

Collaborative Research: MRA: A lineage-based framework to advance grassland macroecology and Earth System Modeling

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Principal Investigator Christopher J. Still, Co-Principal Investigators Daniel Griffith

Williwam Riley, Jesse Nippert, Stephanie Pau, Brent Helliker

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Grass-dominated ecosystems (grasslands and savannas) are tremendously diverse and play an important role in regional and global carbon, water, and energy cycling. However, grass species are underrepresented in plant trait databases and consequently omitted in macroecology analyses and syntheses. Grasses are also inaccurately simplified in Earth System Models (ESMs), which are critical for climate-related decision-making and policy. An interdisciplinary team of scientists, ranging from ecophysiology to phylogenetic community ecology to Earth System Modeling, proposes to advance understanding of grass-dominated ecosystems at regional and continental scales by filling critical gaps in grass species traits and macroecology, and testing a novel evolution-based framework in ESMs. This team will: (1) collect extensive field-based data on grass traits, examine if traits are phylogenetically conserved, and how they co-vary to inform life history strategies; (2) link and scale those traits to NEON AOP hyperspectral data and satellite observations of ecosystem function; and (3) develop a mechanistic, phylo-functional framework for grass macroecology that will be implemented in a state-of-the-art ESM.