214-12 - COMMUNITY LEVEL TRENDS IN MEASURED AND ESTIMATED LEAF MASS PER AREA AND THEIR IMPLICATIONS FOR CHARACTERIZING PLANT COMMUNITY ECOLOGY IN THE GEOLOGIC PAST

Wednesday, 12 October 2022

11:00 AM - 11:15 AM

Mile High Ballroom 4A (Colorado Convention Center)

Abstract

In neo-ecology, functional traits are increasingly used to describe plant communities, as they relate to ecosystem function and community responses to environmental change, and can provide insight to community assembly processes. Leaf mass per area (LMA) is one such trait, with low LMA corresponding to high resource acquisition and relative growth rates, shade intolerance, and long leaf life span, along an investment tradeoff known as the leaf economic spectrum. As leaf mass cannot be directly measured on fossils, a proxy was previously developed to estimate LMA using its relationship with a petiole metric (petiole width^2 / leaf area), and has been previously used to address how plant ecology responds to environmental change (e.g., K-Pg). Assuming that distributions of LMA in environment types are unique, prior studies have also compared distributions of estimated LMA (via petiole metric) from fossil leaf assemblages to distributions of measured LMA (via leaf mass) from modern communities, to find a best match and thus infer analogous environment types. Here we test if particular climates or vegetation types do in fact have statistically distinct measured and/or estimated LMA distributions using an established global-scale dataset of modern leaves, but expanding it to include petiole metric measurements from 37 new sites in warm to cold temperate China. Preliminary results indicate high variability of distributions within climate types, suggesting generally low distinctiveness. However, cold temperate environments lacked a tail at high values, and thus had highly distinct measured LMA (92% of sites matched best with their climate type average) and fairly distinct estimated LMA distributions (62% match), likely reflecting a dominance of ‘fast’ deciduous strategies. Arid environments had distinct estimated LMA distributions (67% match) as a result of their very long tail over high values, but had indistinct measured LMA distributions which lacked such a long tail (36% match). Further work will assess the distinctness of vegetation, rather than climate types. These preliminary results suggest that harsh climates that impart strong filtering effects (e.g., winter frost, aridity) may be unique in having distinct distributions of measured and estimated LMA and, by inference, leaf economic strategies.

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