Quantifying Grassland-to-Woodland Transitions: Implications for Carbon and Nitrogen Dynamics in the Southwest United States

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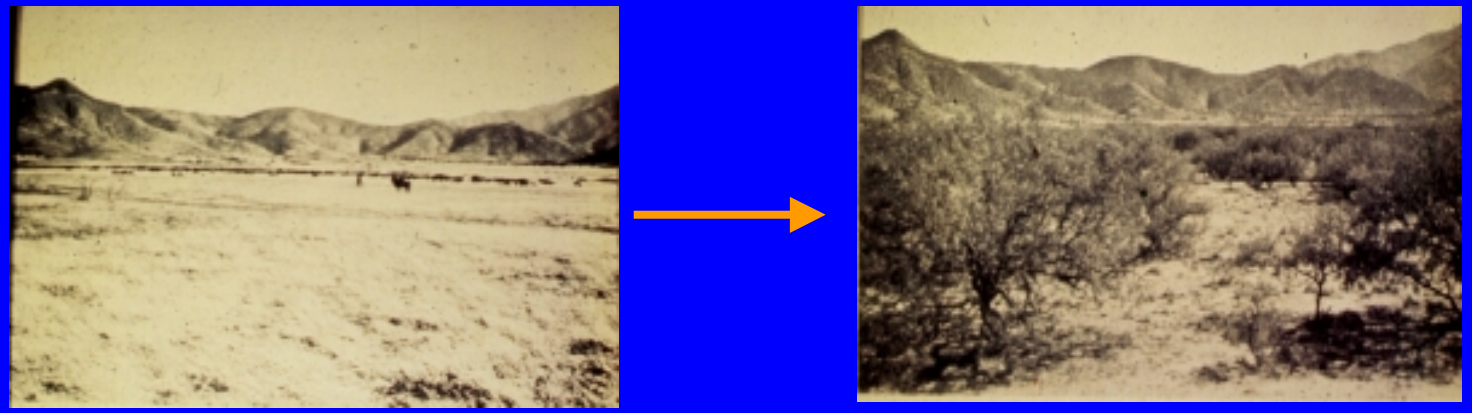


Introduction

Many dryland ecosystems are mixtures of grasses, shrubs and trees. The balance between these contrasting lifeforms is regulated by interactions between climate, soils, herbivory and disturbance.

A shift in one or more of these factors can dramatically alter ecosystem structure and function. In many drylands, woody plants have displaced grasses in recent history….

Project Goal: To understand spatial and temporal changes in vegetation structure (herbaceous and woody species) associated with land management and to quantify how these changes affect sequestration or liberation of C-N across topo-edaphically diverse landscapes.

Objectives:

1. Develop an understanding of temporal changes in plant and soil C and N for grassland-to-woodland chronosequences
2. Improve our ability to remotely quantify grass and woody plant cover and properties in spatially complex regions

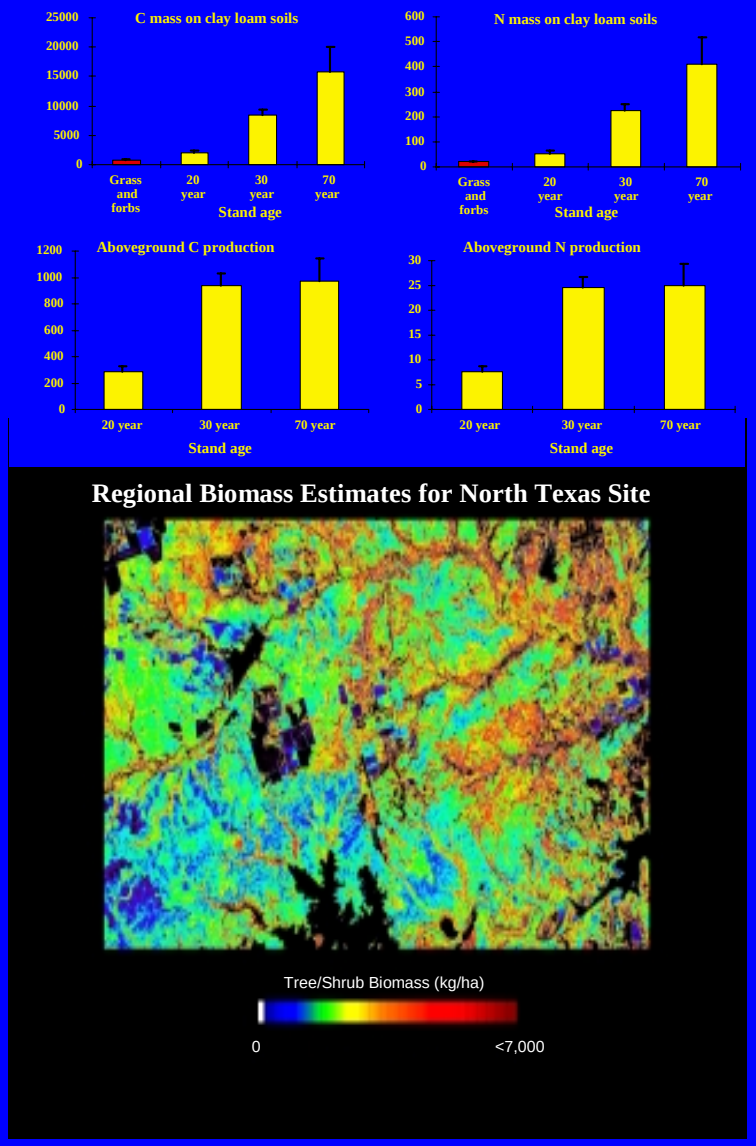
Results

(1) Major improvements in understanding historical and spatial changes in woody plant cover in North Texas rangelands, and the consequences for regional carbon and nitrogen stocks

Plant and soil carbon and nitrogen stocks increase with woody plant encroachment in North Texas rangelands.

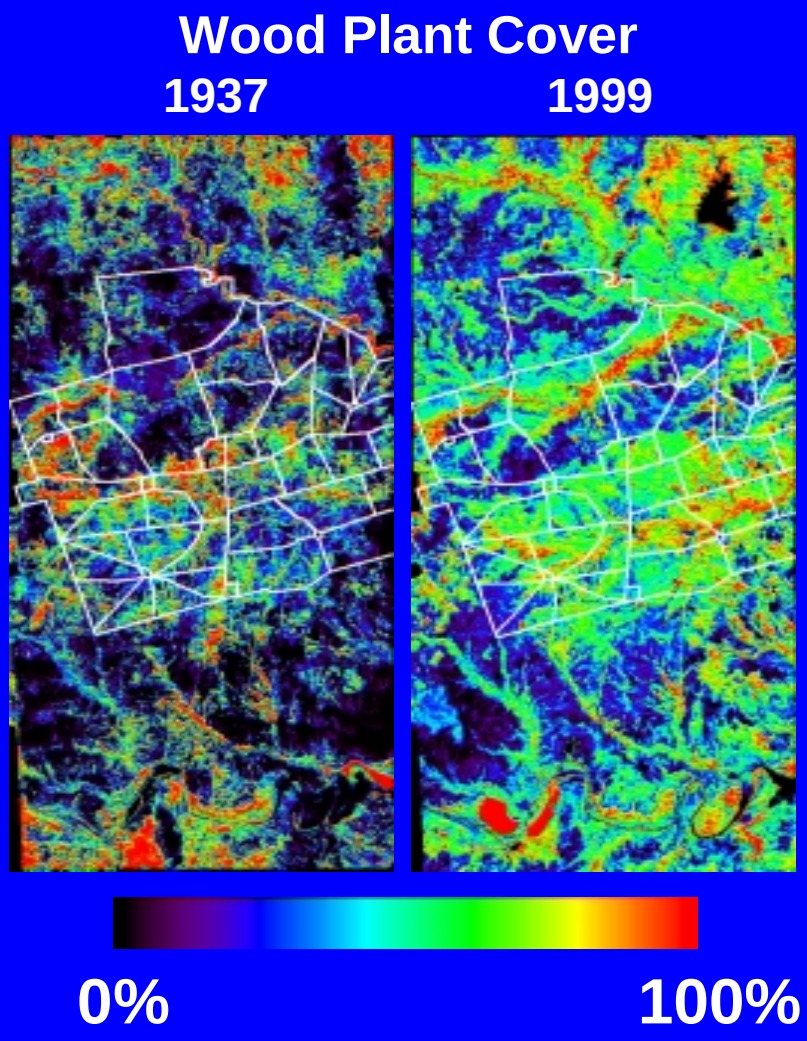
(2) Dramatic improvements in our ability to remotely quantify grass and woody plant cover, structure and biomass in spatially complex regions

Aboveground woody canopy cover and biomass (carbon) have increased in the past 70 years.



Conclusions

- Spatial and temporal changes in woody plant biomass are substantial in Texas rangelands and they impact soil carbon and nitrogen stocks
- New remote sensing methods that employ multi-view angle and high spatial resolution observations can be integrated to estimate plant canopy cover in spatially complex ecosystems such as savannas and shrublands.
- New remote sensing approaches can be directly combined with field measurement networks/campaigns to estimate aboveground vegetation carbon stocks.



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