Project Database of ICP Forests

PROJECT DESCRIPTION

PROJECT INFORMATION

Project title: **Global drivers of tree crown allometry**

Project ID: 247

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Tree species can differ enormously in their crown architectural blueprints, such as the scaling relationships that link their height and crown size to their stem diameter. However, despite the importance of this variation for shaping the structure and function of forest ecosystems, we continue to miss a complete picture what drivers underpin this incredible diversity in crown architecture. Here we use data from >500,000 trees to show that climate, competition, functional traits, and evolutionary history all play a role in constraining the height, crown width and shape of the world's trees. We found that variation in size-standardized tree heights across nearly 2,000 species is primarily driven by a combination of aridity and tree density, while crown width correlates with functional traits related to mechanical stability and photosynthesis. Additionally, several plant lineages have crown architectures that seemingly defy the environments they inhabit, such as the exceedingly tall and slender eucalypts and dipterocarps, or the extremely wide crowns of savanna species in Africa and the Americas. Overall, our study provides a framework for categorising tree species into architectural types and predicting how emergent properties of forests ecosystems – such as their 3D structure – are likely to change in a warming world.