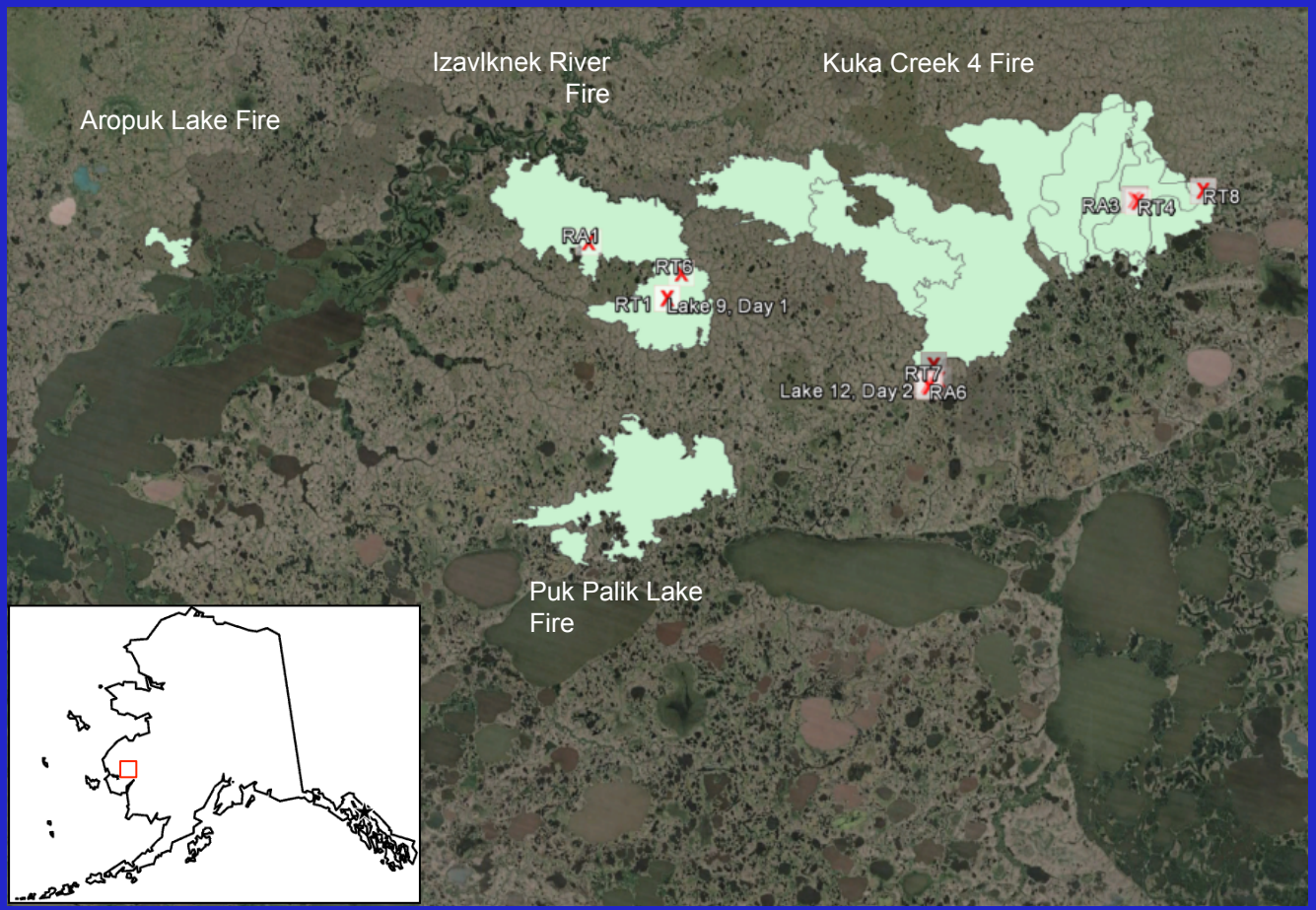
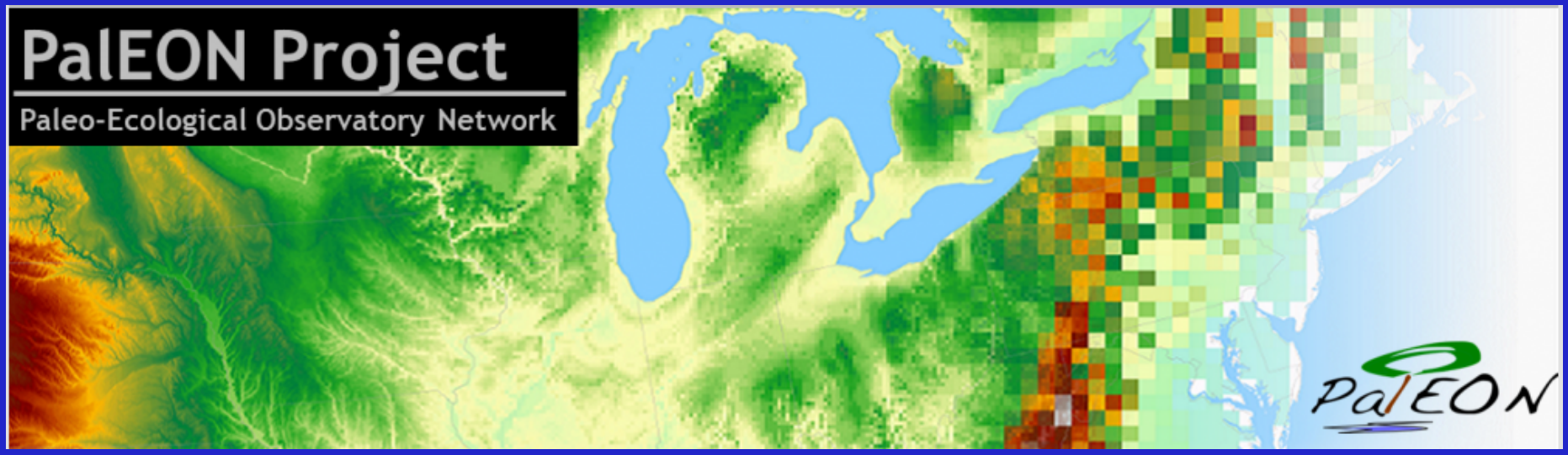
YK Delta Fire Project



- Use GPR to measure fire impacts on ALT
  - August, 2017
  - NASA ‘rapid response’ proposal

Opportunities for Collaboration



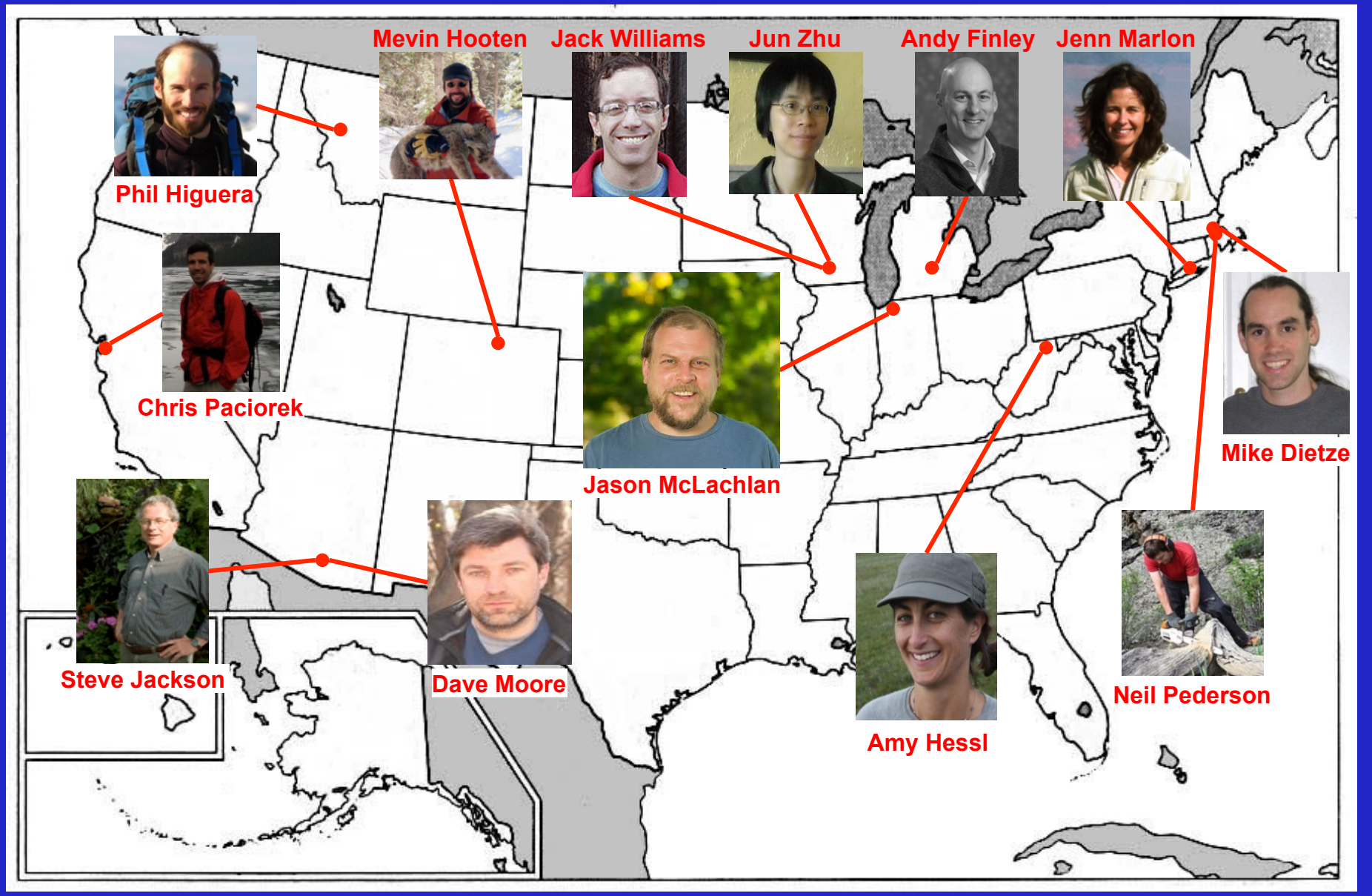
Kevin Schaefer

National Snow and Ice Data Center

Objectives

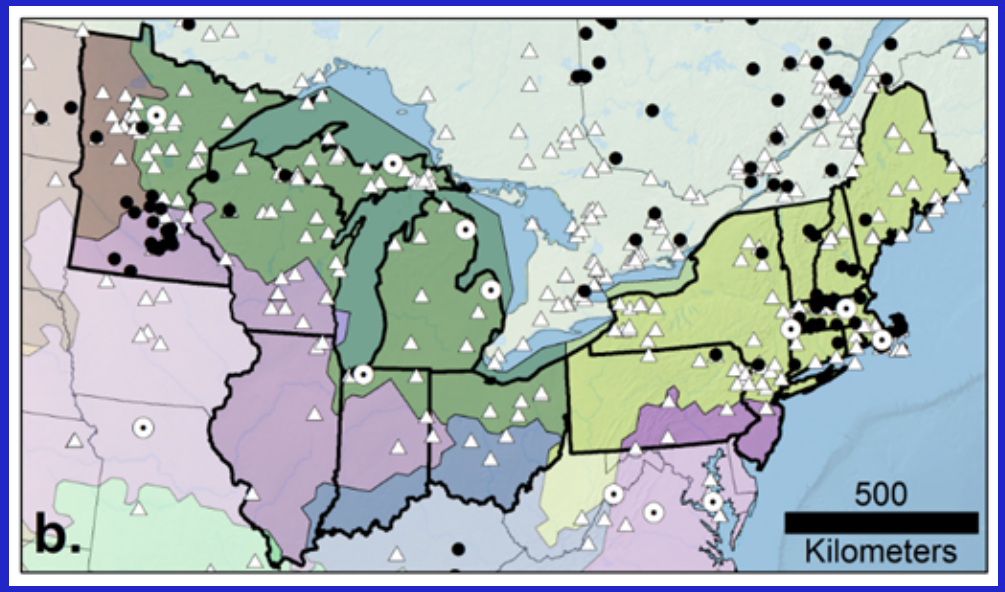
- Assimilate paleoecological data into models to constrain slow processes over last 2000 years
  - Collate/collect historical & paleoecological data
  - Develop statistical models of ecosystem change
  - Integrate into ecosystem models
- Funded by NSF
  - 2011-13: Proof of Concept ($850k)
  - 2013-2018: PalEON 2 ($5.1M)

Leadership Team

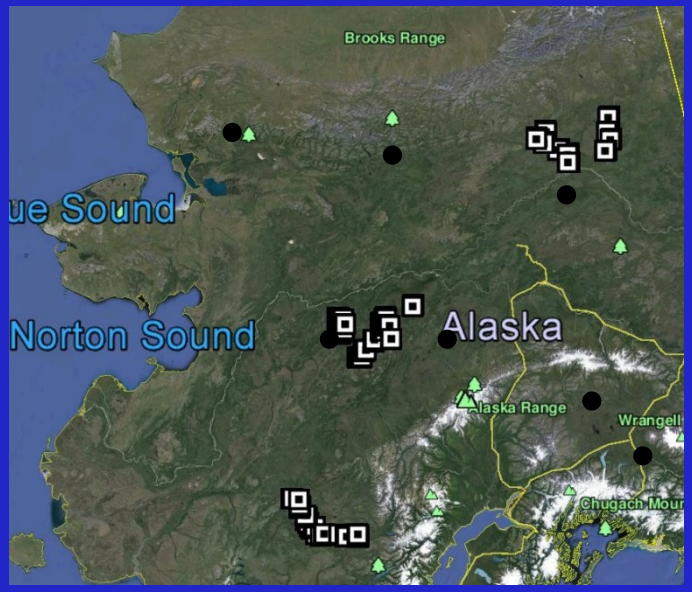


PalEON Domain

Northeast US



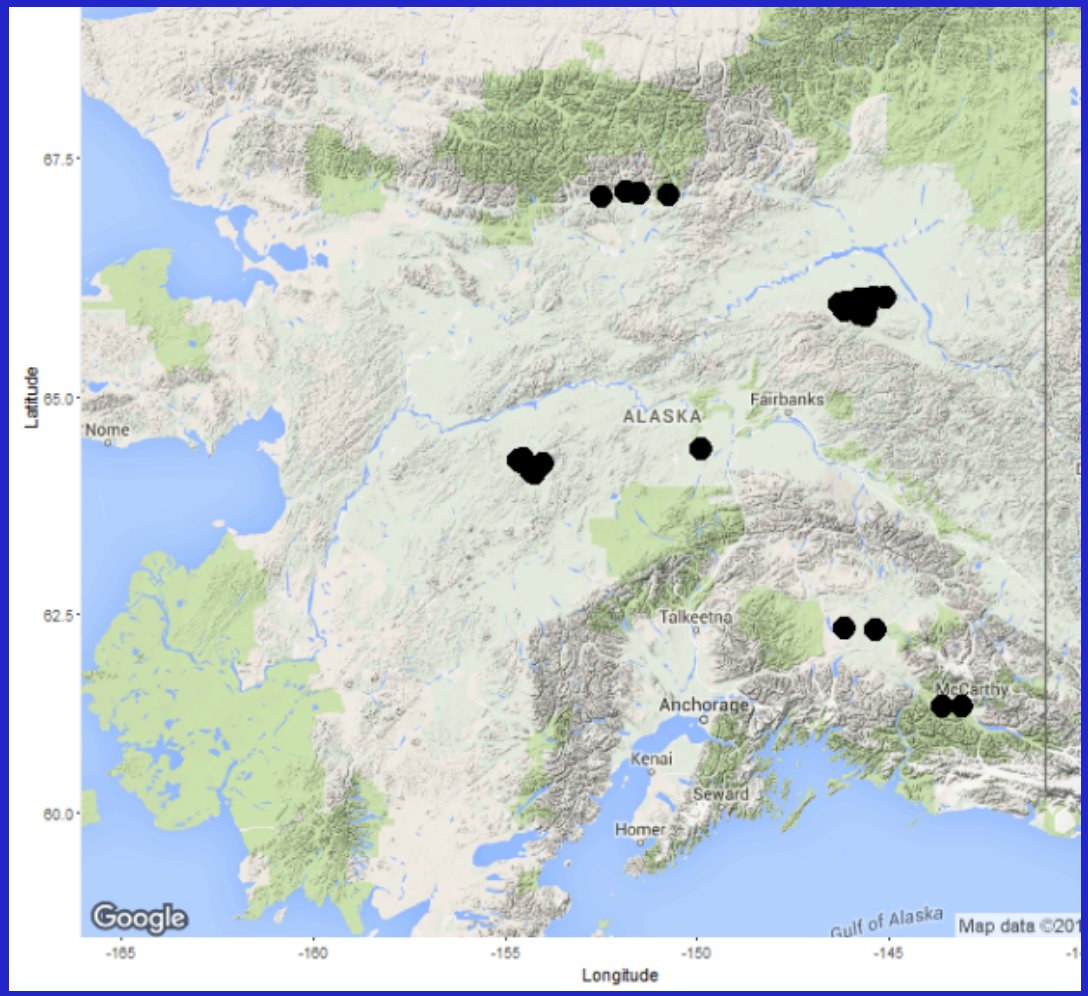
Alaska



● Charcoal ▲ Pollen ■ Tree Ring

- Emphasize fire dynamics in Alaska

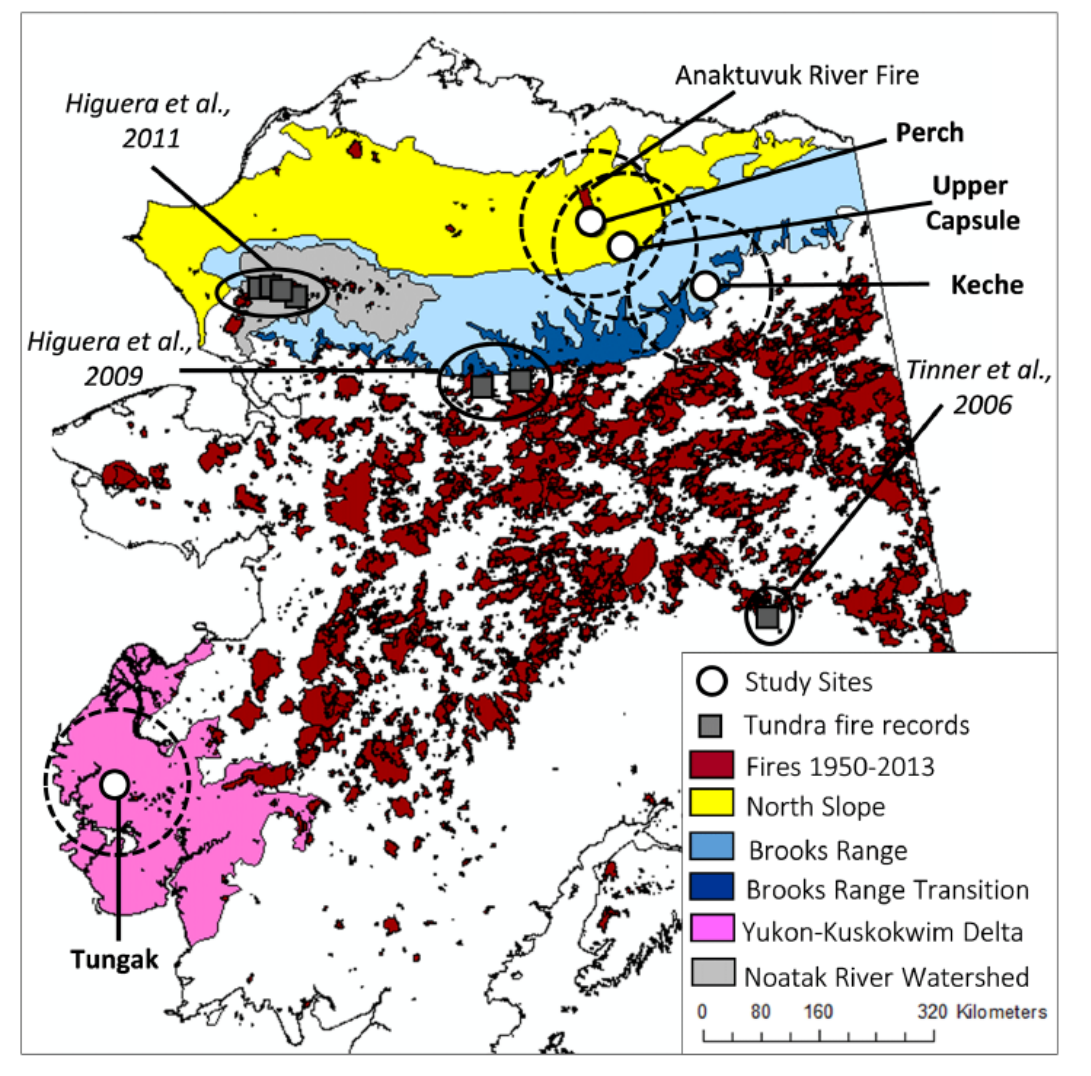
Fire History: Boreal Forest



- > 22 sites (published)
- ~2000 yr to 14,000 yr
- Resolution ≥ 10 yr/sample
- Derived metrics:
  - Fire events
  - Fire return intervals
  - Fire frequency
- Other proxies:
  - Pollen-based vegetation

*duration of boreal forest ~4-6 ka

Fire History: Tundra

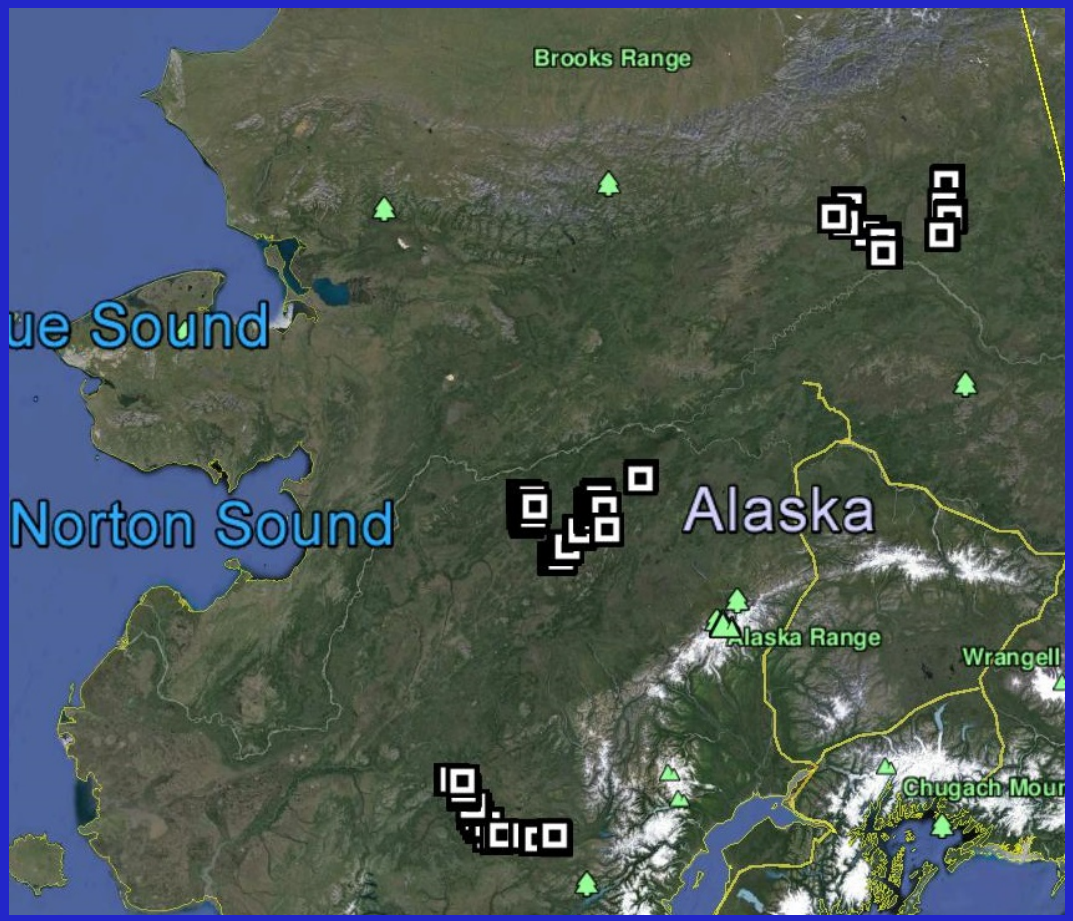


Chipman et al. [2015]

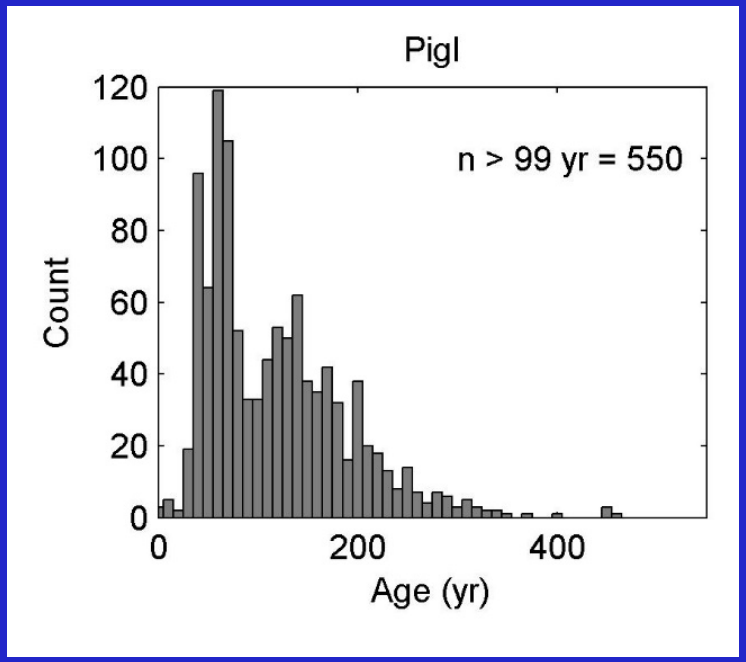
- > 9 sites (published)
- ~2000 yr to 30,000 yr*
- Resolution: ≥ 10 yr/sample
- Derived metrics:
  - Fire events
  - Fire return intervals
  - Fire frequency
- Other proxies:
  - Pollen-based vegetation

*all tundra for duration of records

Tree Ring Records in PalEON



- 3,853 samples [Duffy et al.]
- Stand age reconstruction
- Ages up to ~400 yr
- Focusing on white spruce > 100 yr old (n = 470 measured and crossdated)



ABoVE Collaboration: Fire Dynamics

- Complete ABoVE partnership application
- Join Fire Dynamics Working Group
- Coordinate analysis
- Coordinate core/tree ring collection
- Share sediment cores

ABoVE Collaboration: Modeling

- Join modeling working group
- PalEON Alaska simulations
  - Driver data
  - Benchmarks
  - Model output
- Agree to standards and protocols

Backup Slides

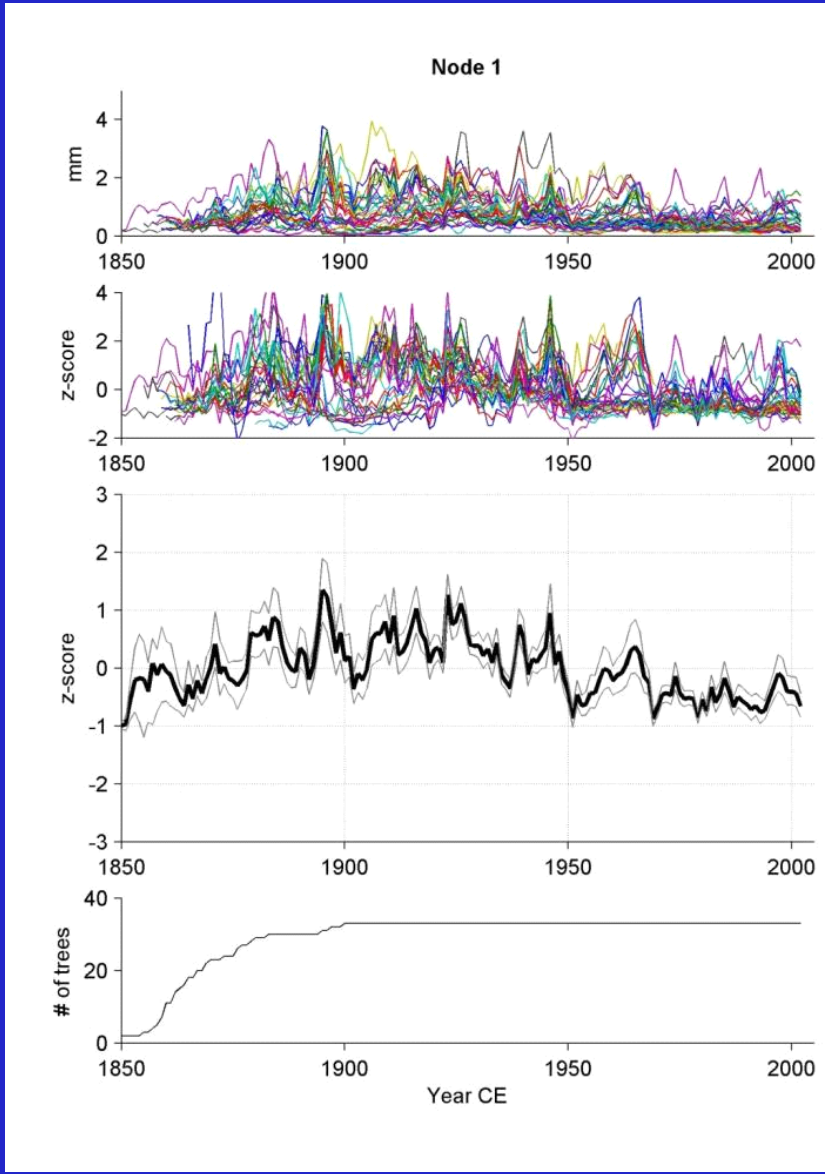
Tree-Ring Records in PalEON

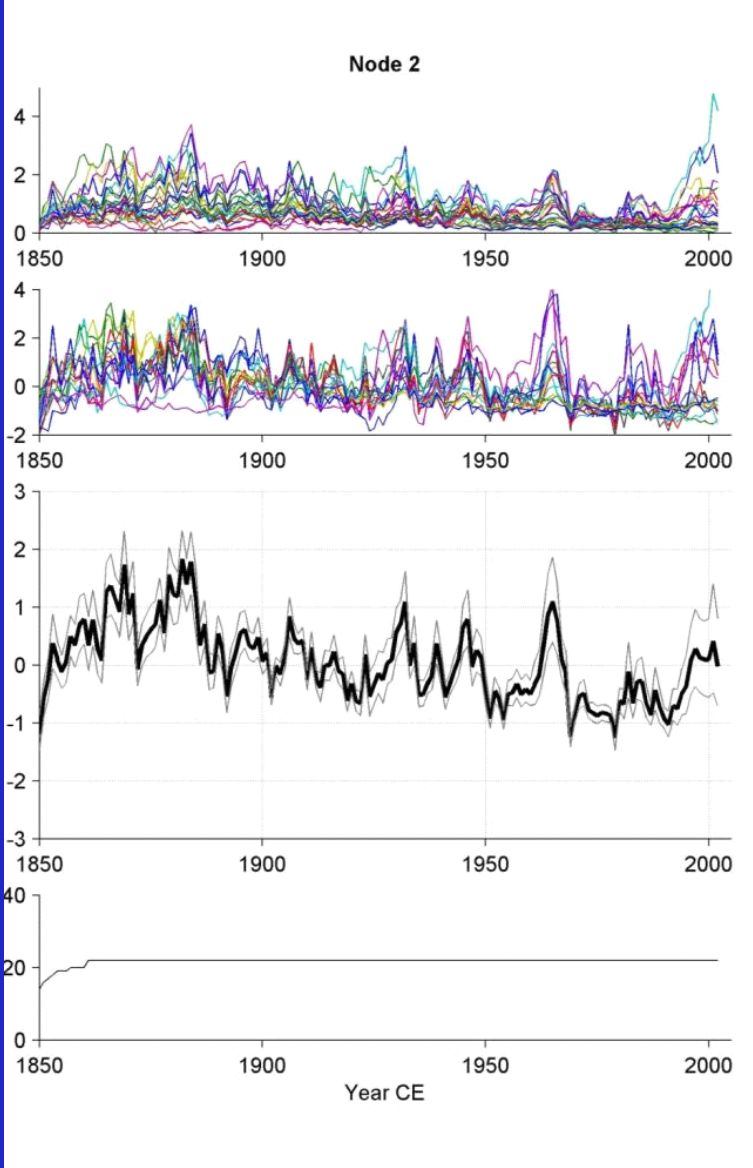
Raw

Z-score

Chron. (mean)

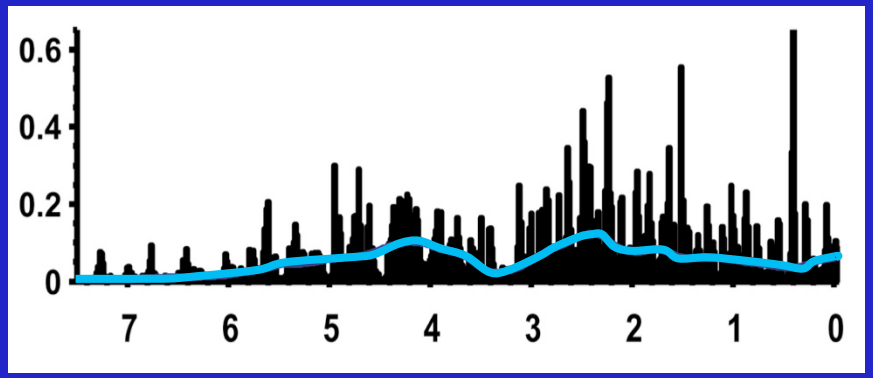
Sample depth





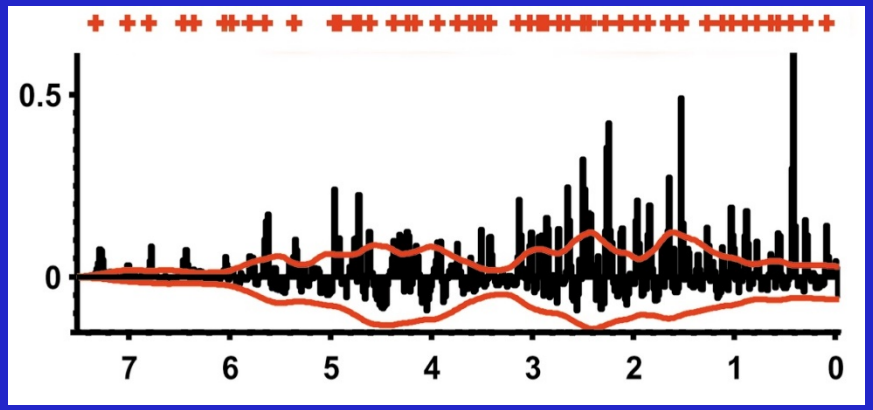
Fire History Example

"Background" CHAR: Regional biomass burning



- Total charcoal accumulation reflect biomass burning, and in some cases is calibrated against area burned.

"Peak" CHAR: Local fire events

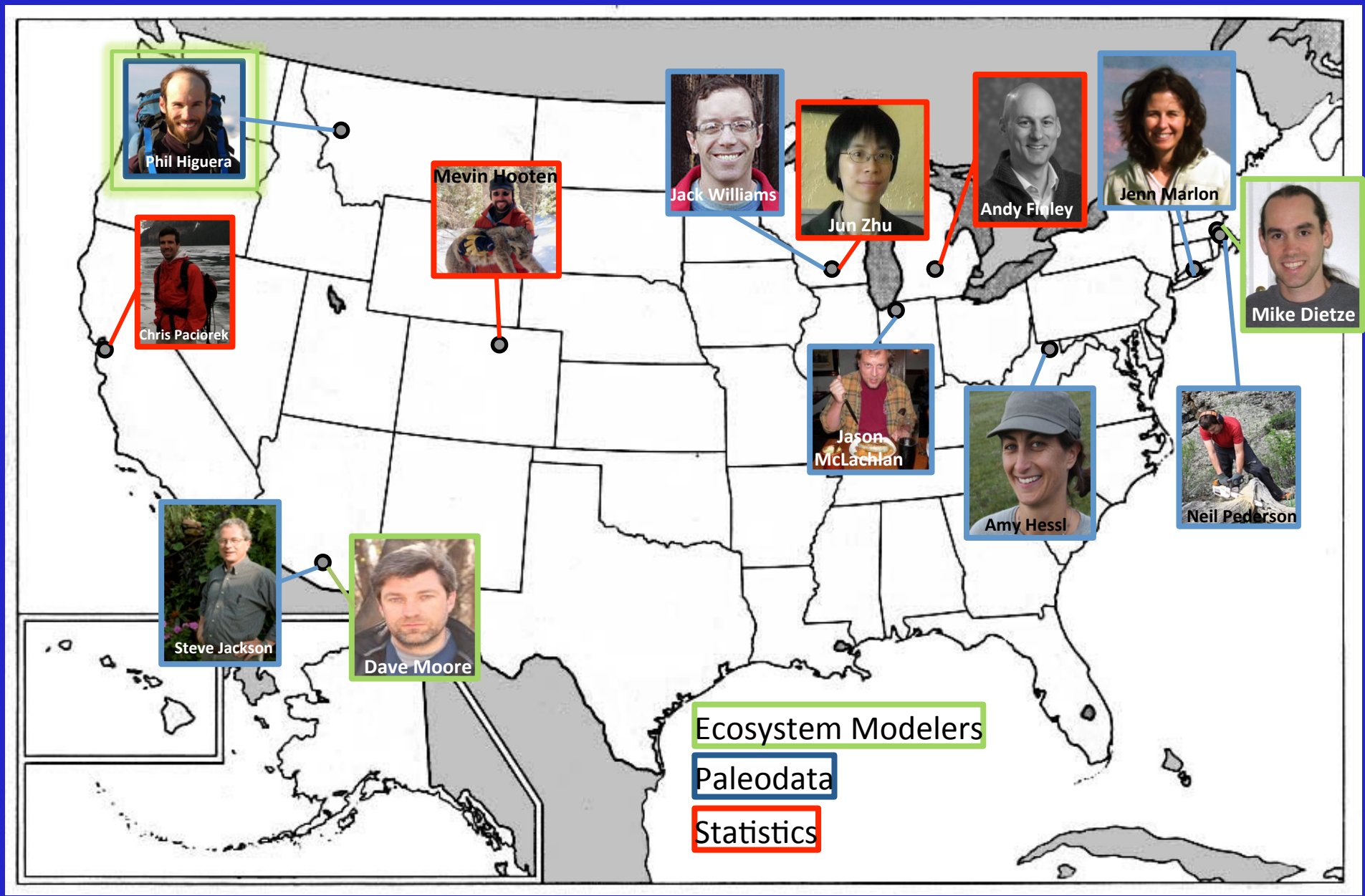


- Charcoal "peaks" reflect local fire events; event frequency and return interval statistics characterize the fire regime.

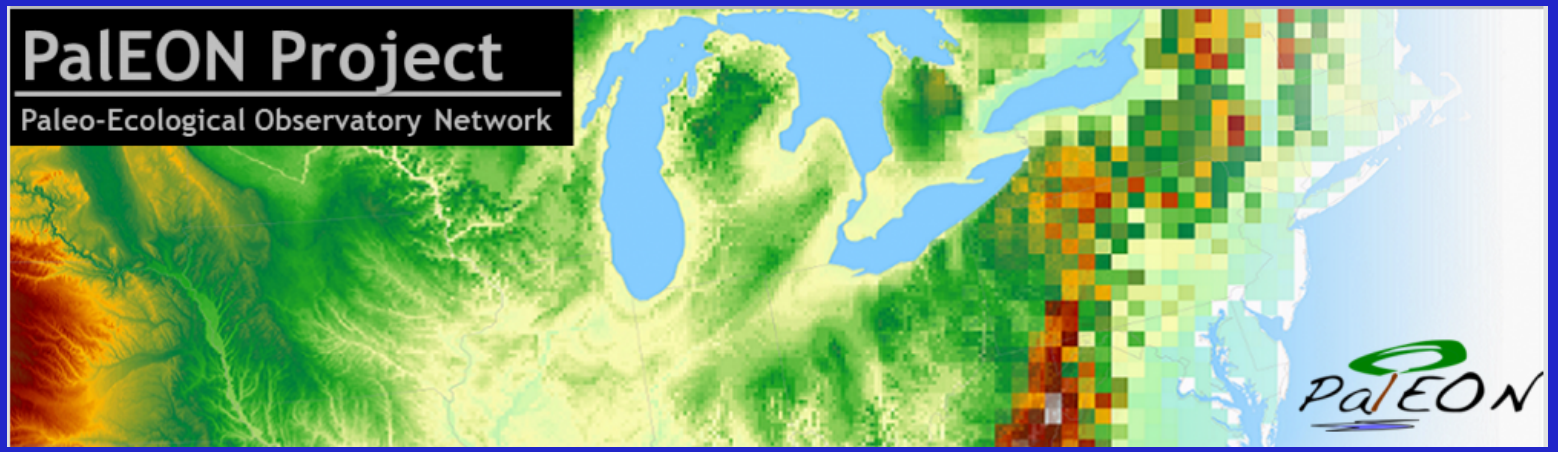
Charcoal Accumulation Rate (# cm^{-2} yr^{-1})

Time (kyr before present)

Project Team by Discipline



Leadership Team



Jason McLachlan – University of Notre Dame
Michael Dietze – Boston University
Andrew Finley – Michigan State University
Amy Hessl – West Virginia University
Philip Higuera – University of Montana
Steve Jackson – University of Arizona/U.S. Geological Survey
Jennifer Marlon – Yale University
David Moore – University of Arizona
Christopher Paciorek – University of California, Berkeley
Neil Pederson – Harvard Forest
Jack Williams – University of Wisconsin, Madison
Jun Zhu – University of Wisconsin, Madison

PalEON

Full Objectives

- Collate existing and collect new historical and paleoecological data from Northeastern and Midwestern states and from the central boreal forest of Alaska;
- Develop and apply statistical models that make inference from these data with uncertainty about changing terrestrial ecosystems over the last 2000 years
- Integrate this statistical inference into models of ecosystem change
- Ultimate Goal: Assimilate inference from long-term data into models, so that the slow processes influencing projections of ecosystem change are constrained by data.