TABLE S1: Summaries of the plots included in the analyses. The total numbers of trees and species given for each plot are the numbers after secondary stems and those with missing or inaccurate data are excluded. Rainfalls and temperatures are approximate and are more accurate for some plots than for others (see referenced information). Disturbance levels are also approximate.

Plot (references)	Location	Size (ha)	Mean elevation (m)	Elevation range (m)	Rainfall (annual mean; monthly range, mm)	Temp. range (monthly averages,°C)	No. trees; no. species (nos. in main analysis)	Forest type	Disturbance	Census year
Pasoh (1)	Malaysia 2°58'N, 102°18'E	50	97	25	1571; 94-224	21.9 - 34.6	378,186; 822 (309,088; 439)	lowland mixed dipterocarp forest; closed canopy 35-60 m	Low; small (<1ha) windthrows	1995
Yasuni (2)	Ecuador 00°41'S, 76°23'W	25	228	32	3081; 174-412	21.2 - 36.6	173,172; 1088 (79,672; 289)	evergreen lowland wet forest, closed canopy 15-30 m	low; occasional wind storms	1999
BCI (3)	Panama 9°9'N, 79°51'W	50	144	40	2551; 23-364	22.8 - 23.7	208,387; 299 (197,954; 147)	semideciduous lowland moist forest, canopy 20-40 m.	low; rare windstorms, droughts	2010
Palanan (4)	Philippines 17°02'N, 122°22'E	16	98	50	~5000 129-525	18.7-33.6	74,747; 324 (67,314; 129)	evergreen dipterocarp forest	medium; regular storms & typhoons	2010
Luquillo (5)	Puerto Rico; 18°19'N, 65°49'W	16	378	93	3548; 203-401	18.7 - 22.0	76,515; 140 (66,418; 62)	tropical montane / subtropical wet; partially open canopy ~ 20m	medium; regular windstorms & hurricanes	2000
Mo Singto (6)	Thailand: 14°26'N; 101°22'E	30	762	93	2120; 5-340	18.0 - 29.0	129,238; 262 (122,968; 97)	moist evergreen forest; canopy 15-30m	low	2005
Fushan (7)	Taiwan, 24°45'N 121°33'E	25	675	133	4271; 149-608	11.8 - 24.0	114,354; 110 (110,593; 58)	moist subtropical mixed evergreen forest; canopy 15-20m, partially open	high; frequent typhoons, wind damage & landslides	2003
Mudumalai (8)	India; 11°35'N, 76°31'E	50	1035	130	1200; 7-170	14.2 - 20.1	30,786; 73 (24,255; 17)	dry/moist deciduous forest; canopy 10-25m	medium; fires, browsing and some cyclones	1988
Lambir (9)	Malaysia, 4°11'N, 114°00'E	52	180	139	2664 153-322	22.1-31.4	149,953; 1303 (122,207; 375)	mature lowland mixed dipterocarp forest canopy 40-60m	medium; large landslips and regular droughts	2005
Sinharaja (10)	Sri Lanka: 6°24'N, 80°24'E	25	471	150	5016; 171-695	19.3 - 26.8	378,186; 206 (200,080; 127)	mixed dipterocarp forest; canopy ~ 30m	low; evidence of rare but substantial wind damage	2002
Xishuangbanna (11)	China: 21°36'N 101°34' E	20	765	150	1493 20-320	15.6-25.3	95,940; 469 (86,430; 129)	tropical seasonal rainforest	low	2007
Lienhuachih (12)	Taiwan, 23°54'N, 120°52'E	25	762	178	2285 21-483	14.8-25.2	135,268; 144 (149,771; 79)	subtropical evergreen broadleaved forest canopy ~ 20m	medium; typhoons & landslides	2008
Dinghushan (13)	China, 23°09'N, 112°30′ E	20	338	246	1985 40-320	12.6 - 28.0	71,617; 210 (67,321; 60)	subtropical evergreen broadleaved	medium; regular storms & typhoons	2005
Gutianshan (14)	China, 29°15'N, 118°07'E	24	580	269	1787 70-330	4.7–27.6	140,700; 159 (137,561; 69)	subtropical evergreen broadleaved	medium; rare but destructive storms	2005

References used in table**:**

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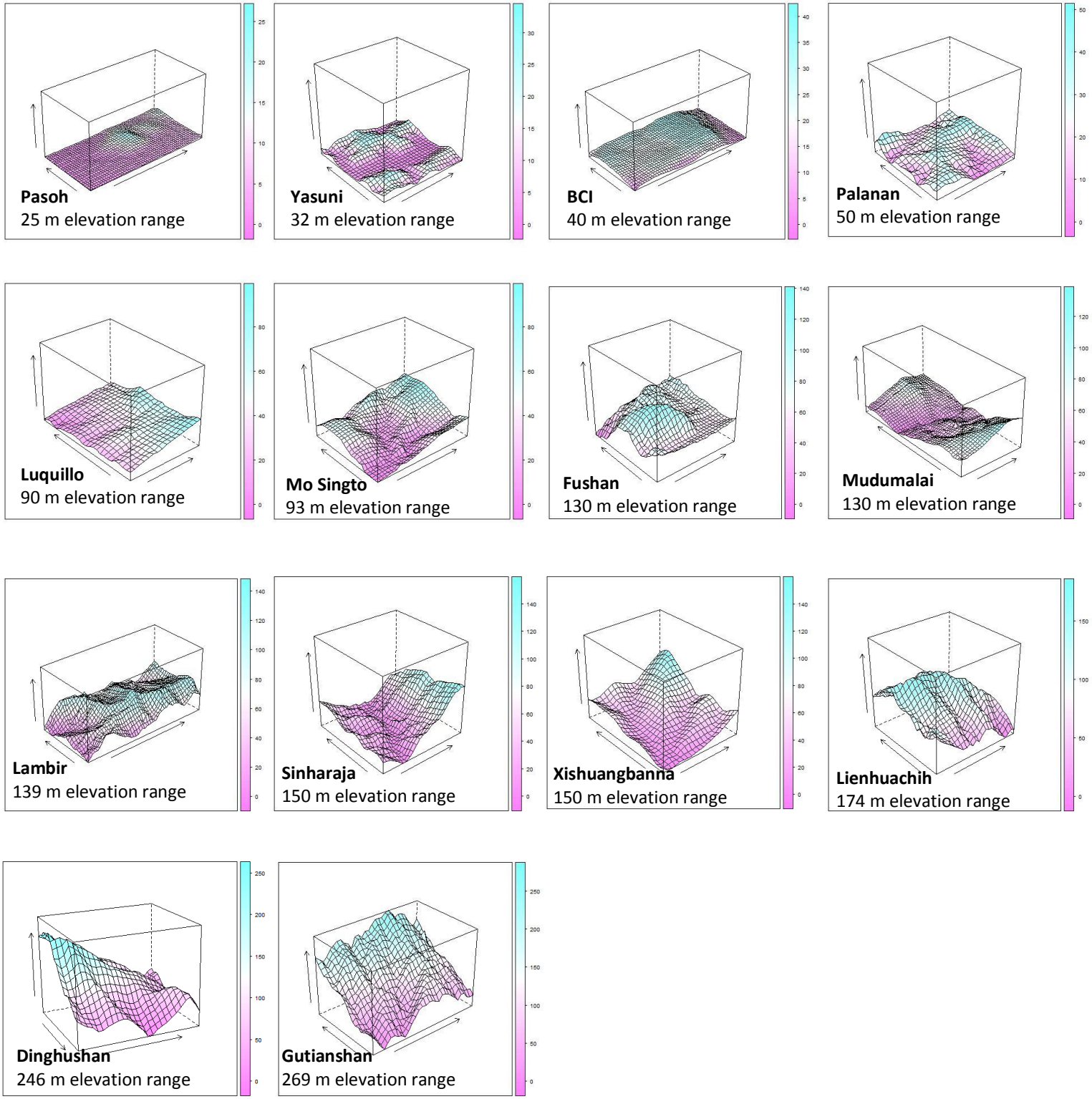
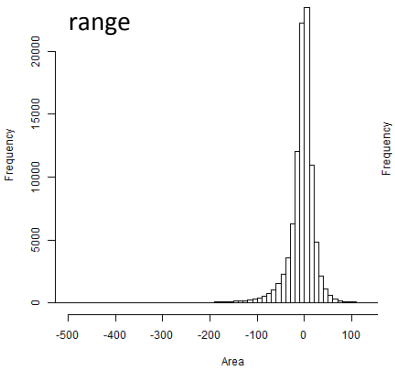
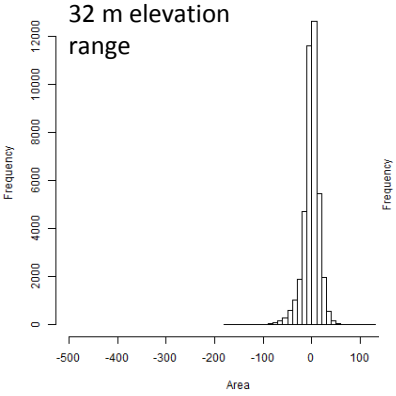
FIGURE S1: Topographies (above) and cross-pair overlap distributions (below) for all plots. Cross-pair overlap distributions are calculated with a dbh threshold of 1cm and an abundance threshold of 100 individuals. Scales on the *y*-axes of the topographic plots are identical, but the colour scale extends over the range of elevation data in each, and these values are shown in the plots.



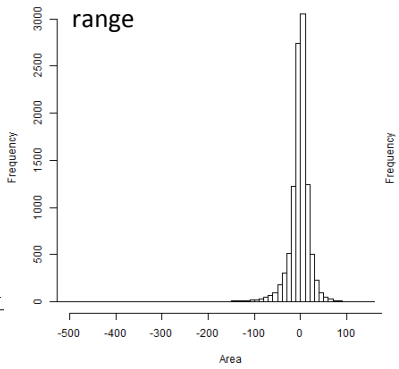
Pasoh
25 m elevation range



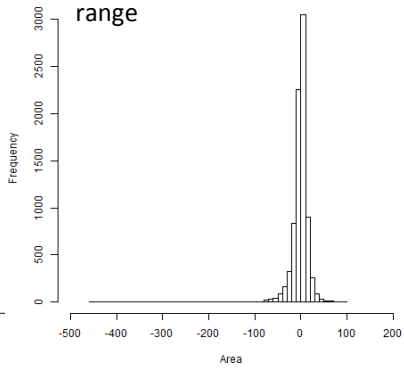
Yasuni
32 m elevation range



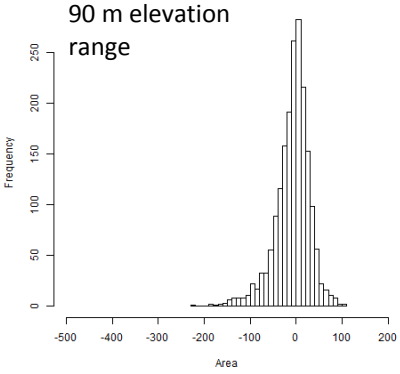
BCI
40 m elevation range



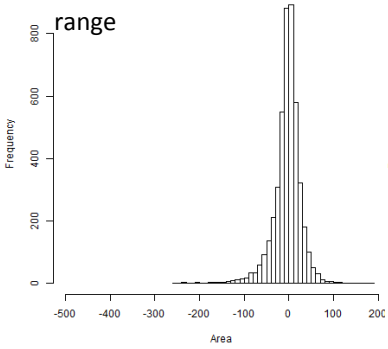
Palanan
50 m elevation range



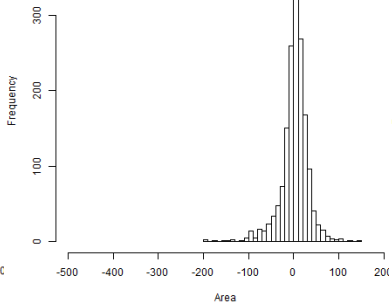
Luquillo
90 m elevation range



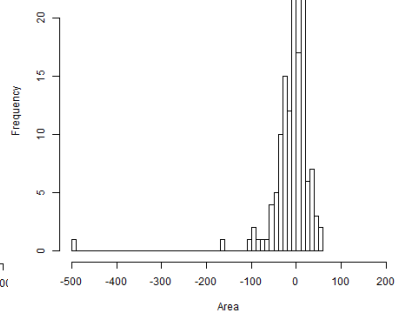
Mo Singto
93 m elevation range



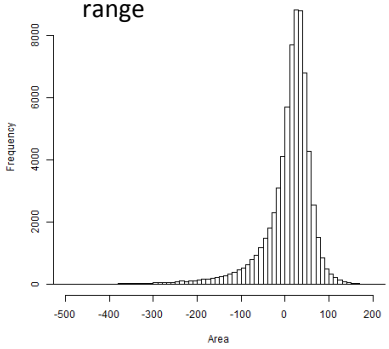
Fushan
130 m elevation range



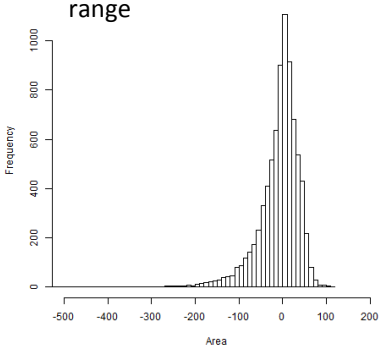
Mudumalai
130 m elevation range



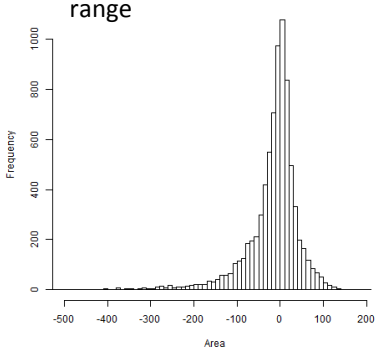
Lambir
139 m elevation range



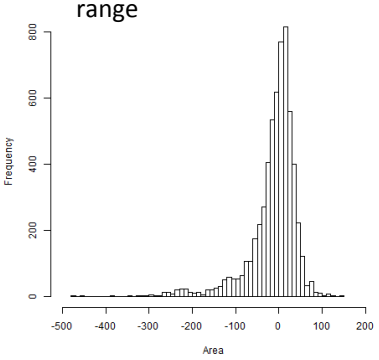
Sinharaja
150 m elevation range



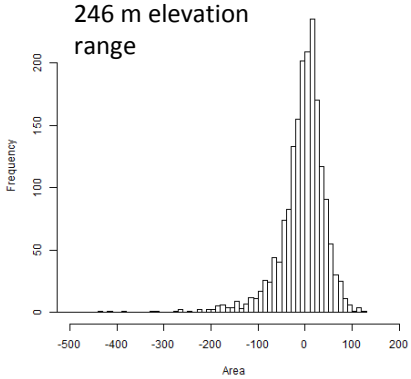
Xishuangbanna
150 m elevation range



Lienhuachih
174 m elevation range



Dinghushan
246 m elevation range



Gutianshan
269 m elevation range

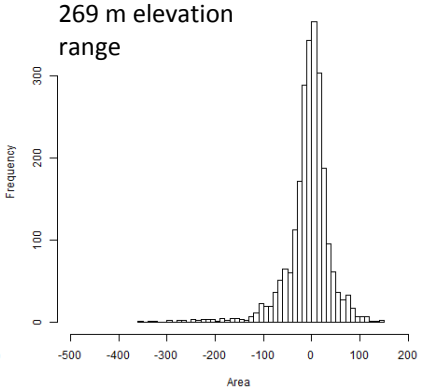


FIGURE S2: Relationships between xPOD standard deviations and elevation range in each plot with dbh and abundance thresholds of (a) 1 cm and 100 individuals, (b) 1 and 500, (c) species-specific adult dbh thresholds (see methods) and abundance of 100. Fitted regression lines and their associated p-values are shown.

BCI = Barro-Colorado Island; Di = Dinghushan; Fu = Fushan; Gu = Gutianshan; La = Lambir; Li = Lienhuachih; Lu = Luquillo; MS = Mo Singto; Mu = Mudumalai; Pa = Pasoh; Pal = Palanan; Si = Sinharaja; Xi = Xishuangbanna; Ya = Yasuni

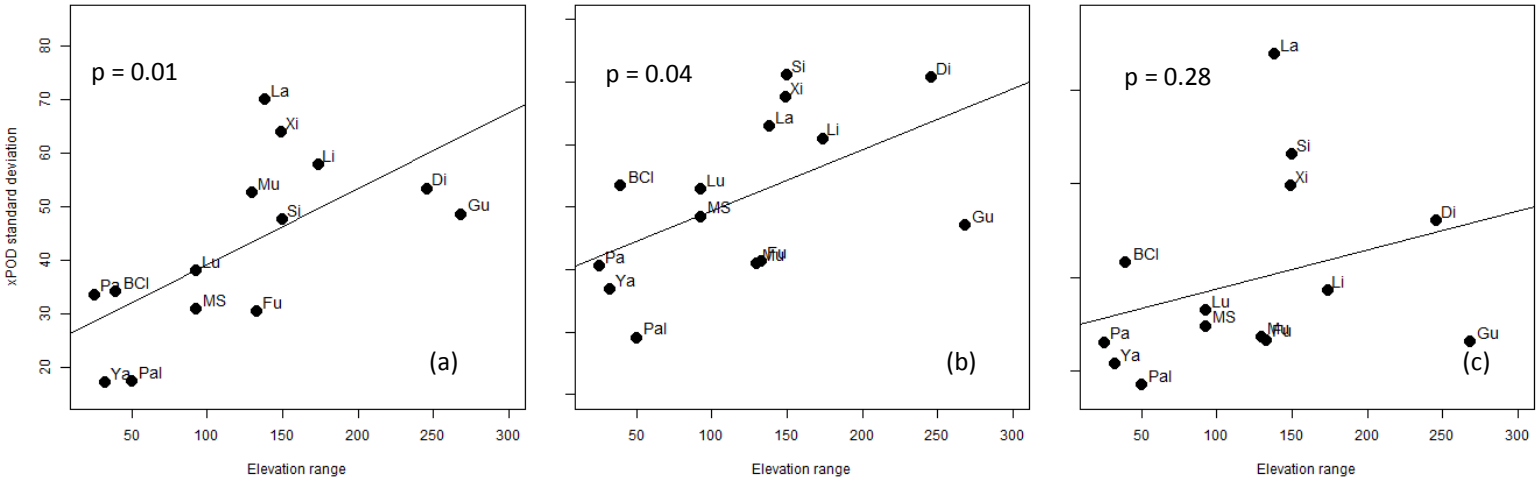


FIGURE S3: Relationships, fitted regression lines and their associated p-values for each of the environmental metrics against standard deviation of cross-pair overlap distributions with a species abundance threshold of 100.

BCI = Barro-Colorado Island; Di = Dinghushan; Fu = Fushan; Gu = Gutianshan; La = Lambir; Li = Lienhuachih; Lu = Luquillo; MS = Mo Singto; Mu = Mudumalai; Pa = Pasoh; Pal = Palanan; Si = Sinharaja; Xi = Xishuangbanna; Ya = Yasuni

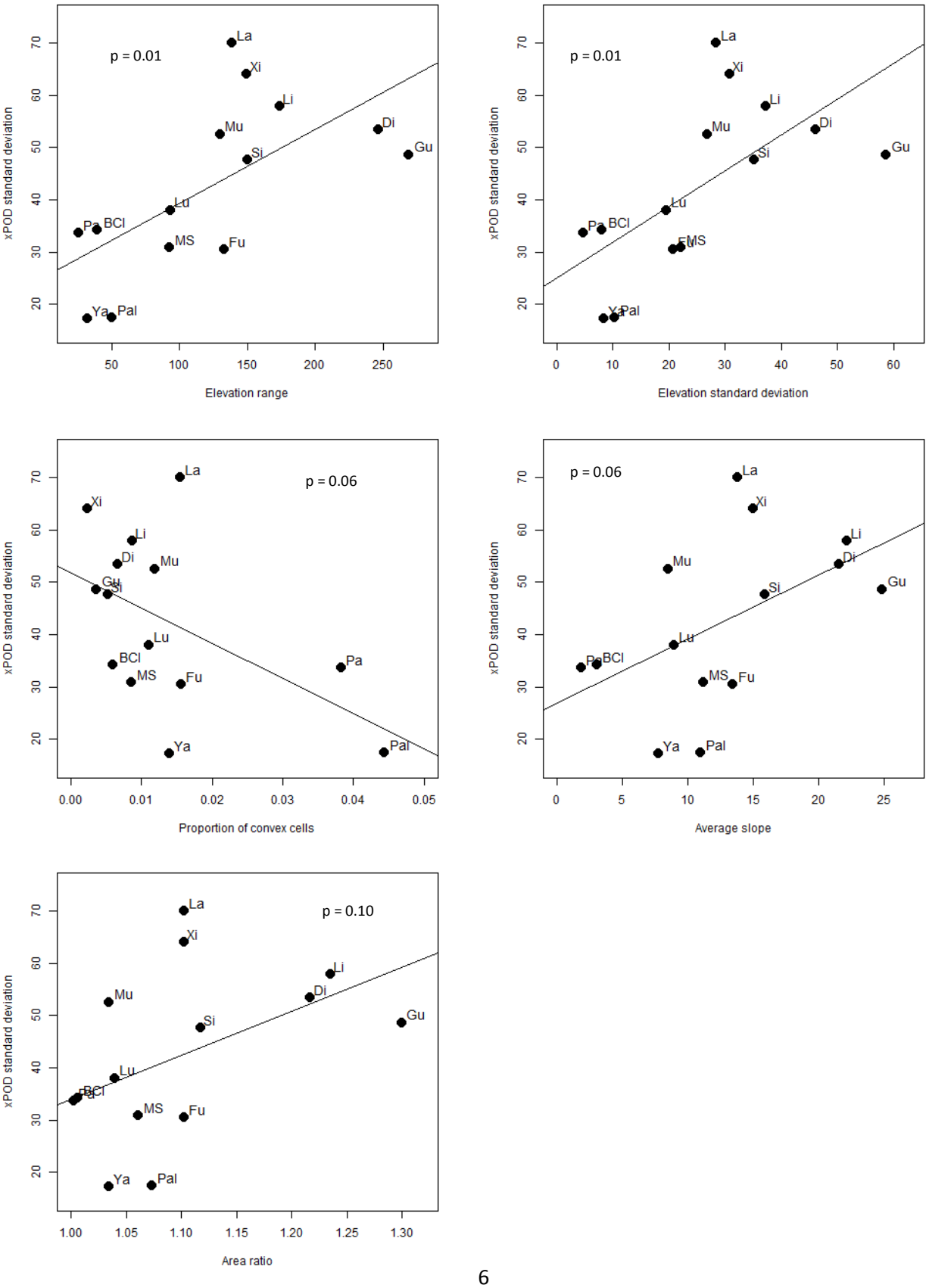


FIGURE S4: Standard deviations of cross-pair overlap distributions against biogeographical variables; (a) latitude, (b) dominant aspect (the aspect of the majority of 20 x 20 m sub-plots), (c) maximum monthly temperature difference, (d) average annual rainfall, (e) species density (ha^{-1}), (f) stem density (ha^{-1}), (g) mean elevation, (h) maximum monthly rainfall difference. No significant relationships were found to exist.

BCI = Barro-Colorado Island; Di = Dinghushan; Fu = Fushan; Gu = Gutianshan; La = Lambir; Li = Lienhuachih; Lu = Luquillo; MS = Mo Singto; Mu = Mudumalai; Pa = Pasoh; Pal = Palanan; Si = Sinharaja; Xi = Xishuangbanna; Ya = Yasuni

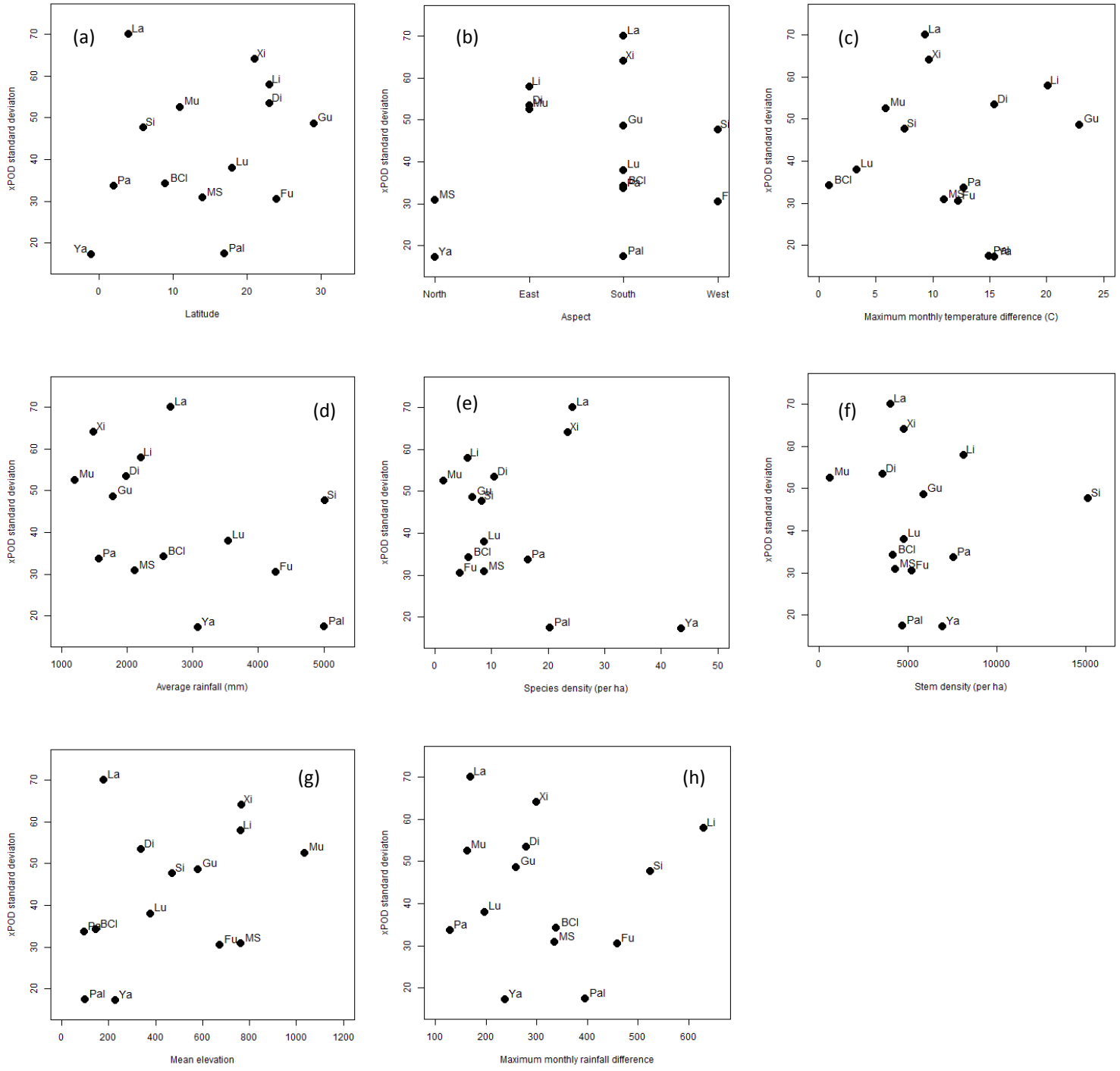


Table S2: The number of species (top) and individuals (bottom) included in the analysis for each plot at each of the different diameter and abundance thresholds used.

	1 cm, 100 individuals	**1 cm, 500 individuals**	**adult*, 100 individuals**
Pasoh	439 309,088	171 243,665	132 33,303
Yasuni	289 79,672	50 46,123	57 11,680
BCI	147 197,954	71 181,861	69 35,500
Palanan	129 67,314	38 47,670	33 8,920
Luquillo	62 66,418	24 58,366	27 17,922
Mo Singto	97 122,968	52 113,758	46 20,370
Fushan	58 110,593	33 103,784	31 20,402
Mudumalai	17 24,255	10 22,688	15 14,601
Lambir	375 122,207	55 52,511	42 6,631
Sinharaja	127 200,080	63 187,226	46 22,761
Xishuangbanna	129 86,430	33 67,842	30 13,220
Lienhuachih	79 149,771	45 140,755	45 25,495
Dinghushan	60 67,321	29 58,699	32 15,078
Gutianshan	69 137,561	40 127,794	44 31,131

*'adult' refers to the variable diameter threshold defined in the text, designed to isolate the signals of adult trees

Text S1

To avoid edge effects without the need to discard data or impose additional correction terms, we develop the cross-pair overlap distribution (xPOD) here to take account of the area over which its constituent data are gathered. The estimated cross-pair correlation function for species *i* and *j* at radius *r*, $\hat{g}_{ij}(r)$, is a ratio of the observed number of members of species *j* within annuli of areas *a(r)* around the members of species *i* to the number expected given the total area of these annuli and the average density λ_j of individuals of species *j* per unit area. Here we use only the fraction of each *a(r)* that falls within the plot in the calculations. This ensures that apparently empty areas beyond the plot boundaries do not influence the result, while all of the data within the plot is used and given equal weighting:

$$\hat{g}_{ij}(r) = \frac{\sum_{k=1}^{s} n_{ja_k(r)}}{\lambda_j \sum_{k=1}^{s} a_k(r)}$$

Where *s* is the number of individuals in species *i*, and $n_{ja_k(r)}$ is the number of individuals of species *j* found within the annulus of area $a_k(r)$ at radius *r* around the k_{th} member of species *i*.

Text S2: Funding details

The BCI forest dynamics research project was made possible by National Science Foundation grants to Stephen P. Hubbell: DEB-0640386, DEB-0425651, DEB-0346488, DEB-0129874, DEB-00753102, DEB-9909347, DEB-9615226, DEB-9615226, DEB-9405933, DEB-9221033, DEB-9100058, DEB-8906869, DEB-8605042, DEB-8206992, DEB-7922197, support from the Center for Tropical Forest Science, the Smithsonian Tropical Research Institute, the John D. and Catherine T. MacArthur Foundation, the Mellon Foundation, the Small World Institute Fund, and numerous private individuals, and through the hard work of over 100 people from 10 countries over the past two decades. The plot project is part the Center for Tropical Forest Science, a global network of large-scale demographic tree plots.

The Fushan and Lienhuachih plots were established with the support of the Taiwan Forestry Research Institute, the Taiwan Forestry Bureau, the Center for Tropical Forest Science of the Smithsonian Tropical Research Institute, and granting agencies the National Science Council of Taiwan and the Council of Agriculture of Taiwan.

Support for Gutianshan plot, Dinghushan plot and Xishuangbanna plot from Biodiversity Committee, Chinese Academy of Sciences, and Key innovation projects of Chinese Academy of Sciences. The Dinghushan plot was funded by the Knowledge Innovation Project of the Chinese Academy of Sciences (KSCX2-EW-Z). The Xishuangbanna plot was established with the support of Xishuangbanna Station of Tropical Rainforest Ecosystem Studies (National Forest Ecosystem Research Station at Xishuangbanna). In this study, LL and MC acknowledge the support of the National Natural Science Foundation of China (31000201, 31061160188).

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The Mo Singto plot in Thailand has received support from the Thailand Research Fund (TRF), Biodiversity Research and Training Program (BRT), and National Center for Genetic Engineering and Biotechnology (BIOTEC).

The Mudumalai plot was established with support from the Ministry of Environment and Forests, Government of India and the Center for Tropical Forest Science of the Smithsonian Tropical Research Institute. Permissions to carry out long-term research in Mudumalai were granted by the Tamilnadu Forest Department.

The Yasuní plot was financed by the generous support of the Pontifical Catholic University of Ecuador, donaciones del impuesto a la renta of the government of Ecuador, the US National Science Foundation, the Andrew W. Mellon Foundation, the Smithsonian Tropical Research Institute, and the University of Aarhus (Denmark).