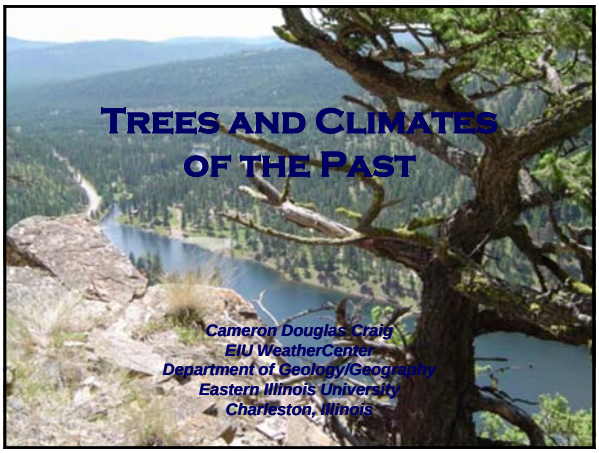
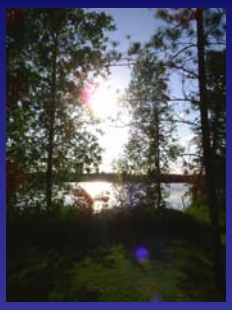


What is Dendrochronology?



- The study of tree rings to reconstruct many environmental variables.
  - Fires
  - Climates
  - Insect outbreaks

Reasons for Tree-Ring Research

- Approximation of absent modern records.
- Measures stress by environmental variables recorded by annual ring growth.
- Records cycles and changes over time.

Site Selection

- Depends on questions being asked.
- Objective is picking a sensitive site.
- Sensitive vs. Complacent.

Field Equipment

- 100m Transect Tape
- DBH Tape
- Increment Borer
- Plastic Flagging
- Straws
- Sharpies
- Field Book
- WD-40/Bee's Wax

Knowledge of Species

- Some species are better indicators of environmental variables than others.
- General age of species in locale.
- Reconnaissance of site.
- Background history of site.

Sampling Techniques

Preparing Tree Samples

Dry Samples

- Place samples on oven safe tray.
- Set oven to 140˚F/60˚C.
- Place tray with samples in oven.
- Allow samples to dry completely.

Mounting

- Label wood mount.
- Remove core from straw.
- Apply glue in groove
- Place sample on mount traverse side out (shiny side).

Ring Cell Structure

- Nonporous
  - Pine, Spruce, Fir (softwoods)
- Diffuse-Porous
  - Poplars and Maples
- Ring-Porous
  - Oaks and hardwoods

Preliminary Ring Counting

- Pith to Bark
- Dot sample
  - 10 years 1 dot
  - 50 years 2 dots
  - 100 years 3 dots
  - 1000 years 4 dots

Skeleton Plot Sample

- Based on stress
  - Signature rings
  - Significant variation
- Used in crossdating
  - Master Chronology
  - Dating Sample

Date Samples

- Match skeleton plot to master chronology
- Remove preliminary ring counting dots
- Date with real years
  - Bark to pith
  - Dot system

Compare Master Chronologies to Samples

- Identify signature years in each sample based on signature years represented in master chronology.

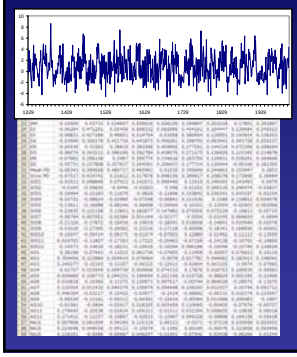
Measuring Samples

- Measure Ring Boundary to Ring Boundary in 0.001 mm.

Analysis

- COFECHA
  - Checks for series accuracy
- ARSTAN
  - Auto Regression Standardization into indices

Correlation to Reconstruction



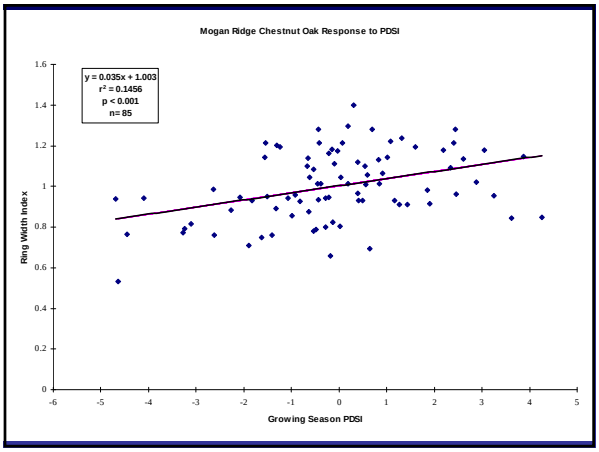
- Correlate Tree-Ring indices to an environmental variable
- Determine significance of the response through regression
- Reconstruct using the regression model

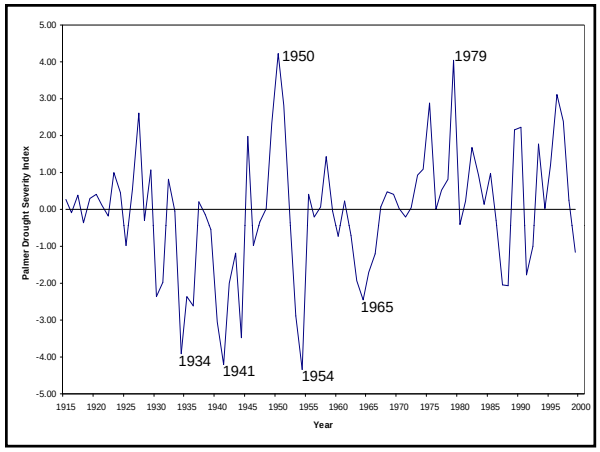
Mogan Ridge Reconstruction

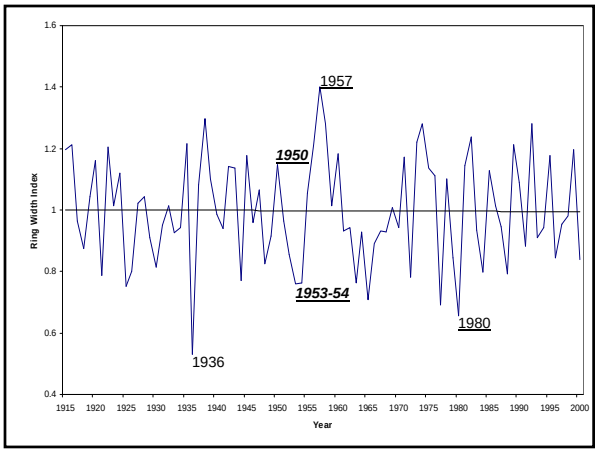
- Hoosier National Forest
- 22 Chestnut Oaks (44 cores)
  - 1860-2000 (140 years)

Mogan Ridge Reconstruction

- Climate Data
  - Indiana Division 8
    - Mean Monthly Temperature, Precipitation, PDSI
- Regression
  - Monthly
  - Growing Season (May-October)
  - Annual
  - Annual Lag
- Results
  - Growing Season PDSI explains 15% of the variance (1915-2000)







Conclusion

- Even with the lack of measured data the use of proxy data are beneficial.
- Although proxy data can be used, problems can occur…
  - Only an approximation of climate.
  - Humans forcing models on natural objects.