# Understanding the Global 3D Signature of Tree Biodiversity

Atticus E.L. Stovall, Lola Fatoyinbo, John Armston, Shukhrat Shokirov, Lisa Patrick Bentley, Kim Calders, Mat Disney

Leaves and wood are classified, and trees are prepared for extraction of 3D biodiversity traits.

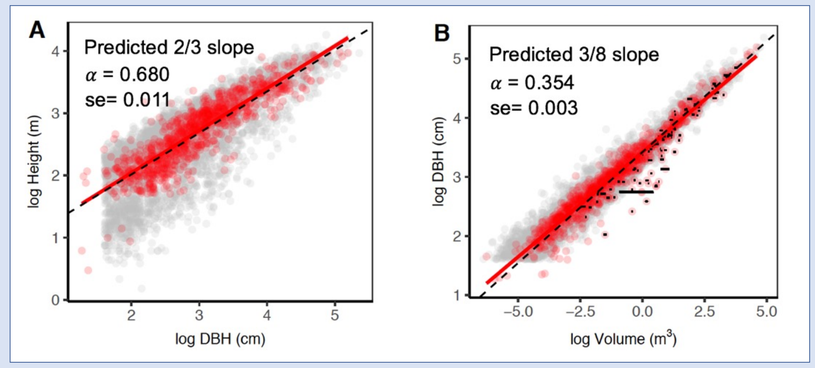
Trees are isolated with automatic extraction

▲ *Acer pseudoplantanus* from Wytham Woods, UK

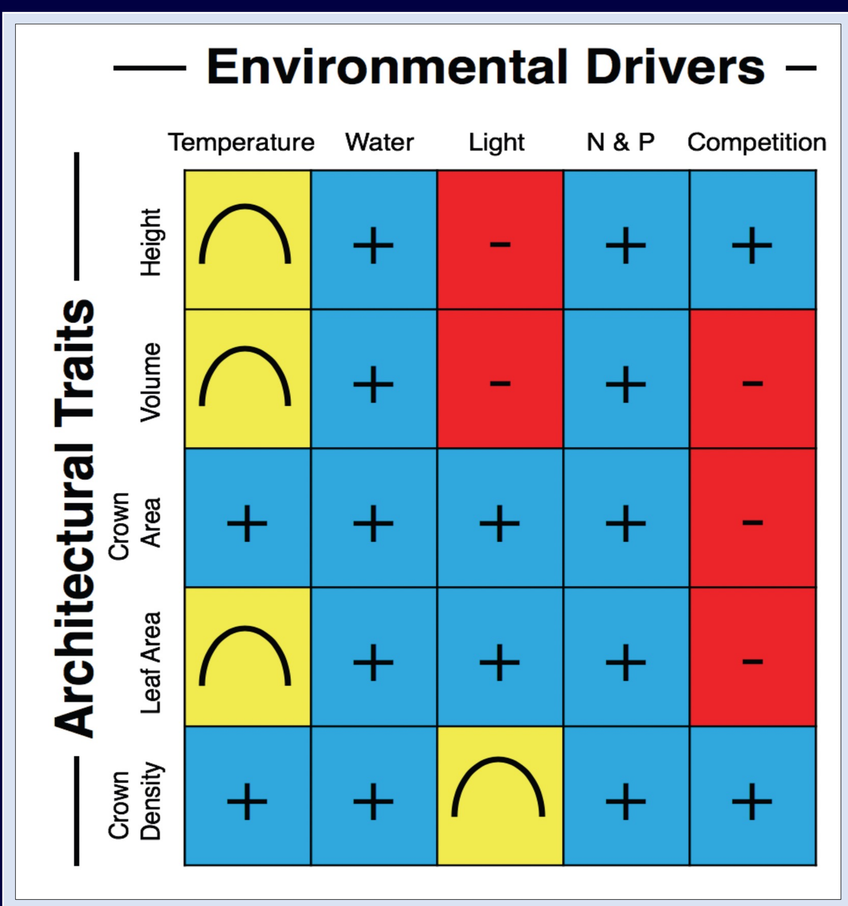
▲ *Eucalyptus microcarpa* from Victoria, Australia

3D biodiversity traits help us understand scaling in trees

| Table 1: 3D architecture structural biodiversity traits we will investigate to improve scaling theory. | |
|---|---|
| Structural Biodiversity Traits | Description |
| Top-heaviness | Ratio of total woody volume in the crown to the stem woody volume |
| Aspect ratio | Ratio of maximum crown width to crown height |
| Relative Crown Width | Ratio of maximum crown width to tree height |
| Crown Area | Maximum ground area covered by the crown viewed from above |
| Leaf Area | Total tree leaf area |
| Crown Density | Ratio of crown area to woody volume in the crown |
| Mass Taper Exponent | Exponent of a power law fit to the vertical profile of volume |
| Path Fraction | Ratio of mean to maximum base-to-twig path length |
| Crown Asymmetry | The ratio of maximum to mean of 8 angular crown segments |
| Branching Angle | The average angle between two cylinders at each branching point |




How does environment control scaling relationships?




Contributions from international collaborators are making the TLS database grow!


We have assembled a global terrestrial lidar database