Hyperdominance in Amazonian carbon cycling

While Amazonian forests are extraordinarily diverse, the abundance of trees is skewed strongly towards relatively few 'hyperdominant' species. In addition to their diversity, Amazonian trees are a key component of the global carbon cycle, assimilating and storing more carbon than any other ecosystem on Earth.

We asked, using a unique data set of 530 forest plots (figure below), whether the functions of storing and producing woody carbon are concentrated in a small number of tree species. We also asked whether the most abundant species also dominate carbon cycling, and whether dominant species are characterized by specific functional traits. We found that dominance of forest function is even more concentrated in a few species than in dominance of tree abundance, with only ≈1% of Amazon tree species responsible for 50% of carbon storage and productivity. Although those species that contribute most to biomass and productivity are often abundant, species maximum size is also influential, while the identity and ranking of dominant species varies by function and by region.

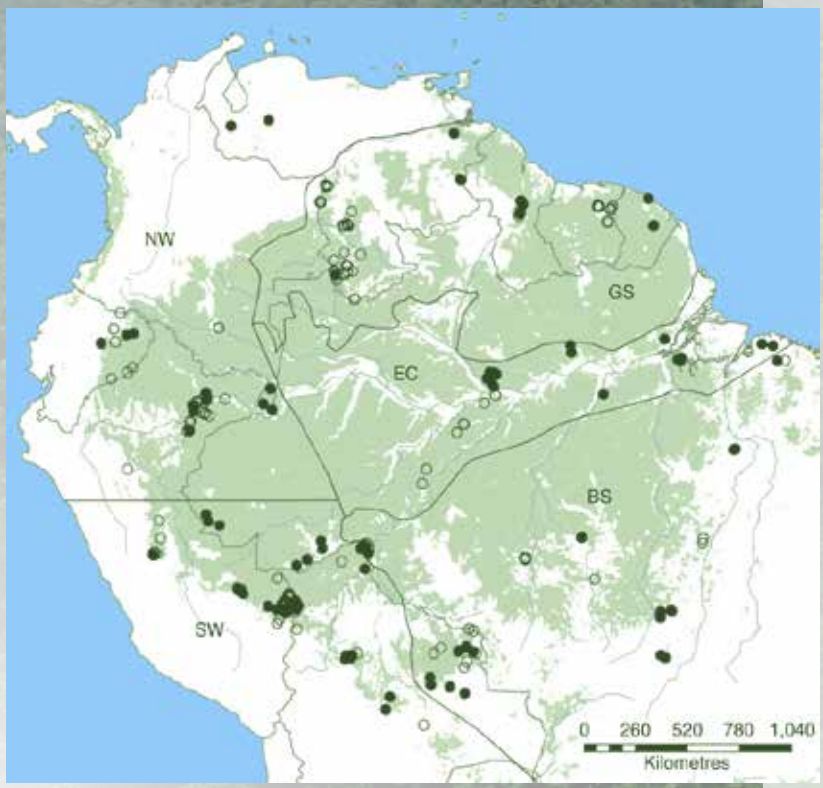

Fig.: *Map of plot locations. Black lines: regional boundaries from Feldpausch et* al. *36 with additional north–south separation of the western Amazon. Green: unflooded closed canopy forest below 500 m.a.s.l. reclassified from GLC2000 data.*

In summary, we found that carbon in the world's most extensive and diverse tropical forest is concentrated into remarkably few species. Although the most abundant species contribute significantly to this phenomenon, other properties also govern which taxa are important for biomass dynamics. Notably, the maximum potential size of Amazon tree species is a key predictor of their capacity to store and gain carbon. Functional hyperdominance also has a strong geographical signal. Thus, most species that contribute strongly to carbon cycling change according Amazonian's region.

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