Title: Resource availability and disturbance shape maximum tree height across the Amazon

**Running title**: Tree height across the Amazon

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*Tall trees are key drivers of ecosystem processes in tropical forest, but the controls on the distribution of the very tallest trees remain poorly understood. The recent discovery of grove of giant trees over 80 meters tall in the Amazon forest requires a reevaluation of current thinking. We used high-resolution airborne laser surveys to measure canopy height across 282,750 ha of old growth and second growth forests randomly sampling the entire Brazilian Amazon. We investigated how resources and disturbances shape the maximum height distribution across the Brazilian Amazon through the relations between the occurrence of giant trees and environmental factors. Common drivers of height development are fundamentally different from those influencing the occurrence of giant trees. We found that changes in wind and light availability drive giant tree distribution as much as precipitation and temperature, together shaping the forest structure of the Brazilian Amazon. The location of giant trees should be carefully considered by policymakers when identifying important hotspots for the conservation of biodiversity in the Amazon.*

**Keywords:** sentinel tree, height, giant trees, dominant tree, tall tree, distribution, modeling, random forest, envelope model