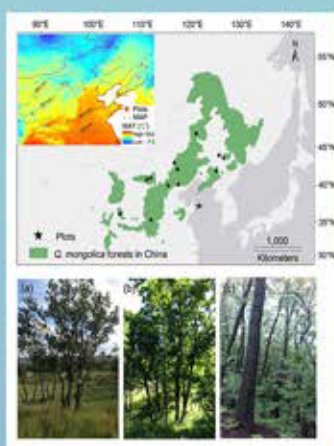




# Drought-forced Tree Morphological Changes Facilitate Trubs in A Semiarid Region

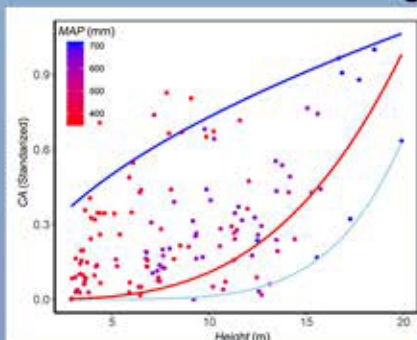
Jingyu Dai, Hongyan Liu\*, Yongcai Wang, and Qinghua Guo

Semiarid forests characterized by the presence of “trub” species, which have short heights but large canopy sizes, can maintain a high carbon sequestration rate.



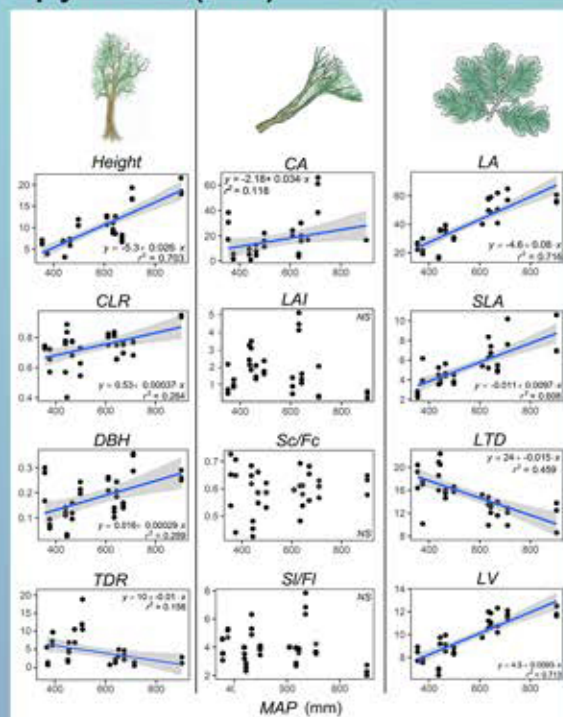
By integrating terrestrial laser scanning (TLS), we quantified drought-forced tree morphological variation along a precipitation gradient.

Theoretical CA-Height relationships widely adopted by dynamic global vegetation models (DGVMs) matched only the 5<sup>th</sup> percentile of our results, which is problematic for estimating open forests in semiarid regions.



Our results demonstrate the importance of tree morphological studies for both tree environment-acclimation strategies and the improvement of DGVMs.

Annual precipitation (MAP) explained 70.3% of variation in trunk morphological traits like tree height (Height) and leaf morphological traits, but had less explanation on canopy traits like canopy area (CA).



The trend toward “trubs” under a drying climate implies two decoupled functions of stems, the spatial arrangement of leaves and hydraulic efficiency, and can be an important strategy for trees to balance water and carbon.

