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)
Leadership Team

Phil Higuera

Mevin Hooten

Jack Williams

Jun Zhu

Andy Finley

Jenn Marlon

Chris Paciorek

Steve Jackson

Dave Moore

Amy Hessl

Neil Pederson

Mike Dietze
PalEON Domain

Northeast US

Alaska

- 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

> 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

Chipman et al. [2015]

*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.
Project Team by Discipline

Ecosystem Modelers
Paleodata
Statistics
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
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.