Tree functional traits across Caribbean island dry forests are remarkably similar

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TDFs are species rich, geographically structured, and dispersal-limited. We know that environmental and biogeographic filtering and speciation shape Caribbean TDF plant communities, but we do not know how traits are spatially structured accross broad climate gradients across the Caribbean islands.

What is the magnitude of plant functional variation and its relationship with climatic variability and biogogegraphic factors?

Methods:

We used 572 plots spanning the 11 archipelagos, encompassing 616 spp. We appended species level trait data of specific leaf area (SLA, $cm^2\ g^{-1}$), seed mass (SM, mg), and wood density (WD, $g\ cm^{-2}$) to the the presence/absence matrix of plots by spp from thre sources:

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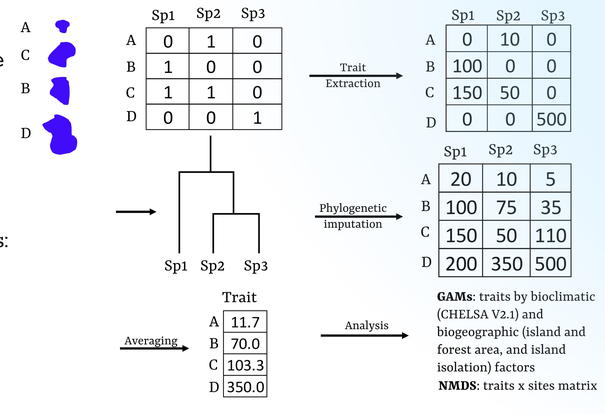


What is Functional Dspersion?:

Functional Dispersion

$FDis = \Sigma z_j / n,$

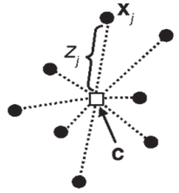
Centroid

$C = \Sigma x_{ij} / n$

n = no. of sp,

z_j = the distance of sp j to centroid c

x_{ij} = the attribute of sp j for trait i



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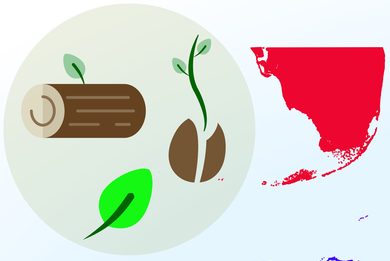
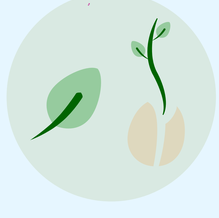


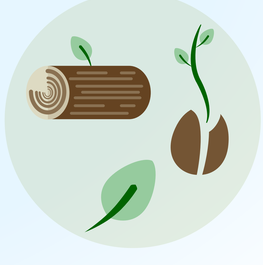
1 Despite occurring in climatically distinct regions, Caribbean TDFs were functionally similar, and the trait space of many islands was nested within the functional space of others.

2 Mean annual precipitation and temperature were the strongest determinant of trait variation: the higher the temperature and precipitation, the greater functional diversity.

3 Both island and dry forest area were correlated with trait variation and functional diversity in line with Island Biogegraphy Theory

4 This was reflected in the positive relationship of SM and WD with precipitation and temperature, respectively, as well as the negative relationship of SLA with temperature seasonality.





Conclusion

Plant trait variation is low across Caribbean TDFs. The high functional overlap is also remarkable given the significant climatic gradient across the region, suggesting that strong environmental and biogegraphic filters intrinsically constrain plant form and function in these fascinating systems.