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Supplement of

Structural, physiognomic and above-ground biomass variation in savanna–forest transition zones on three continents – how different are co-occurring savanna and forest formations?

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S1: Site Descriptions:

Plot	Latitude	Long.	V	E_V (m)	T_A (°C)	P_A (m)	WRB Soil Classification
<u>AFRICA: Cameroon</u>							
MDJ-01	6.168N	12.825E	Tall forest	773	23.8	1.61	Haplic Lixisol (Humic, Chromic)
MDJ-02	6.163N	12.824E	Long-grass savanna	867	23.4	1.62	Pisolithic Plinthosol (Humic)
MDJ-03	5.984N	12.869E	Stunted shrub-rich forest	761	23.9	1.59	Pisolithic Plinthosol (Dystric)
MDJ-04	5.999N	12.868E	Long-grass savanna	755	23.9	1.59	Haplic Ferralsol (Dystric)
MDJ-05	5.980N	12.868E	Stunted shrub-rich forest	768	23.9	1.59	Pisolithic Plinthosol (Dystric)
MDJ-06	6.003N	12.891E	Long-grass savanna	755	23.9	1.59	Pisolithic Plinthosol (Humic, Clayic)
MDJ-07	6.007N	12.886E	Tall forest	755	23.9	1.59	Pisolithic Plinthosol (Ferric, Dystric)
MDJ-08	6.213N	12.749E	Long-grass savanna	772	23.8	1.62	Haplic Lixisol (Humic, Endoskeletal)
MDJ-09	6.009N	12.889E	Long-grass savanna	778	23.8	1.59	Hyperskeletal Leptosol (Dystric)
MDJ-10	5.997N	12.894E	Tall closed woodland	766	23.8	1.59	Pisolithic Plinthosol (Humic, Dystric)
<u>AFRICA: Ghana</u>							
ASU-01	7.136N	2.447W	Tall forest	263	26.0	1.21	Endofluvic Cambisol (Dystric)
BFI-01	7.714N	1.694W	Tall closed woodland	358	25.4	1.29	Haplic Alisol(Arenic, Hyperdystric, Rhodic)
BFI-02	7.715N	1.692W	Tall savanna woodland	358	25.4	1.29	Brunic Arenosol (Alumic, Hyperdystric)
BFI-03	7.705N	1.696W	Tall savanna woodland	350	25.4	1.29	Brunic Arenosol (Alumic, Hyperdystric)
BFI-04	7.707N	1.698W	Tall forest	350	25.4	1.29	Haplic Nitosol (Dystric)
KOG-01	7.302N	1.180W	Tall savanna woodland	201	26.3	1.25	Haplic Arenosol (Dystric)
MLE-01	9.304N	1.857W	Savanna woodland	134	27.9	1.03	Brunic Arenosol (Dystric)
<u>AFRICA: Burkina Faso</u>							
BBI-01	12.731N	1.165W	Savanna woodland	275	28.3	0.69	Haplic Luvisol (Epidystric, Endosiltic)
BBI-02	12.733N	1.164W	Savanna woodland	275	28.3	0.69	Pisolithic Plinthosol (Eutric)
BDA-01	10.940N	3.150W	Shrub-rich savanna woodland	264	27.8	0.98	Acric Plinthosol (Magniferric, Dystric, Siltic)
BDA-02	10.940N	3.154W	Shrub-rich savanna woodland	258	27.9	0.98	Pisolithic Plinthosol (Magniferric, Dystric, Siltic)
BDA-03	10.865N	3.073W	Grassland	295	27.6	0.98	Gleyic Leptosol
<u>AFRICA: Mali</u>							
HOM-01	15.344N	1.468W	Savanna grassland	306	29.9	0.35	Rubic Arenosol (Dystric, Aridic)
HOM-02	15.335N	1.547W	Savanna grassland	310	30.0	0.35	Rubic Arenosol (Dystric, Aridic)
<u>SOUTH AMERICA: Bolivia</u>							
ACU-01	15.251S	61.245W	Tall forest	271	24.1	1.27	Nitic Acrisol (Epieutric, Chromic)
LFB-01	14.579S	60.831W	Tall forest	238	23.9	1.45	Geric Acric Ferralsol (Dystric)
LFB-02	14.577S	60.832W	Tall forest	238	23.9	1.45	Geric Acric Ferralsol (Dystric)
LFB-03	14.600S	60.849W	Shrub-rich savanna woodland	215	24.0	1.44	Geric Acric Gibbsic Ferralsol (Dystric)
OTT-01	16.391S	61.212W	Tall closed woodland	455	23.2	1.15	Plinthic Acrisol (Epieutric, Epiarenic)
OTT-02	16.414S	61.189W	Savanna woodland	437	23.3	1.15	Haplic Ferralsol (Dystric, Xanthic)
OTT-03	16.416S	61.191W	Tall savanna woodland	437	23.3	1.15	Umbric Ferralsol (Dystric)
OTT-04	16.399S	61.196W	Grassland	442	23.2	1.15	Umbric Planosol (Ferric, Albic, Dystric)
TUC-01	18.524S	60.812W	Stunted forest	312	24.8	0.82	Haplic Cambisol (Hypereutric, Greyic, Siltic)
TUC-02	18.533S	60.634W	Shrub-rich woodland	319	24.8	0.85	Acric Ferralsol (Dystric, Arenic)
TUC-03	18.183S	60.859W	Savanna woodland	302	24.7	0.89	Feralllic Cambisol (Hypereutric)
<u>SOUTH AMERICA: Brazil</u>							
ALC-01	2.5287S	54.909W	Savanna woodland	29	25.9	2.02	Hyperalbic Arenosol (Alumic, Hyperdystric)

Plot	Latitude	Long.	\mathcal{V}	E_V (m)	T_A (°C)	P_A (m)	WRB Soil Classification
ALC-02	2.4905S	54.960W	Savanna woodland	30	26.0	1.97	Hyperalbic Arenosol (Alumic, Hyperdystric)
ALF-01	9.5983S	55.937W	Tall forest	264	25.5	2.35	Vetic Acrisol (Hyperdystric)
ALF-02	9.5784S	55.918W	Tall forest	253	25.6	2.35	Haplic Regosol (Hypereutric, Epiarenic)
FLO-01	12.812S	51.854W	Forest	377	25.5	1.61	Geric Ferralsol (Alumic, Hyperdystric, Epiarenic, Rhodic)
IBG-01	15.950S	47.871W	Scrub savanna	1126	20.6	1.61	Posic Geric Ferralsol (Humic, Alumic, Hyperdystric, Epiclayic, Rhodic)
IBG-02	15.952S	47.872W	Scrub savanna	1144	20.5	1.59	Posic Geric Ferralsol (Humic, Alumic, Hyperdystric, Epiclayic, Rhodic)
IBG-03	15.930S	47.873W	Scrub savanna	1154	20.5	1.61	Posic Geric Ferralsol (Humic, Alumic, Hyperdystric, Clayic, Rhodic)
IBG-04	15.945S	47.861W	Savanna woodland	1140	20.6	1.60	Posic Geric Ferralsol (Humic, Alumic, Hyperdystric, Clayic, Rhodic)
NXV-01	14.708S	52.352W	Savanna woodland	318	24.9	1.51	Vetic Acric Ferralsol (Alumic, Hyperdystric, Arenic, Xanthic)
NXV-02	14.700S	52.351W	Tall closed woodland	318	24.9	1.51	Vetic Acric Ferralsol (Alumic, Hyperdystric, Epiarenic)
SMT-01	12.819S	51.770W	Savanna woodland	332	25.8	1.60	Hypoluvis Ferralic Arenosol (Hyperdystric)
SMT-02	12.825S	51.769W	Savanna woodland	332	25.8	1.60	Hypoluvis Ferralic Arenosol (Hyperdystric)
SMT-03	12.835S	51.766W	Savanna woodland	319	25.9	1.60	Hypoluvis Ferralic Arenosol (Hyperdystric)
TAN-04	12.921S	52.373W	Forest	386	25.0	1.66	Geric Ferralsol (Humic, Alumic, Hyperdystric, Clayic)
VCR-01	14.831S	52.160W	Tall forest	301	25.2	1.52	Geric Ferralsol (Alumic, Hyperdystric, Clayic, Rhodic)
VCR-02	14.832S	52.169W	Forest	289	25.2	1.51	Geric Plinthic Ferralsol (Alumic, Hyperdystric, Endoclayic, Rhodic)
AUSTRALIA							
			Shrub-rich savanna				
FMS-01	18.092S	144.840E	woodland	234	21.1	0.73	Pisolithic Plinthosol (Dystric)
FMS-02	18.108S	144.823E	Stunted shrub-rich forest	759	21.5	0.69	Haplic Leptosol (Dystric)
RSC-01	20.156S	146.536E	Stunted forest	274	23.2	0.67	Haplic Regosol (Arenic, Skeletic)
EKP-01	18.068S	145.993E	Tall savanna woodland	8	24	2.59	Endogleyic Umbrisol (Hyperdystric, Arenic)
KBL-01	17.764S	145.544E	Tall forest	761	20.5	1.75	Haplic Regosol (Siltic, Hyperdystric)
KBL-02	17.849S	145.532E	Tall savanna woodland	860	20.1	1.43	Geric Acrisol (Hyperdystric, Rhodic)
KBL-03	17.685S	145.535E	Tall forest	1055	19.1	1.34	Haplic Nitisol (Hyperdystric, Rhodic)
DCR-01	17.026S	145.597E	Tall savanna woodland	683	21.2	1.45	Haplic Cambisol (Orthodystric, Alumic)
DCR-02	17.021S	145.584E	Tall savanna woodland	653	21.3	1.46	Arenic Cambisol (Epieutric)
KCR-01	17.107S	145.604E	Tall forest	813	20.5	1.96	Haplic Cambisol (Dystric, Alumic)
CTC-01	16.103S	145.447E	Tall forest	90	25.2	3.20	Haplic Cambisol (Hyperdystric, Alumic, Skeletic)

Table S1. Study plot coordinates, Torello-Raventos et al. (2013) vegetation classification (\mathcal{V}), elevation above sea level (E_V), mean annual temperature (T_A), mean annual precipitation (P_A) and World Reference Base (WRB) soil classification.

S2: Tree Distributions:

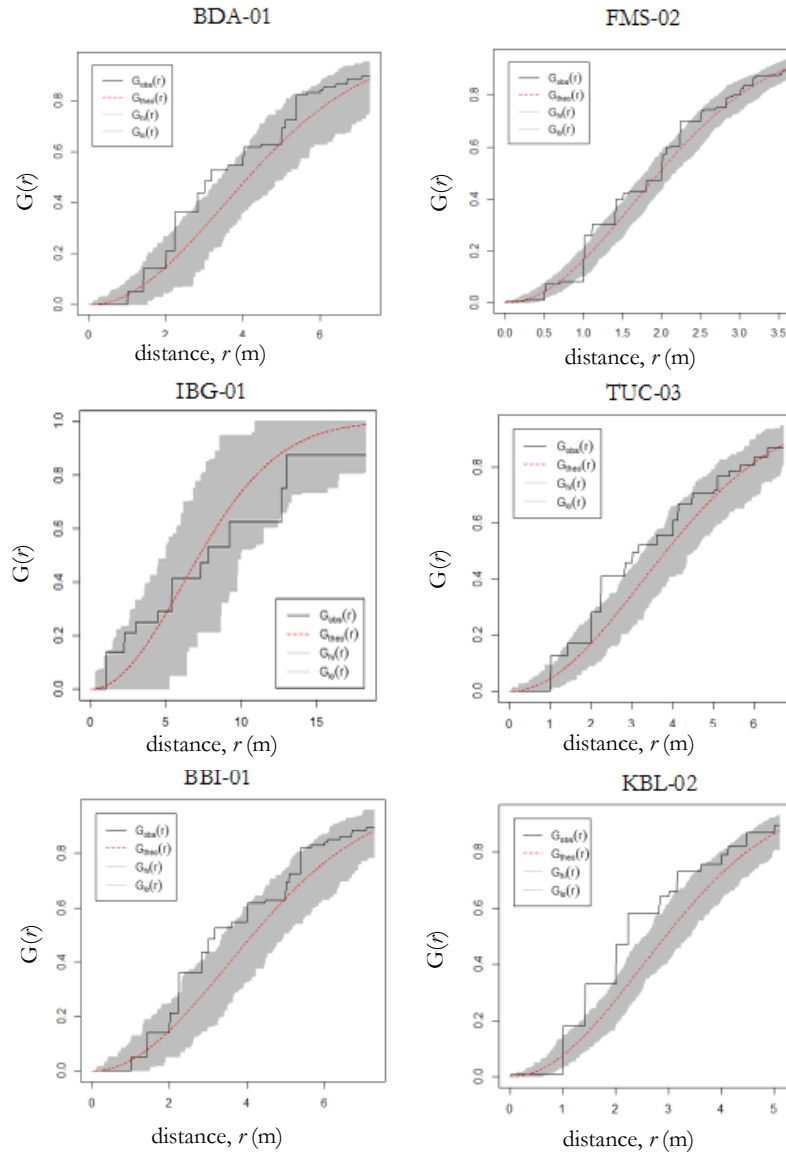


Fig. S1. Estimation of the nearest neighbour distance distribution function (also called the “*event-to-event*” or “*inter-event*” distribution). Here the actual cumulative distribution function G of the distance (r in metres) from a typical randomly selected tree to the next nearest tree (black line) is compared with that expected for a totally spatially random distribution (red dotted line) with the grey shaded area indicating 0.95 quantile confidence intervals. Results are shown for six representative savanna/dry forest sites (taken from all three continents and across a range of tree densities), none of which show any significant indications of tree clustering.

S3: Allometric equations:

	Equation	Applied to	Source	Units
S1	$\hat{B} = \exp[-2.187 + 0.916 \ln(\rho D^2 H)]$	all forest trees ($D \geq 25\text{mm}$)	Chave <i>et al.</i> (2005)	kg, cm, m, g cm ⁻³
S2	$\hat{B} = \exp[-2.77 + 1.33 \ln(A_B)]$	all forest shrubs ($D < 25\text{mm}$)	this study	kg, cm ²
S3	$\hat{B} = \exp[-2.85 + 2.69 \ln(D_C)]$	all forest shrubs ($D \geq 25\text{mm}$)	this study	kg, cm
S4	$\hat{B} = \exp[-1.484 + 2.657 \ln(D)]$	all lianas ($D \geq 25\text{mm}$)	Schnitzer <i>et al.</i> (2006)	kg, cm
S5	$\hat{B} = 0.6 \exp[-1.754 + 2.665 \ln(D)]$	all palms ($D \geq 25\text{mm}$)	De Castilho <i>et al.</i> (2006)	kg, cm
S6	$\hat{B} = \exp[0.06 + 2.012 \ln(D) + 0.710 \ln(H)]$	African savanna trees ($H \geq 10\text{m}$)	Malimbwi <i>et al.</i> (1994)	kg, cm, m
S7	$\hat{B} = \exp[-3.368 + 2.129 \ln(D) + 0.403 \ln(H)]$	African savanna trees ($H < 10\text{m}$)	this study	kg, cm, m
S8	$\hat{B} = \exp[-3.189 + 2.358 \ln(D)]$	African savanna trees (if H unknown)	this study	kg, cm
S9	$\hat{B} = \exp[-0.510 + 1.426 \ln(A_C)]$	<i>Cochlospermum planchonii</i> (Africa only)	this study	kg, m ²
S10	$\hat{B} = \exp[1.07 + 1.03 \ln(A_C)]$	African savanna shrubs (drier sites)	Skarpe (1990)	kg, m ²
S11	$\hat{B} = \exp[-3.3369 + 2.7635 \ln(D) + 0.4059 \ln(H) + 1.2439 \ln(\rho)]$	South American savanna ($D \geq 25\text{mm}$)	Ribeiro <i>et al.</i> (2011)	kg, cm, m, g cm ⁻³
S12	$\hat{B} = \exp\{-2.0596 + 2.1561 \ln(D) + 0.1362 [\ln(H)]^2\}$	Australian savannas ($D \geq 25\text{mm}$)	Williams <i>et al.</i> (2005)	kg, cm, m
S13	$\hat{B} = \exp[-2.26 + 2.4 \log(D)^{0.8}]$	African Sahelian plots	Henry <i>et al.</i> (2011)	kg, cm
S14	$\hat{B} = 0.1263 + 0.1006 (A_B)$	African Sudan savanna	Henry <i>et al.</i> (2011)	kg, cm ²

Table S2. Allometric equations used for estimating forest and savanna above ground biomass in kg per tree (\hat{B}). Input variables: ρ (wood density); D (diameter at breast height); H (tree or shrub height); D_C (crown diameter) A_C (crown area), A_B (basal area) and D_B (basal diameter).

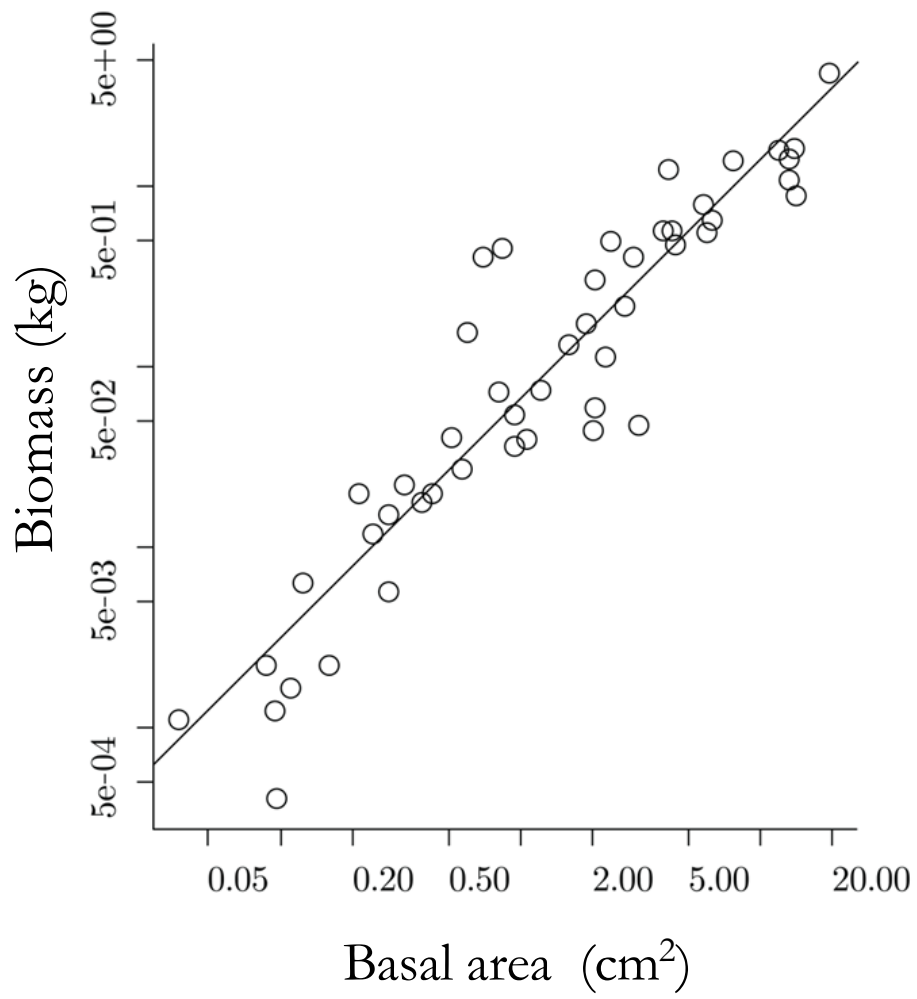


Fig. S2: Relationship between basal area (cm²) and biomass (kg) for forest shrubs ($D < 25\text{mm}$) as developed in his study (equation S2).

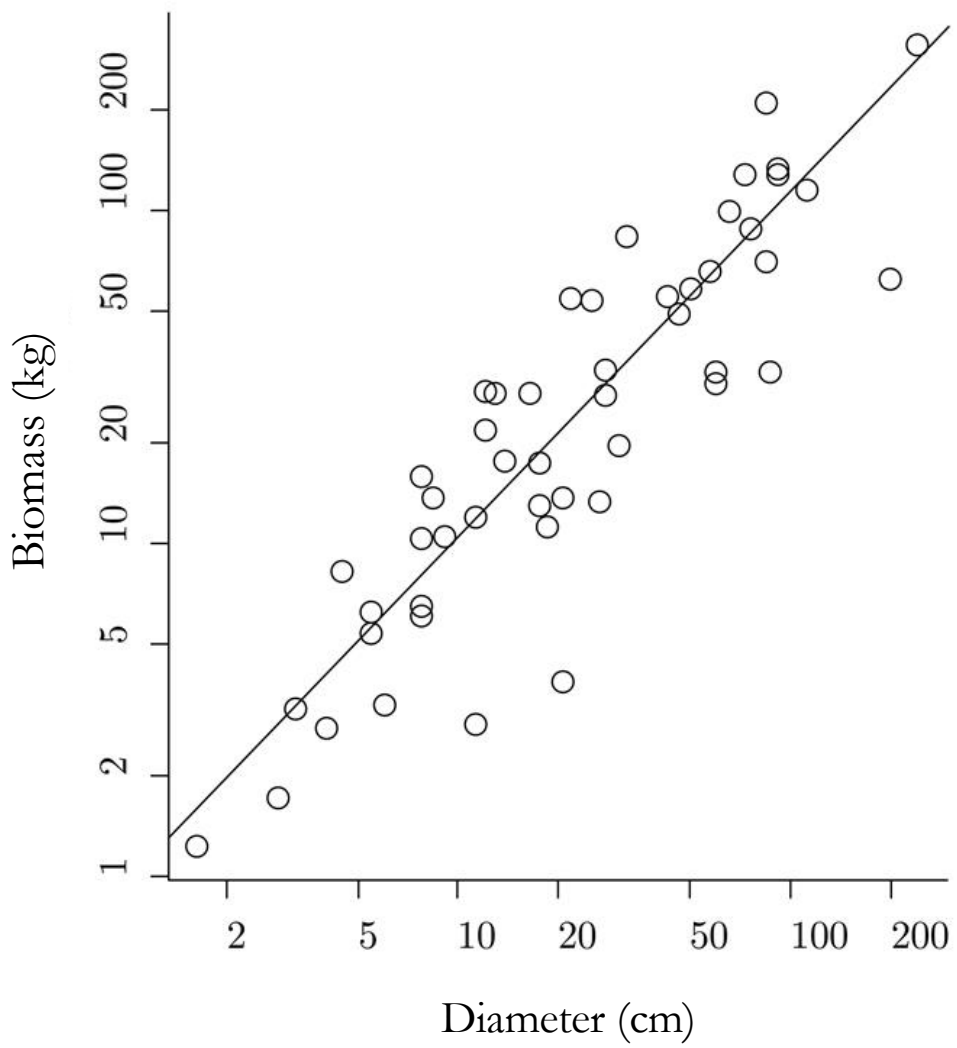


Fig. S3: Relationship between diameter at breast height D (cm) and biomass, B (kg) for African savanna trees when height was unknown as developed in this study (equation S8).

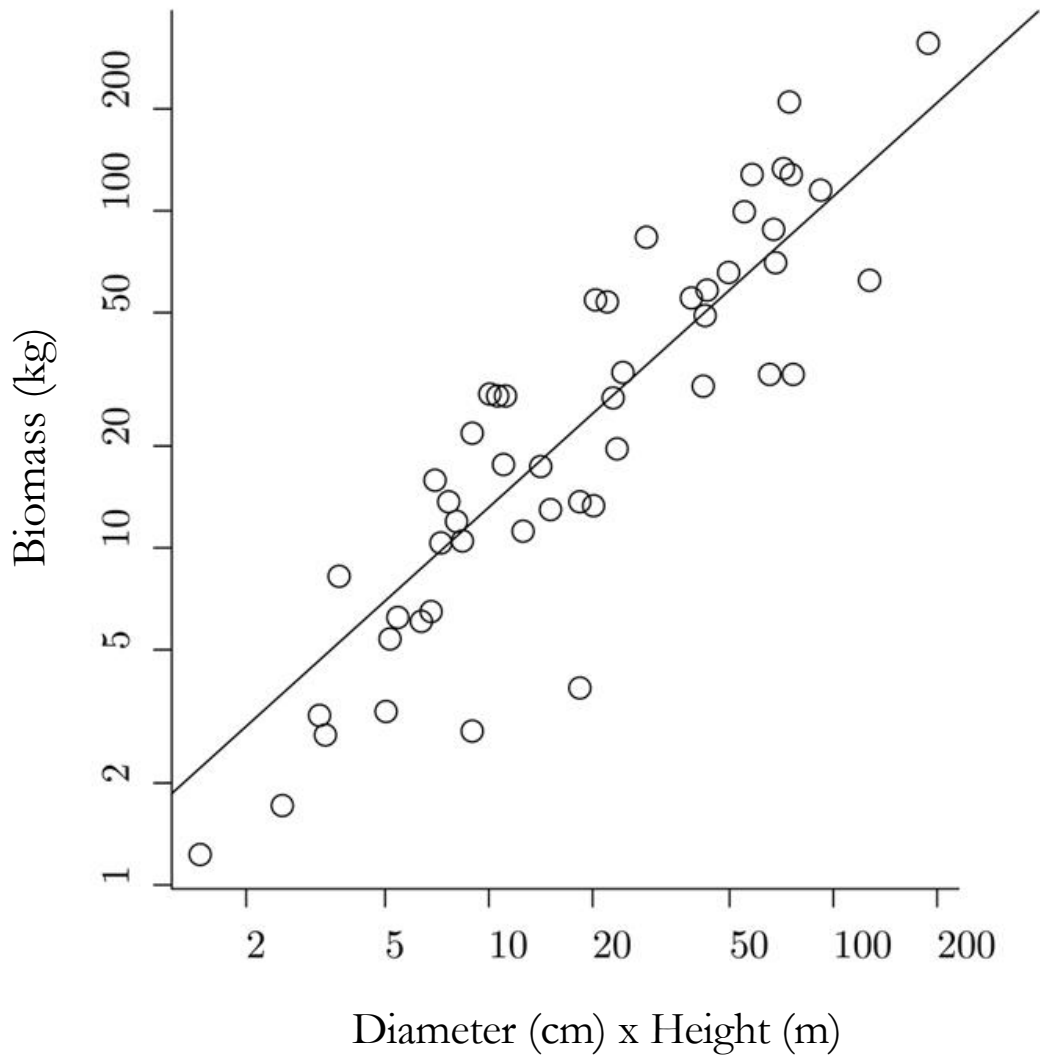


Fig. S4: Relationship between both D (cm) and H (m) and biomass (kg) for African savanna trees when H is known developed in this study (equation S7).

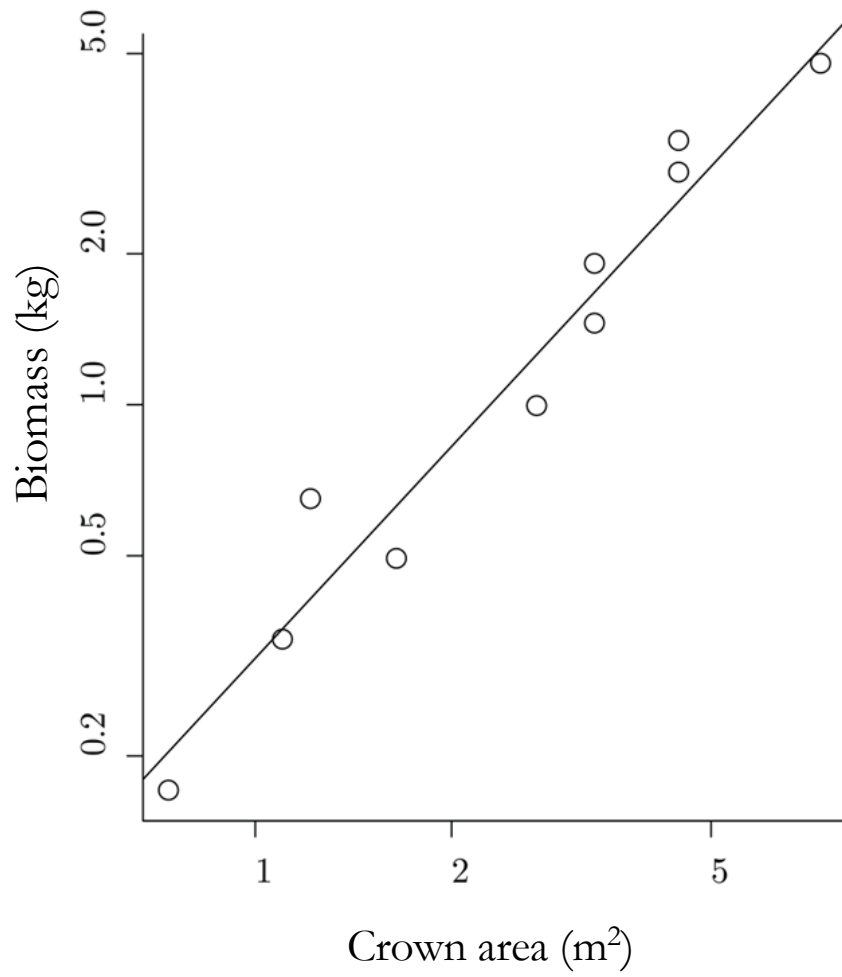


Fig. S5: Relationship between crown area (m²) and biomass (Kg) for the species *Cochlospermum planchonii* in Africa developed in this study (equation S10).

S4: Additional Figures

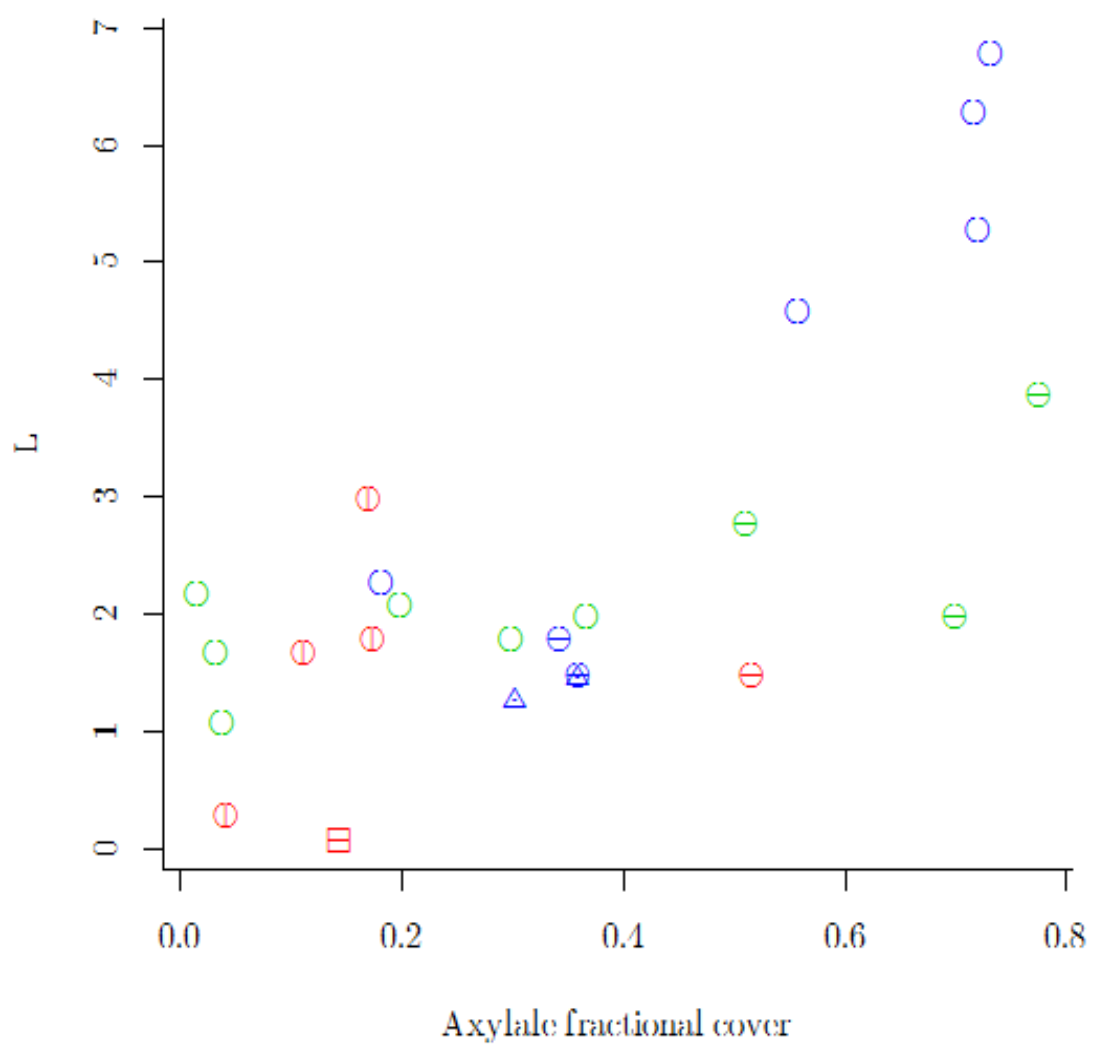


Fig. S6. Relationship between axylale fractional cover and its leaf area index (L). Symbols as in the main text.

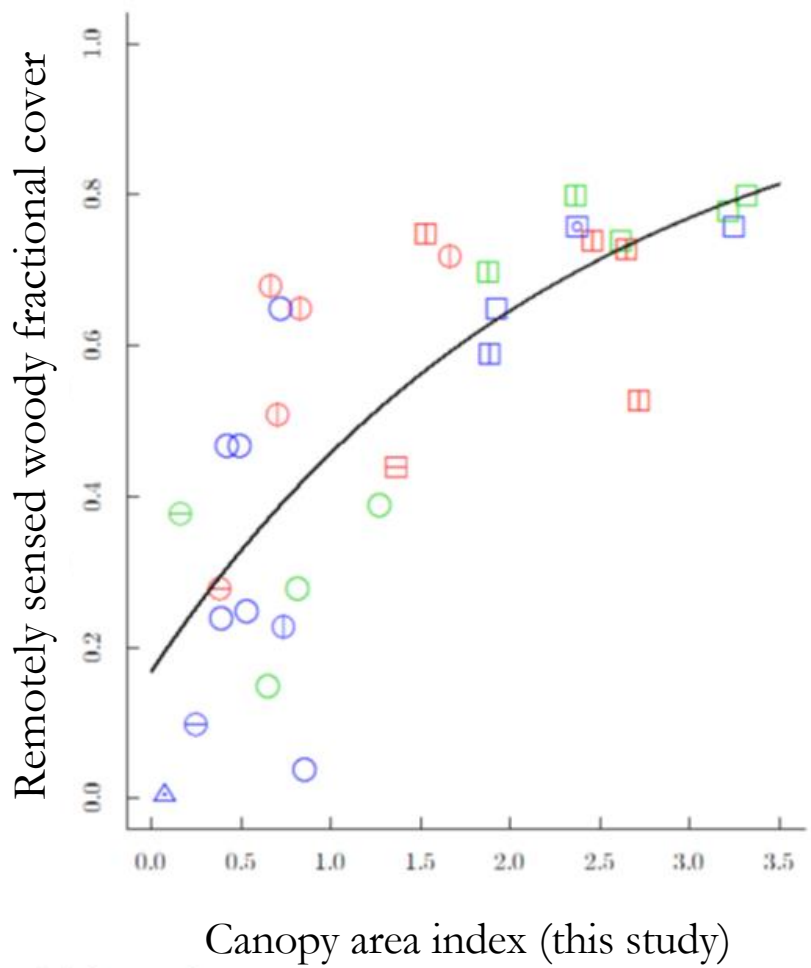


Fig. S7. Relationship between our canopy area index measurements and the remotely sensed fractional cover of the corresponding grid square (Hansen *et al.* 2003). Symbols as in the main text.

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