

Using a multi-proxy approach to characterize the historical fire regime of Jasper, AB, during the late Holocene

Wildland Fire Canada
Halifax, Nova Scotia

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Project Context

- Fire season length increase and increases in total area burned in Canada (Flannigan et al 2005; 2013)
- Human activities have changed fire regimes in some areas (land use change, fire suppression)
- Town of Jasper, AB, situated at the wildland/urban interface

Vegetation change in Jasper, AB



1915

M.P. Bridgland 1915



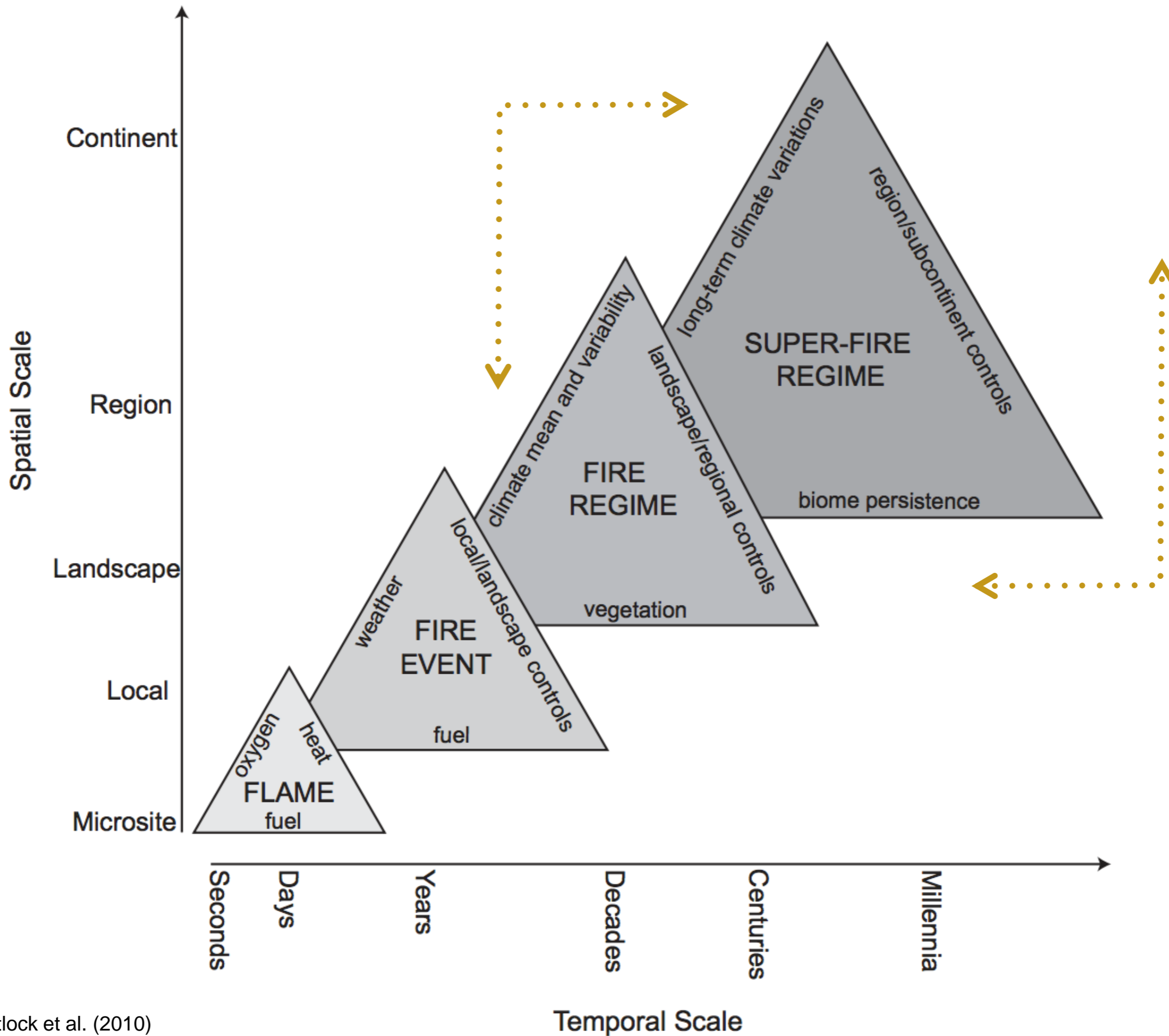
1998

J.Rhemtulla and E. Higgs 1998

Rhemtulla et al. 2002

Objectives





Multi-proxy Approach



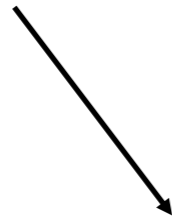
Charcoal

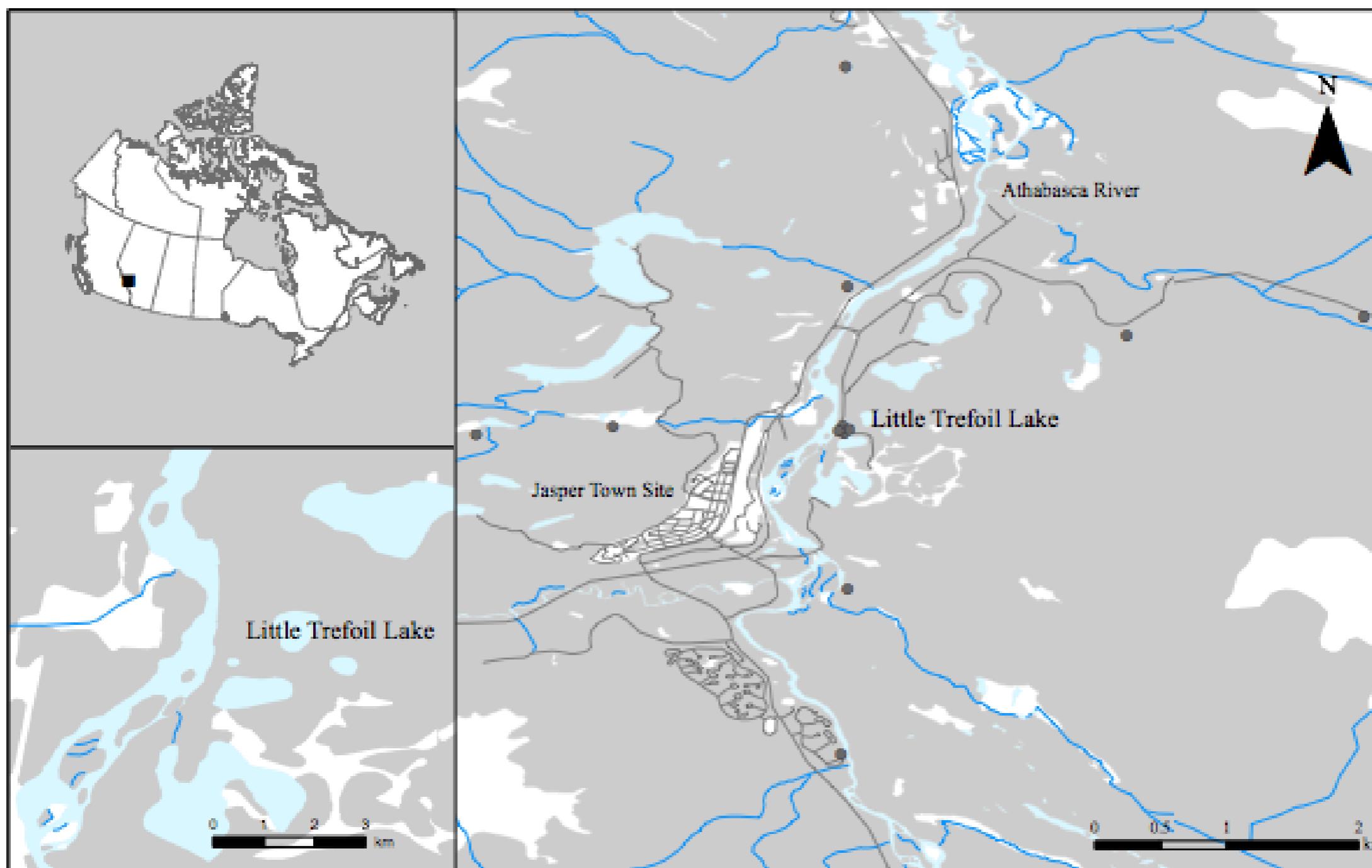


Tree Rings



Pollen Analysis





Legend

- Tree-ring Site
- Road
- Stream
- Vegetation
- Waterbody

Little Trefoil Lake, Jasper AB

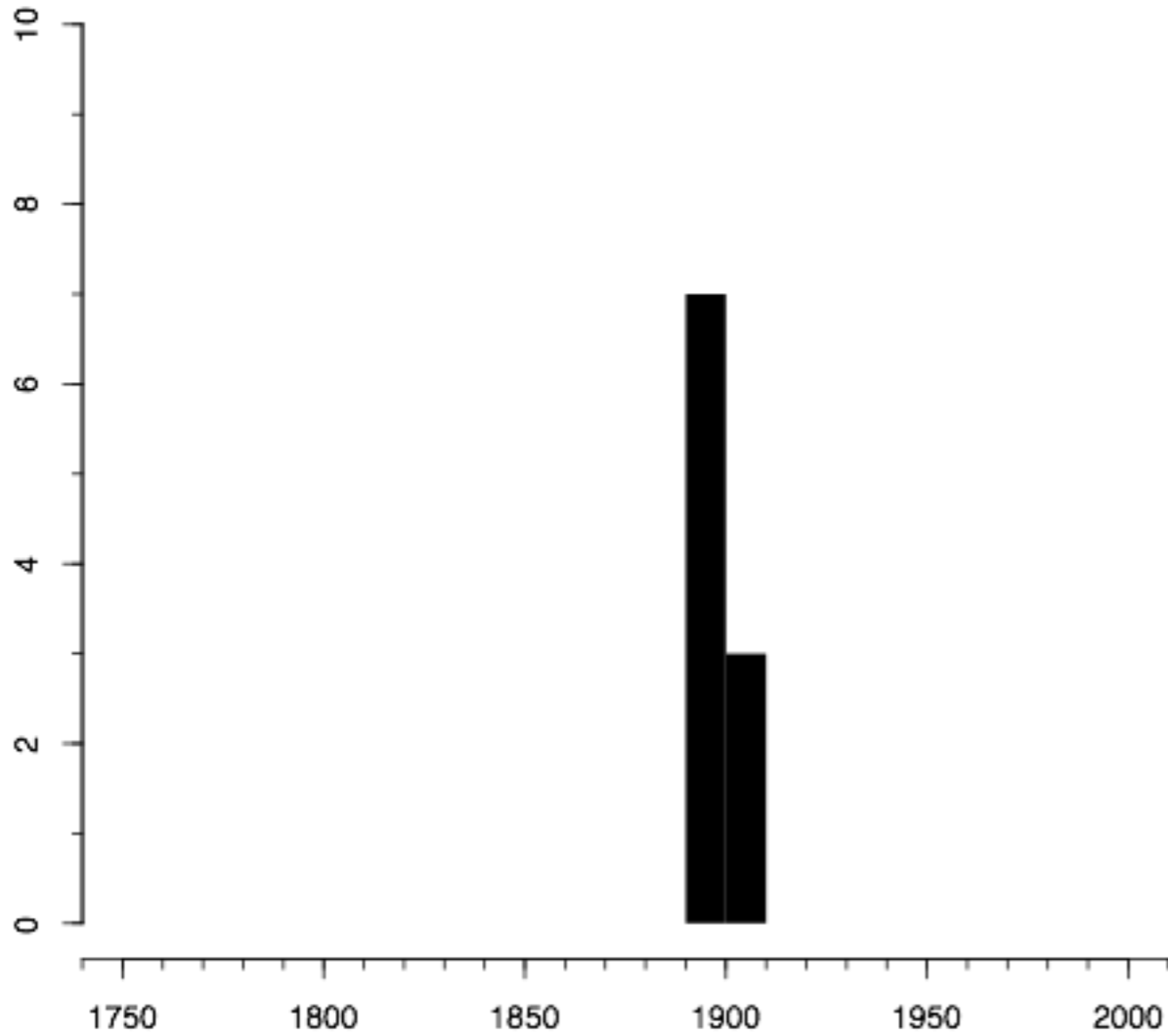




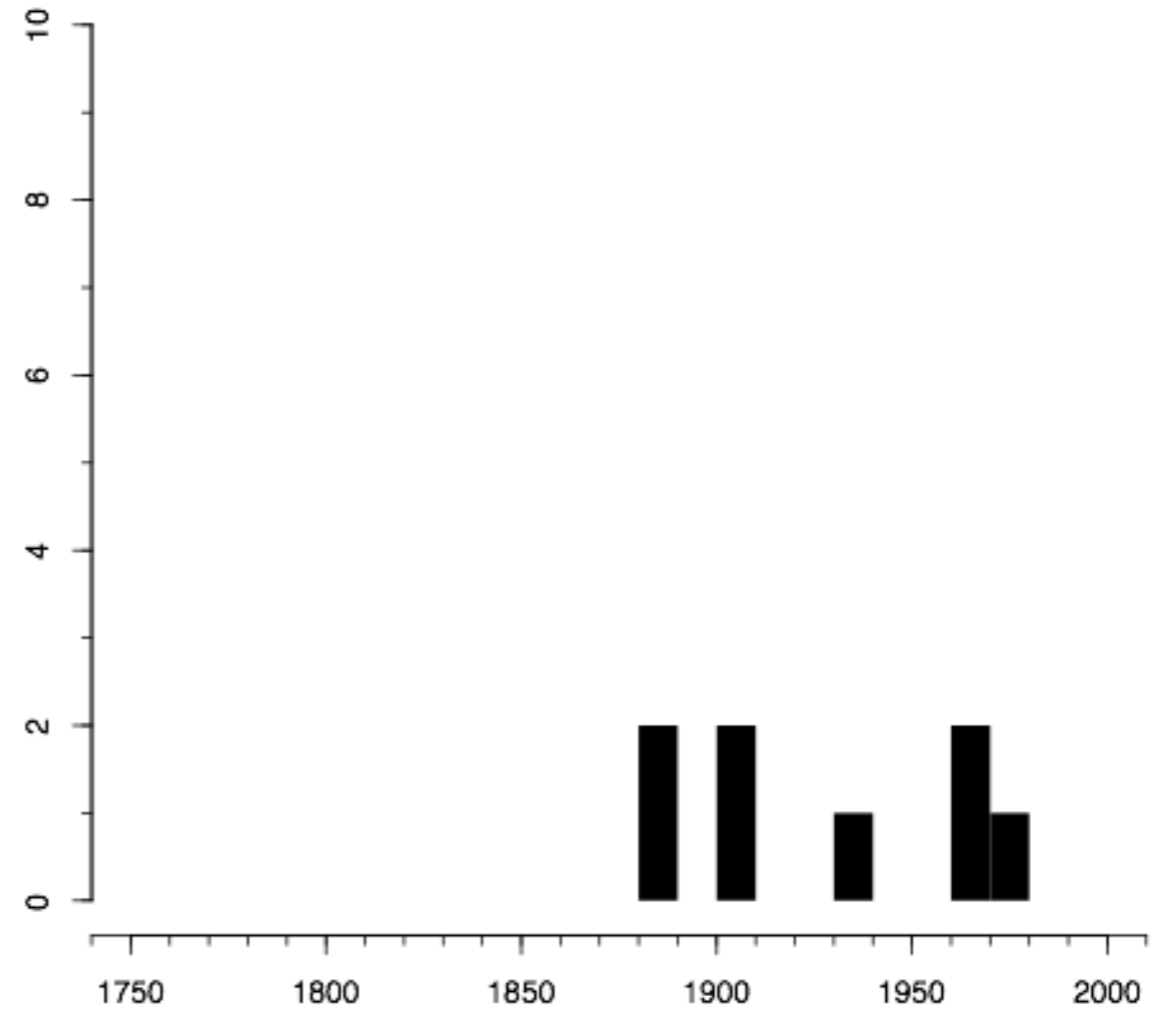
Tree-ring analysis

Contemporary fire history record.

Patterns of stand establishment



Even-aged Canopy

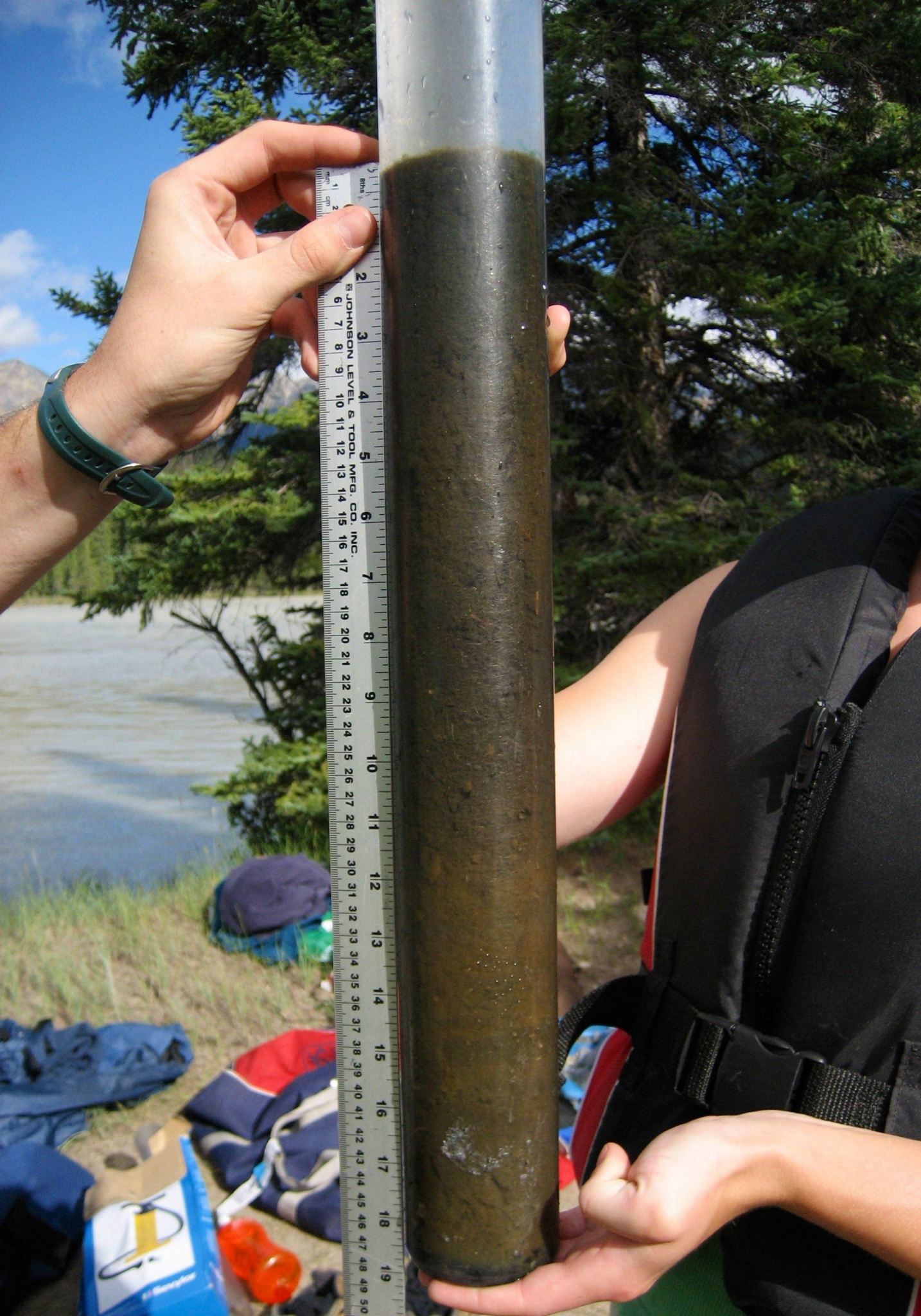


Uneven Canopy



Tree-ring Results

- Evidence of both high and low-severity fires (1771-2013 CE)
- Vegetation characteristics and tree-ring data suggest that there has been a mixed-severity fire regime over the past few centuries (at least)
- How does this compare to the past?

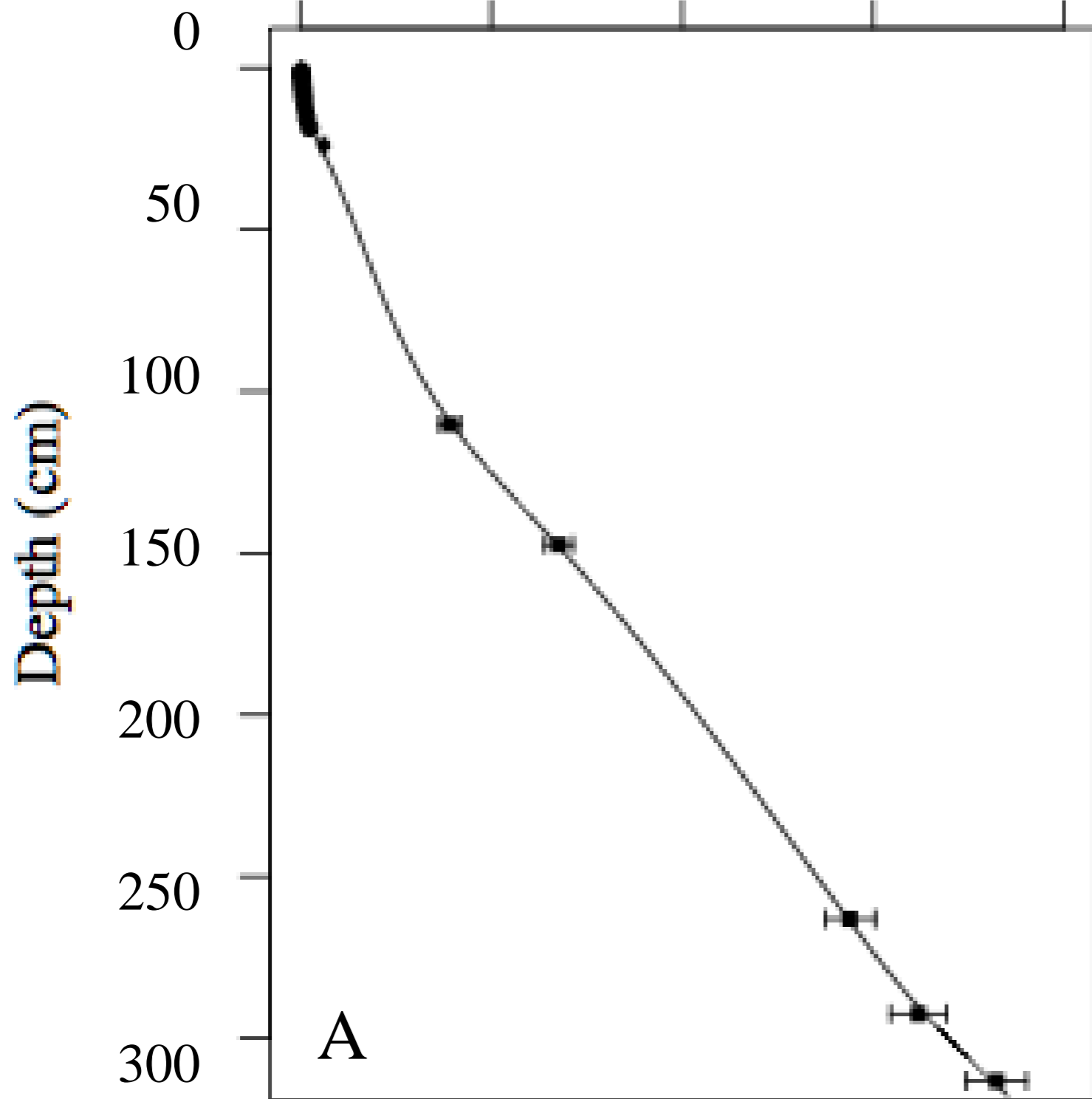


Lake Sediment

Used for macroscopic charcoal and pollen analyses

Year BP

0 1000 2000 3000 4000



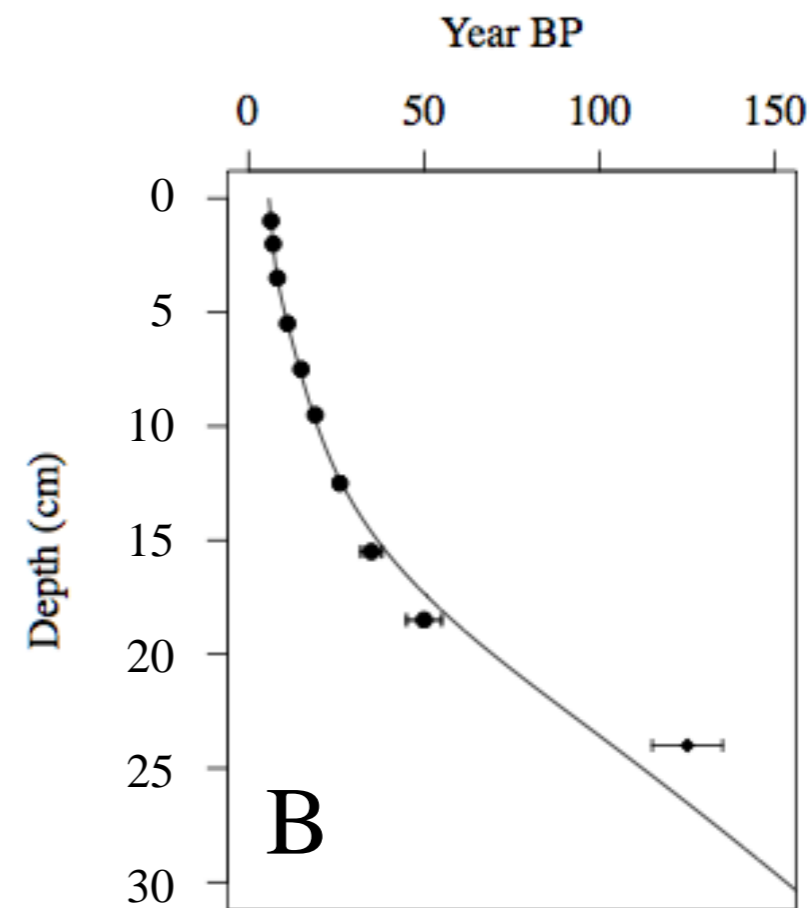
A

Age-Depth Model

^{210}Pb

Tree-ring data

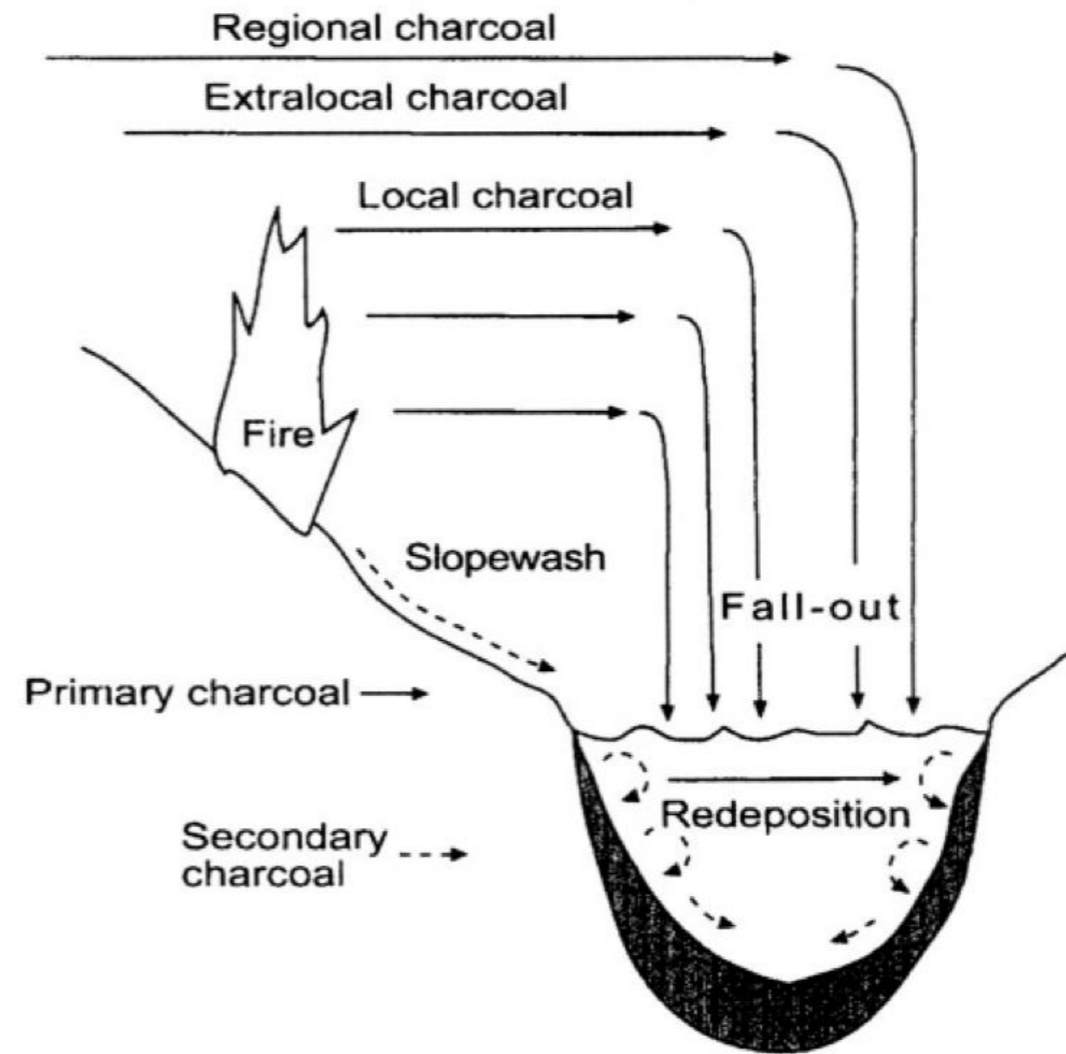
AMS dating



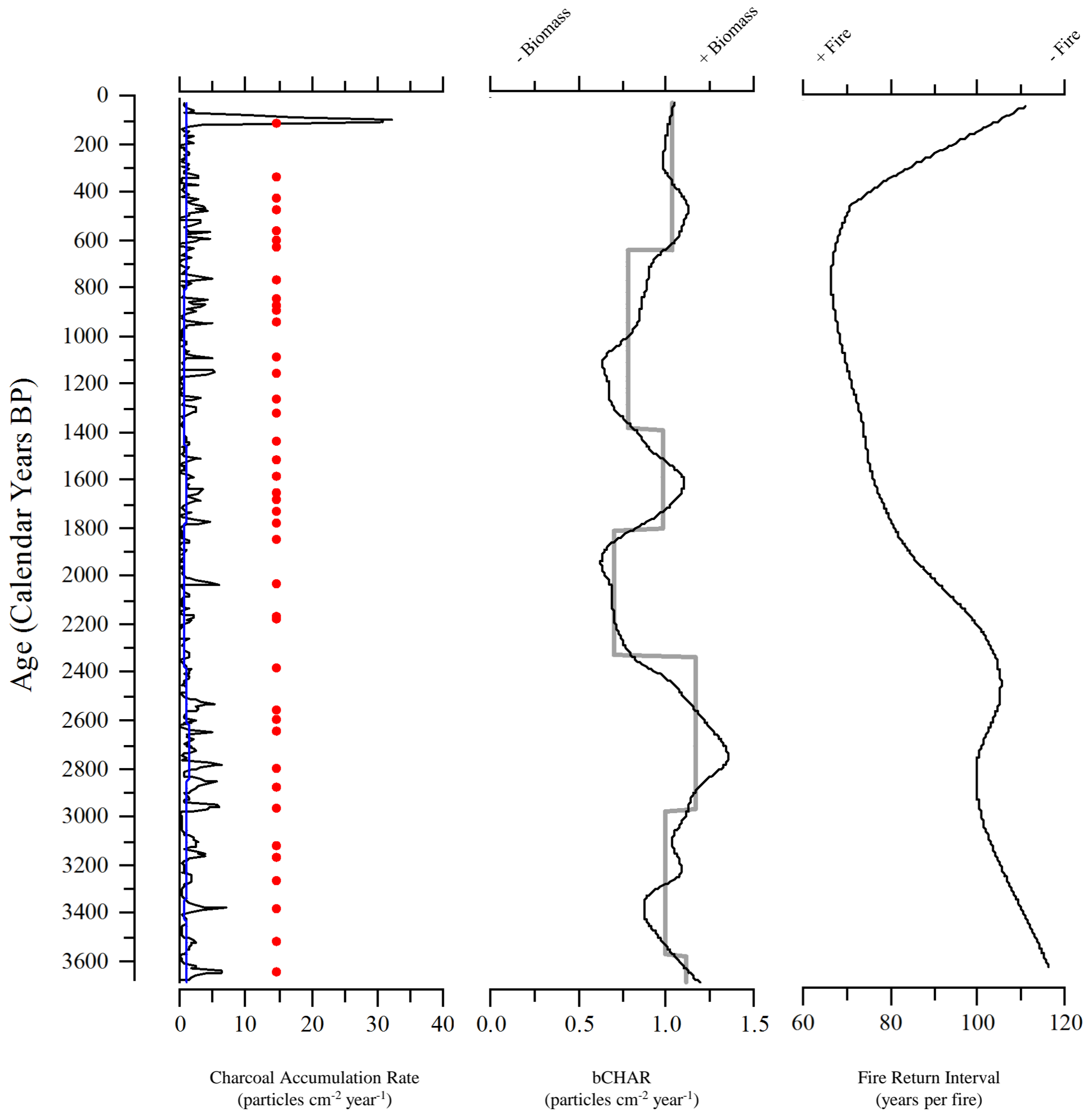
B

Charcoal Analysis

Captures signal of local, historical fire events

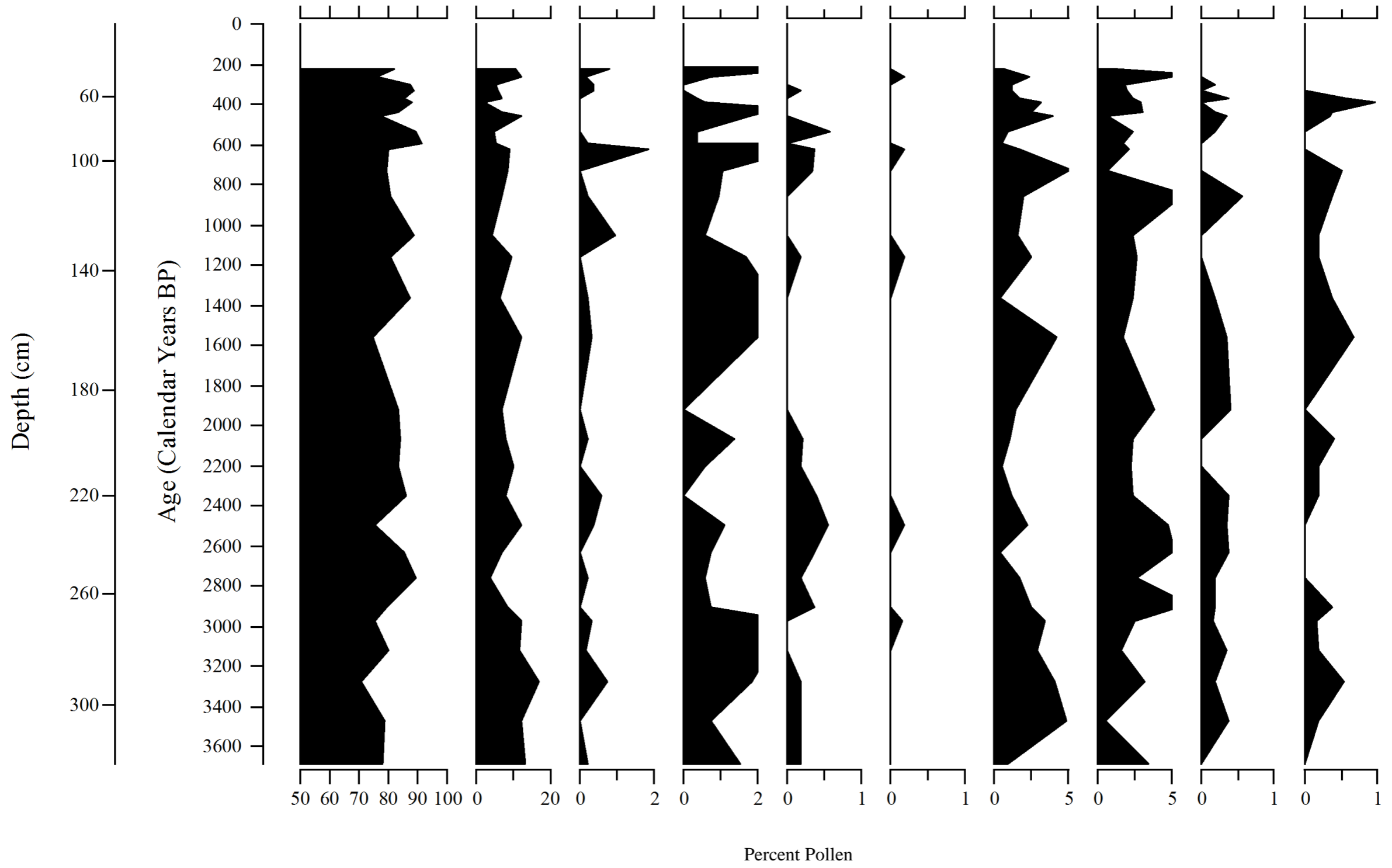


From Whitlock & Larsen, 2001



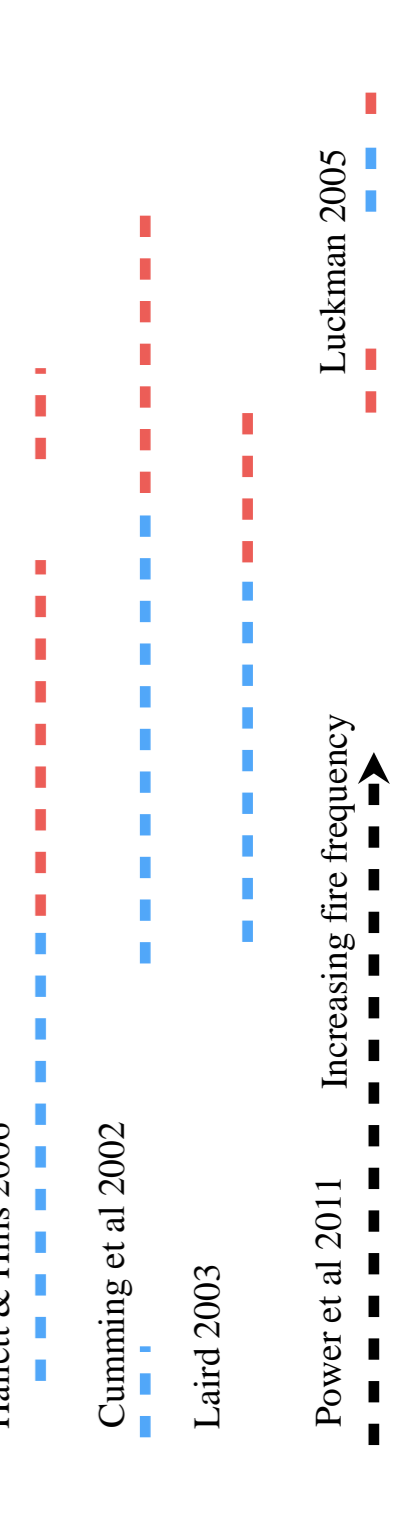
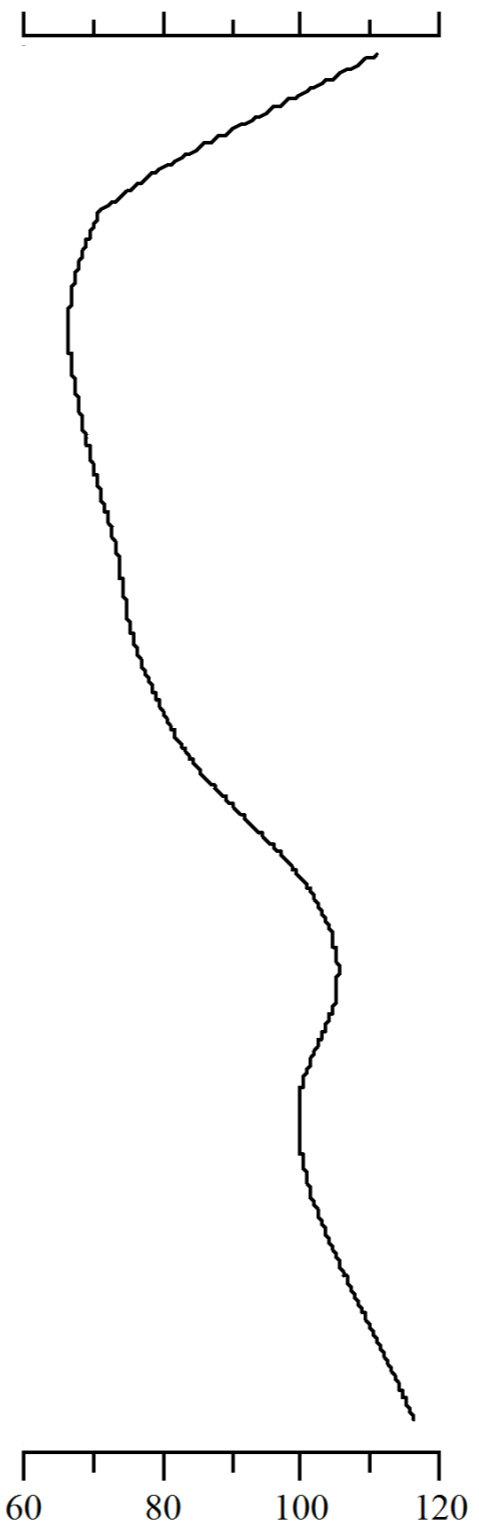
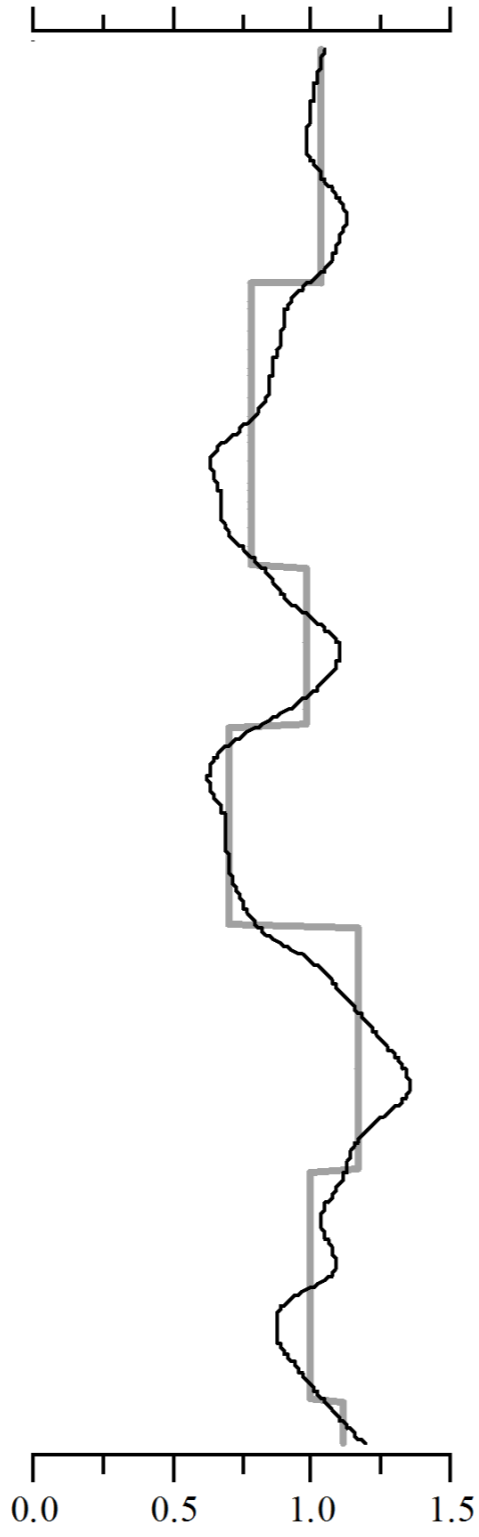
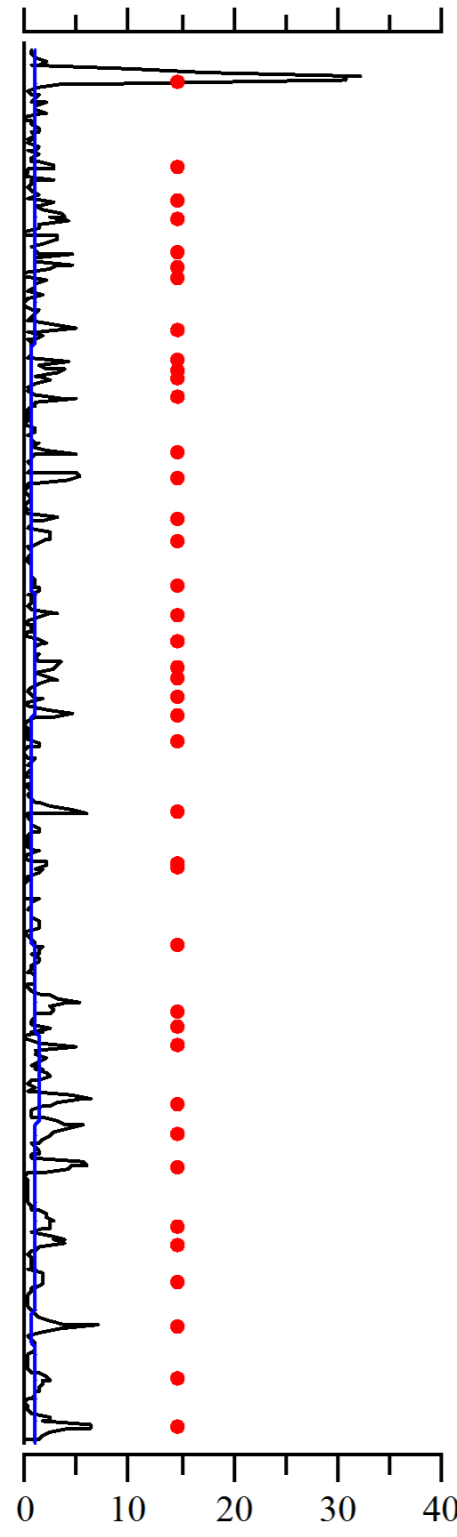


Pollen Analysis
changes in regional
vegetation composition
through time



Age (Calendar Years BP)

0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600



Conclusions

- The area is characterized by a mixed-severity fire regime
- Changes in vegetation and fire activity have occurred in response to changes in climate
- Significant change in fire and vegetation in contemporary period from what would be expected
- Methods have high applicability to other locations where fire history is not well documented, or where a long-term perspective is desirable



Thanks!



N SERC
CRSNG



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Questions?



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