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Shifting Patterns of Boreal Forest Succession and Browning Over the Last 30 Years

Goulden-02

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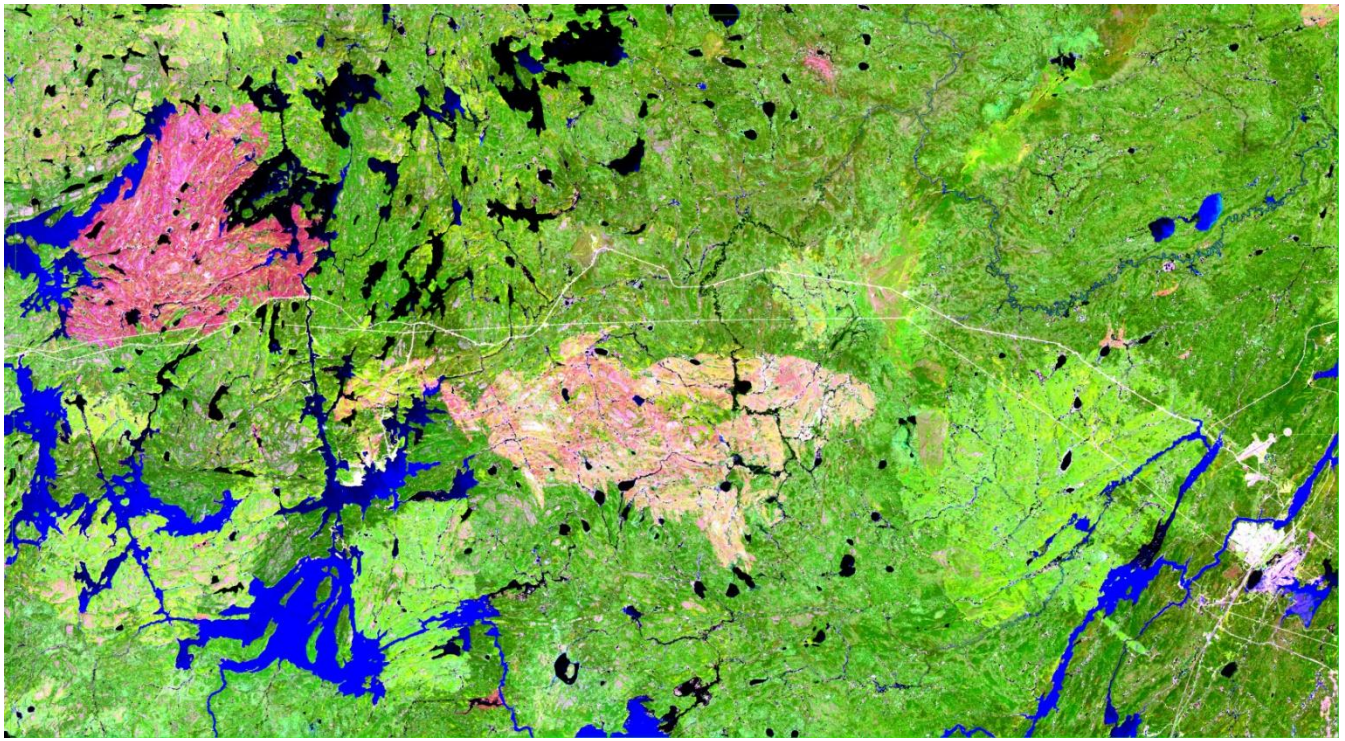
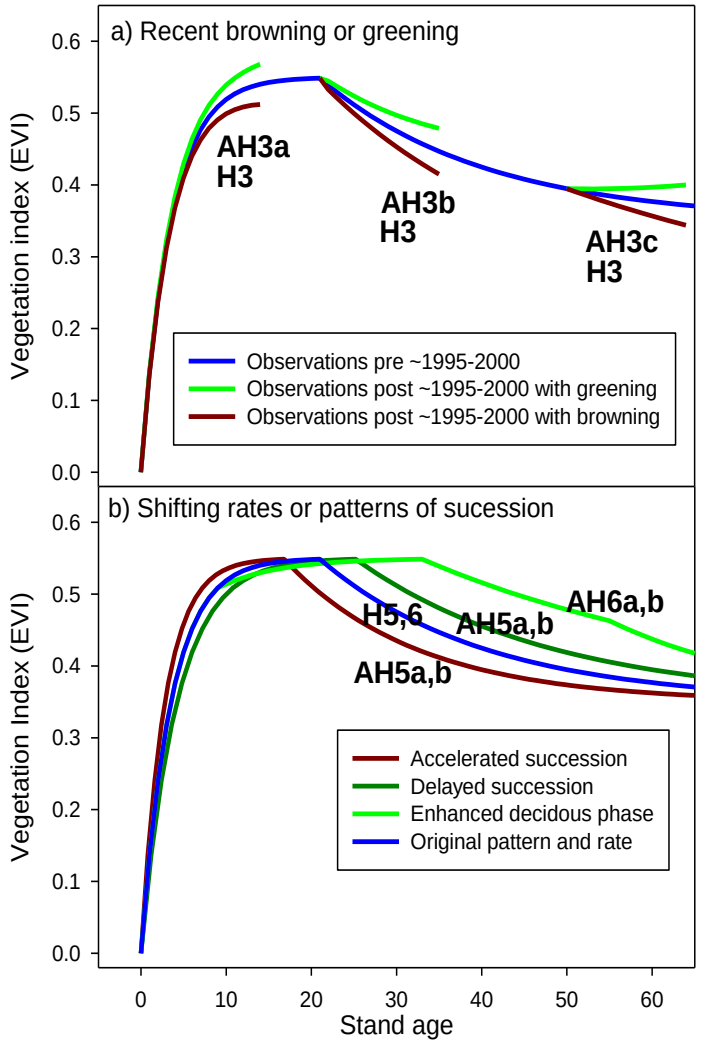
Institutional Collaborations

- The ABoVE science team
- Builds on past fire recovery work at BOREAS-NSA (Goulden et al) and Fairbanks (Randerson et al)



The Core Idea

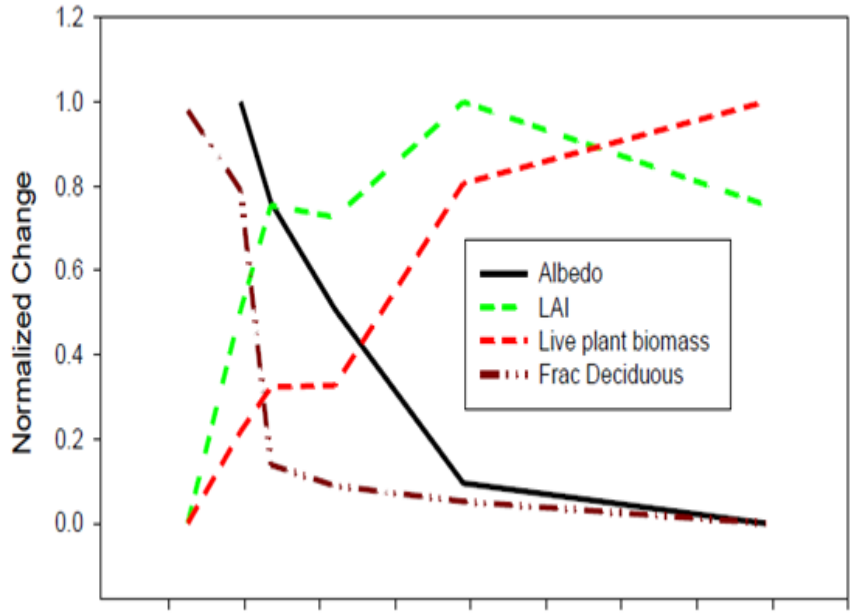
- Boreal Browning – Forest NDVI decline since early 90s
- Warming -> forest dieback?
- Fire recovery exerts dominant influence on veg/ecosystem properties – comparative control for age (blue line)
- Warming/browning and succession will interact - must be tackled in concert

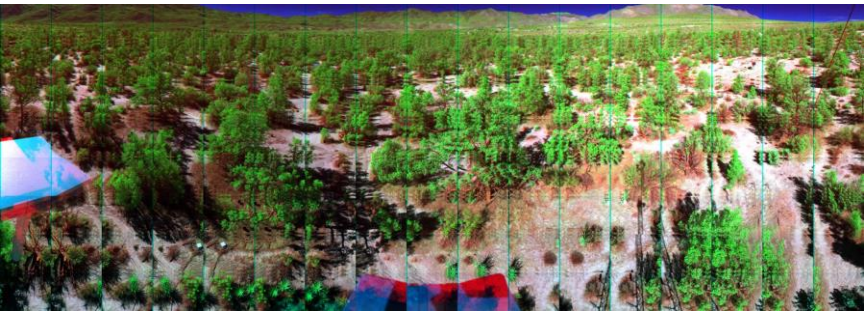


Science Questions & Objectives

- Better understand the patterns of, controls on, and recent changes in North American Boreal Forest “Browning" and declining NDVI in satellite records - Tier 2 Science Objective #5
- Better understand the patterns of, controls on, and recent changes in North American Boreal Forest fire recovery and succession - Tier 2 Science Objectives #2, #6, and especially # 3

Field Studies

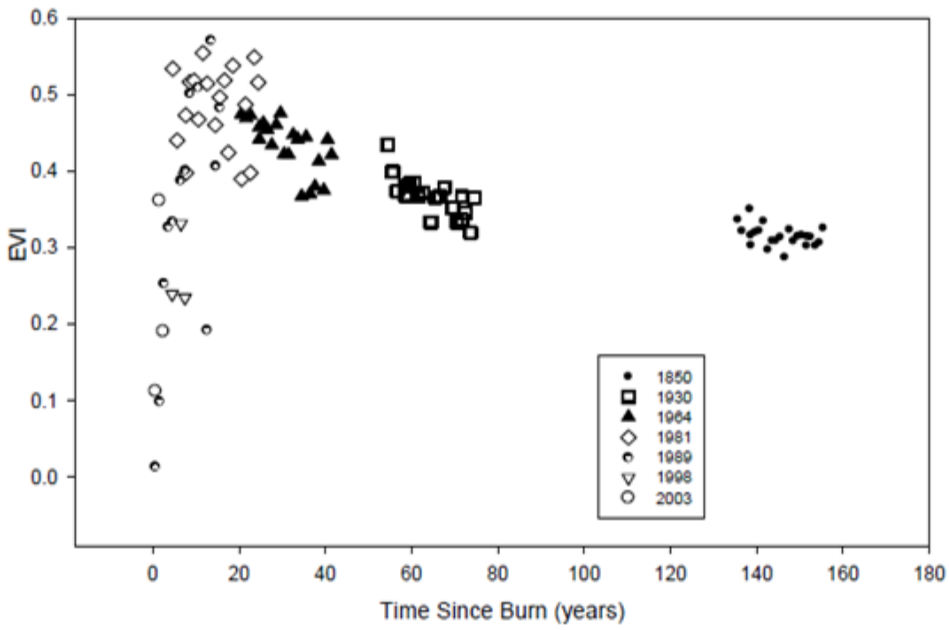




- Extensive/Intensive to help interpret remote sensing
- Extensive - biophysical obs with age around Fairbanks
- Intensive – Multi-angle/ spectral ((VIS,NIR,SWIR,TIR+ spectra) x (300^{o}x90^{o}) x (12/day) at ~3 age sites
- Intensive logistics problematic - Delta Junction? Is there much interest in this type of work?

Spaceborne Remote Sensing

- Follow spatial hierarchy
  GIMMS -> MODIS -> Landsat
- Finer analysis using Landsat stacks
- Compare spatial (chronosequence) vs temporal (time series) patterns of succession
- Relate Landsat to surface biophysics

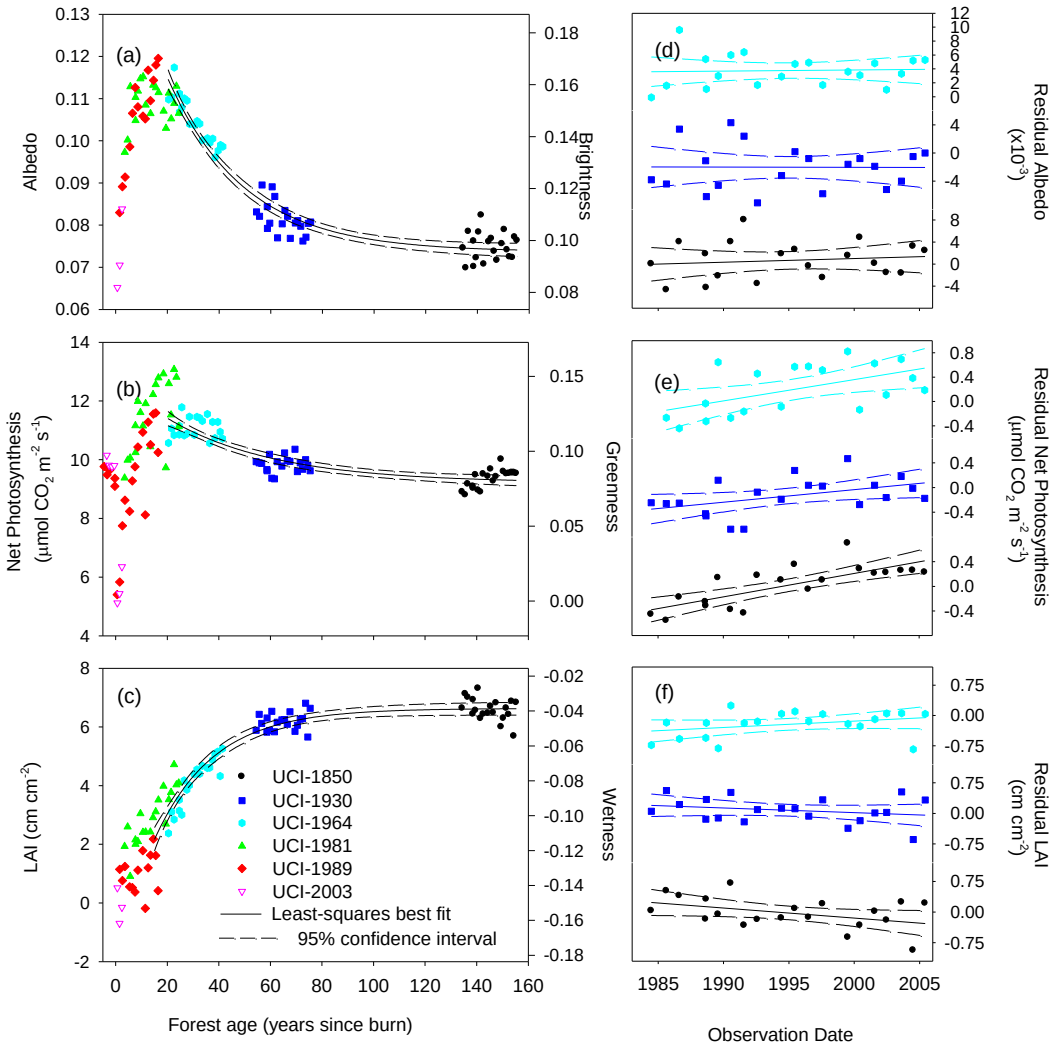


Airborne Remote Sensing

- Especially interested in airborne campaign that includes boreal fire and recovery
- Replicated and matched chronosequences (Gamon et al recommendation 5.1 Comparative experimental design)
- Aircraft reflectance, TIR, LIDAR (5.2 Intermediate scale sampling; 5.3 Multidimensional sampling; 5.4 Stand structure)
- A few intensive field sites with time series (5.2 Intermediate scale sampling; 5.3 Multidimensional sampling ; 5.4 Stand structure)
- Spatially extensive sampling along gradient(s) (5.1 Comparative experimental design ; 5.4 Stand structure)

Modeling Approaches

- Empirical relationships
- Reflectance/TIR vs biophysical properties
- Age vs properties
- Have patterns of recovery changed?



Geospatial Data Products

- Focus more on hypothesis testing
- Very happy to share all data, results, etc
- Strongly support common/overlapping sites, data formats and easy/fast data sharing