.0075		b1	1.8654	0.0077
		c1	1.0479	0.0126		c1	1.0536	0.0128
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-4.6197	0.0479	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.4387	0.0585
		b2	0.7583	0.0033		b2	0.7602	0.0040
2901	AGB = Bst + Bbr				AGC = Cst + Cbr			
	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-3.4869	0.0191	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.2860	0.0191
		b1	1.4216	0.0098		b1	1.4194	0.0102
		c1	1.4140	0.0116		c1	1.4168	0.0121
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.2322	0.0362	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-6.0616	0.0445
		b2	0.7583	0.0033		b2	0.7602	0.0040
2902	AGB = Bst + Bbr				AGC = Cst + Cbr			
	$Bst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-3.4288	0.0247	$Cst = \exp(a1) \cdot D^{b1} \cdot H^{c1}$	a1	-4.2301	0.0246
		b1	1.4136	0.0100		b1	1.4107	0.0103
		c1	1.4057	0.0141		c1	1.4099	0.0145

Guzmán-Santiago JC, Vargas-Larreta B, Gómez-Cárdenas M, Nava-Nava A, Espinosa-Hernández V, González-Trillo AC, Santiago-García W, González-Cubas R (2026). **Aboveground biomass and carbon estimations for *Abies religiosa* (Kunth) Schltdl. & Cham. in Mexico: regional allometric models** iForest – Biogeosciences and Forestry – doi: [10.3832/ifer4893-019](https://doi.org/10.3832/ifer4893-019)

UMAF OR	Biomass equation				Carbon equation			
	Equation	Param	Value	SE	Equation	Param	Value	SE
	$Bbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-4.8756	0.0545	$Cbr = \exp(a2) \cdot (D^2 \cdot H)^{b2}$	a2	-5.6935	0.0674
		b2	0.7583	0.0033		b2	0.7602	0.0040
	AGB = Bst + Bbr				AGC = Cst + Cbr			