

## Supplementary material

Slope remained a significant variable influencing aboveground carbon density (ACD) on BCI when considering surface-area adjusted ACD (Table 1). Surface-area-adjusted carbon density was computed by dividing the normal (i.e., horizontal area) ACD by the total surface area as determined from the slope of all 1.12-m pixels contained within each 1.0-ha pixel. At 100-m resolution, the model collectively explained 27% of surface-area-adjusted ACD (versus 33% for normal ACD;  $F_{1,1038} = 42.0$ ,  $P < 0.0001$ ); the importance of slope in explaining ACD declined from 19% to 11% when considering surface-area-adjusted ACD.

**Table 1.** Results of multiple regression analysis of variables controlling normal versus surface-area-adjusted aboveground carbon density (ACD) variation on Barro Colorado Island (BCI), Panama at 100-m spatial resolution. Surface-area-adjusted carbon density was computed by dividing the normal (i.e., horizontal area) ACD by the total surface area as determined from the slope of all 1.12-m pixels contained within each 1.0-ha pixel. With the exception of slope, all variables are categorical and thus coefficients reflect predicted deviation from the base classes (these are “Old-growth” in forest type, “Bohio” in bedrock type, and “Brown Fine Loam” in soil type). The model utilized all areas inside a 50-m shoreline mask on BCI, including 1,048 1.0-ha pixels (NS = not significant, + =  $P < 0.1$ , \* =  $P < 0.05$ , \*\* =  $P < 0.01$ , \*\*\* =  $P < 0.001$ , \*\*\*\* =  $P < 0.0001$ ).

Component	Horizontal Area (100m)	Surface-area-adjusted (100m)
<i>Carbon density</i>		
(Intercept)	92.02 ****	90.33 ****
Slope	1.01 ****	0.69 ****
Secondary (80-110 yr)	-12.85 ****	-11.92 ****
Secondary (120-130 yr)	-08.70 ****	-8.47 ****
Andesite	-1.30 NS	3.69 +
Caimito Marine	-5.72 **	-2.92 NS
Caimito Volcanic	-10.74 ****	-8.18 ***
Heavy Clay	-1.12 NS	-2.78 NS
Pale Swelling Clay	-7.35 ****	-7.29 ****
Red Clay	1.62 NS	1.87 NS