High-resolution pollen-inferred paleoclimate and fire records from the southern boreal forest/aspen parkland ecotone in Saskatchewan, Canada

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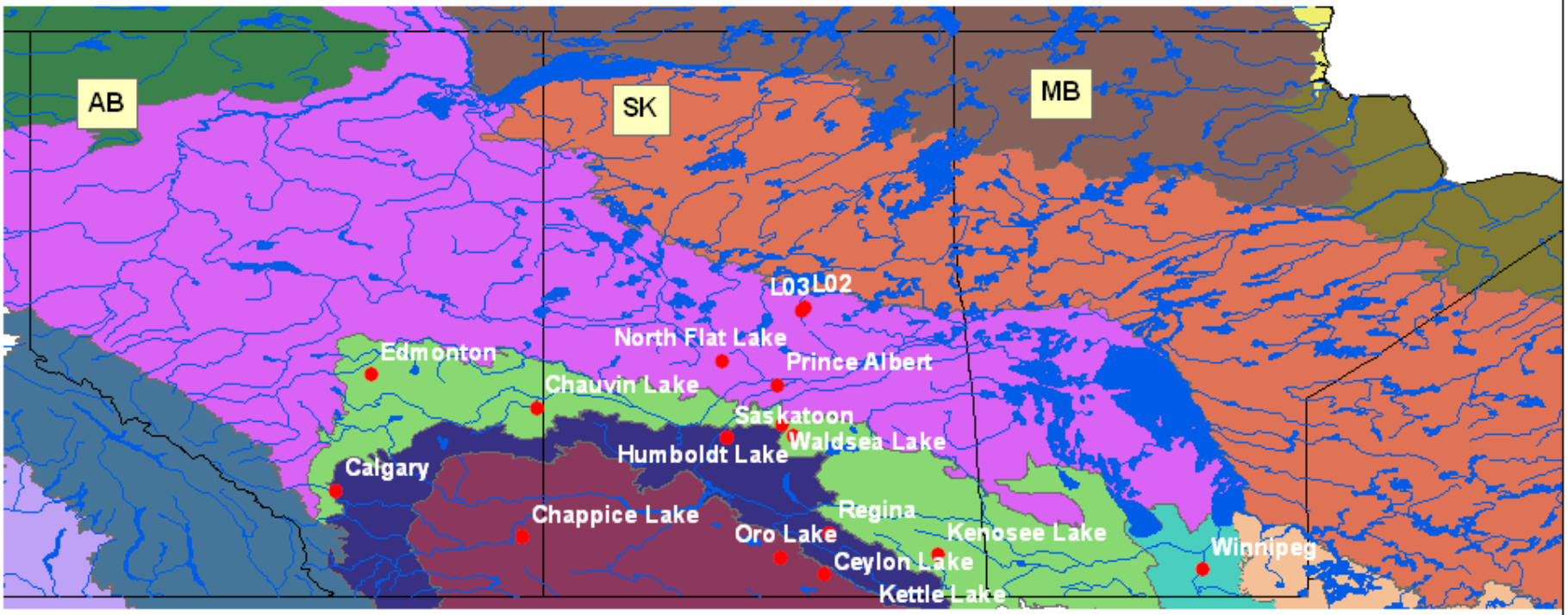
Photo: Melissa Ranelli

3 Sites:

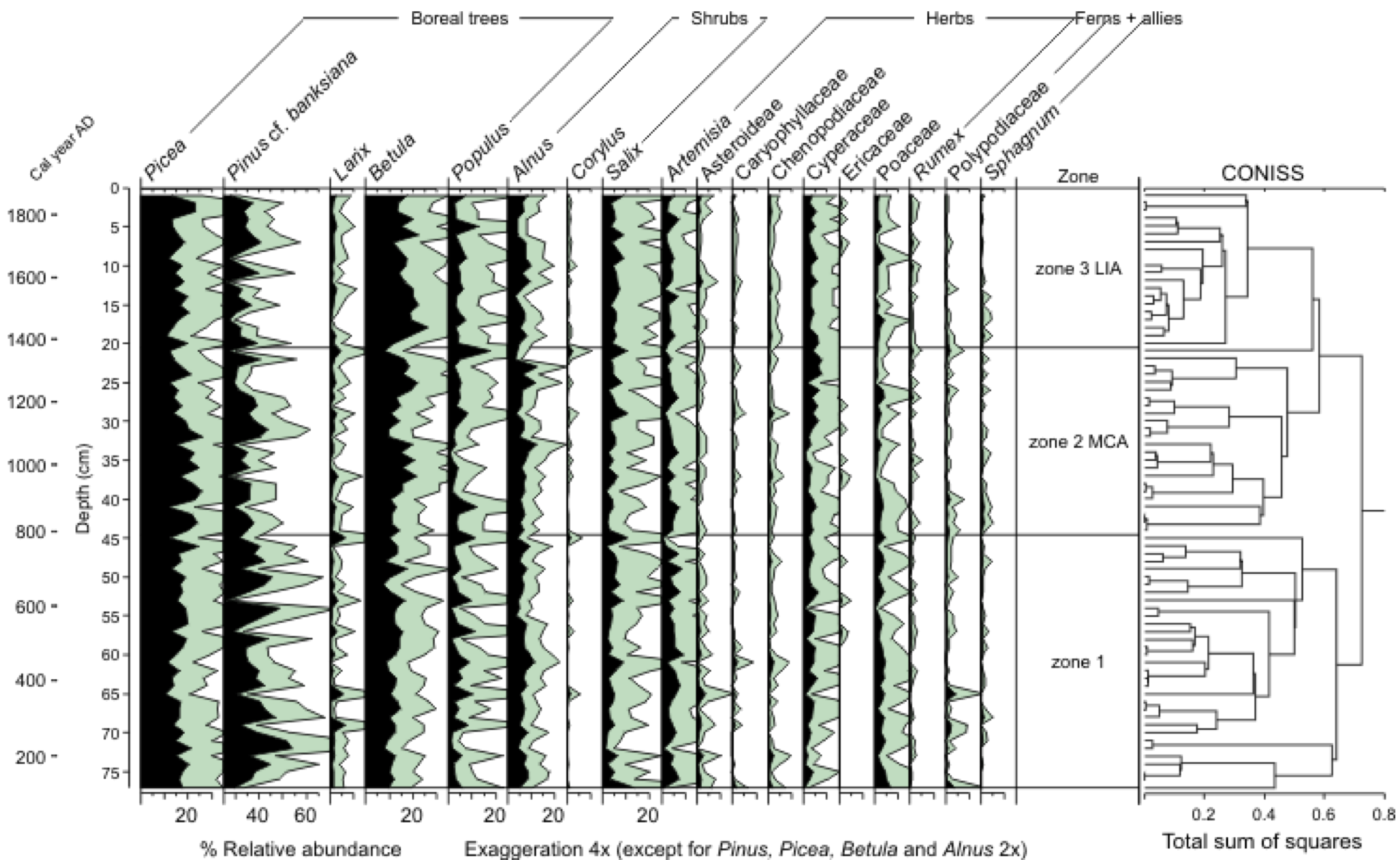
North Flat Lake
AD 115-1885

Lake L03 AD 1430-2003

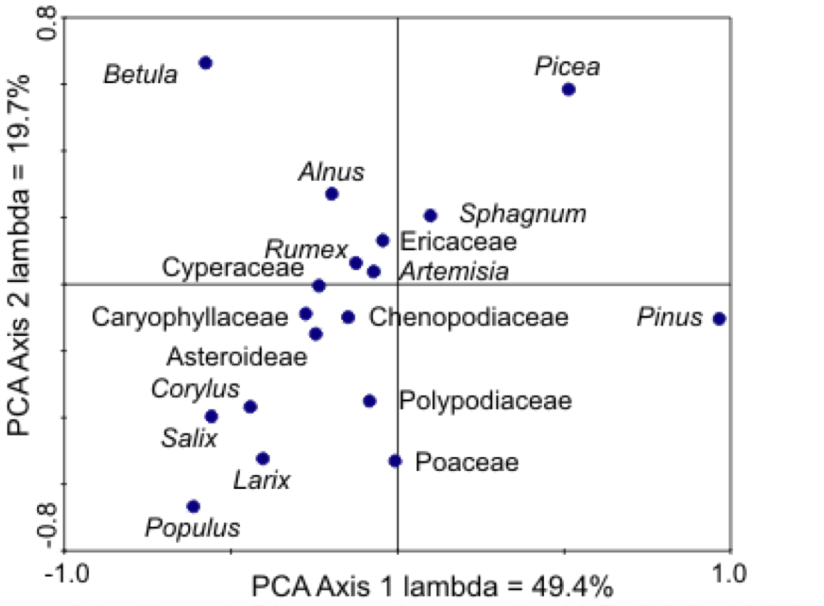
Lake L02 AD 1811-2003



North Flat Lake Pollen Relative Abundances

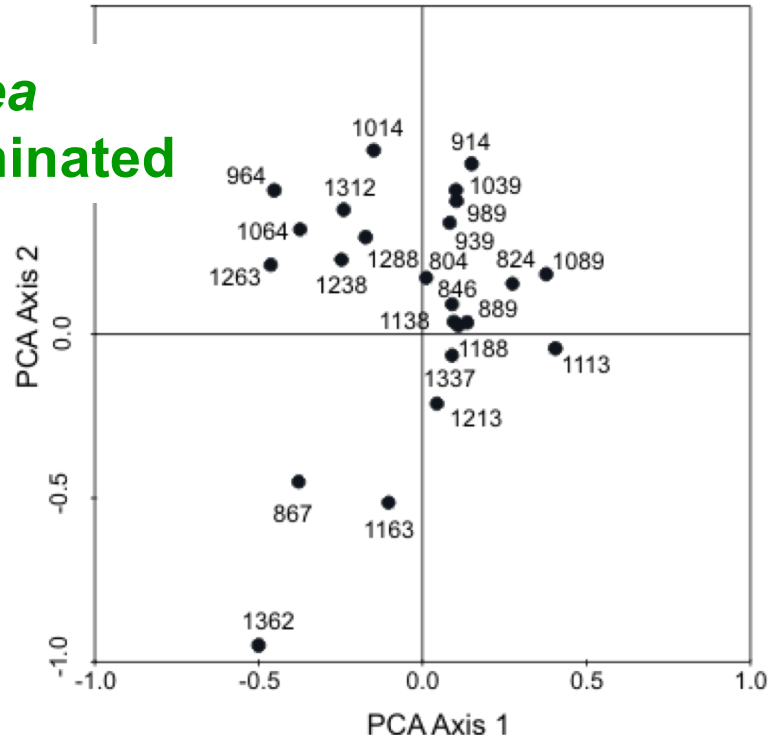


North Flat L. pollen ordination



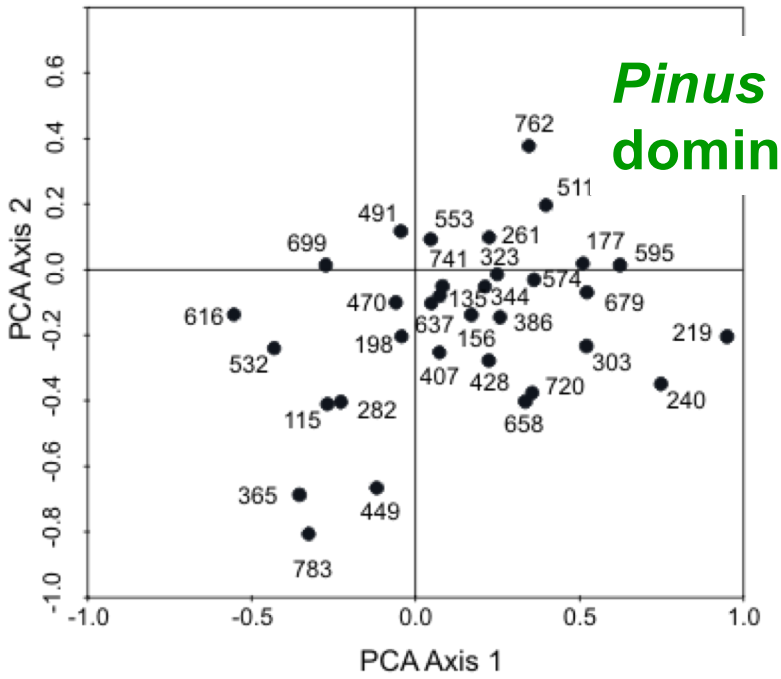
Medieval Climate Anomaly (AD 795-1375)

Picea **dominated**



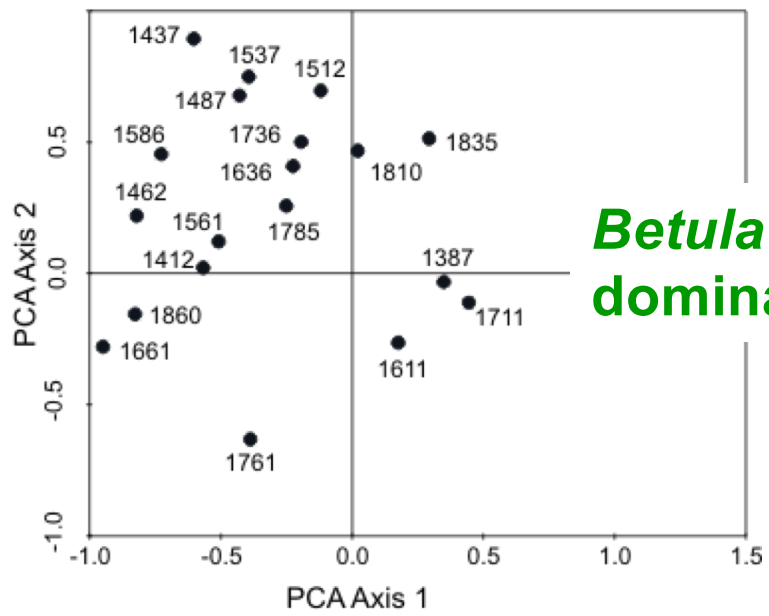
First millennium AD (AD 115-794)

Pinus **dominated**

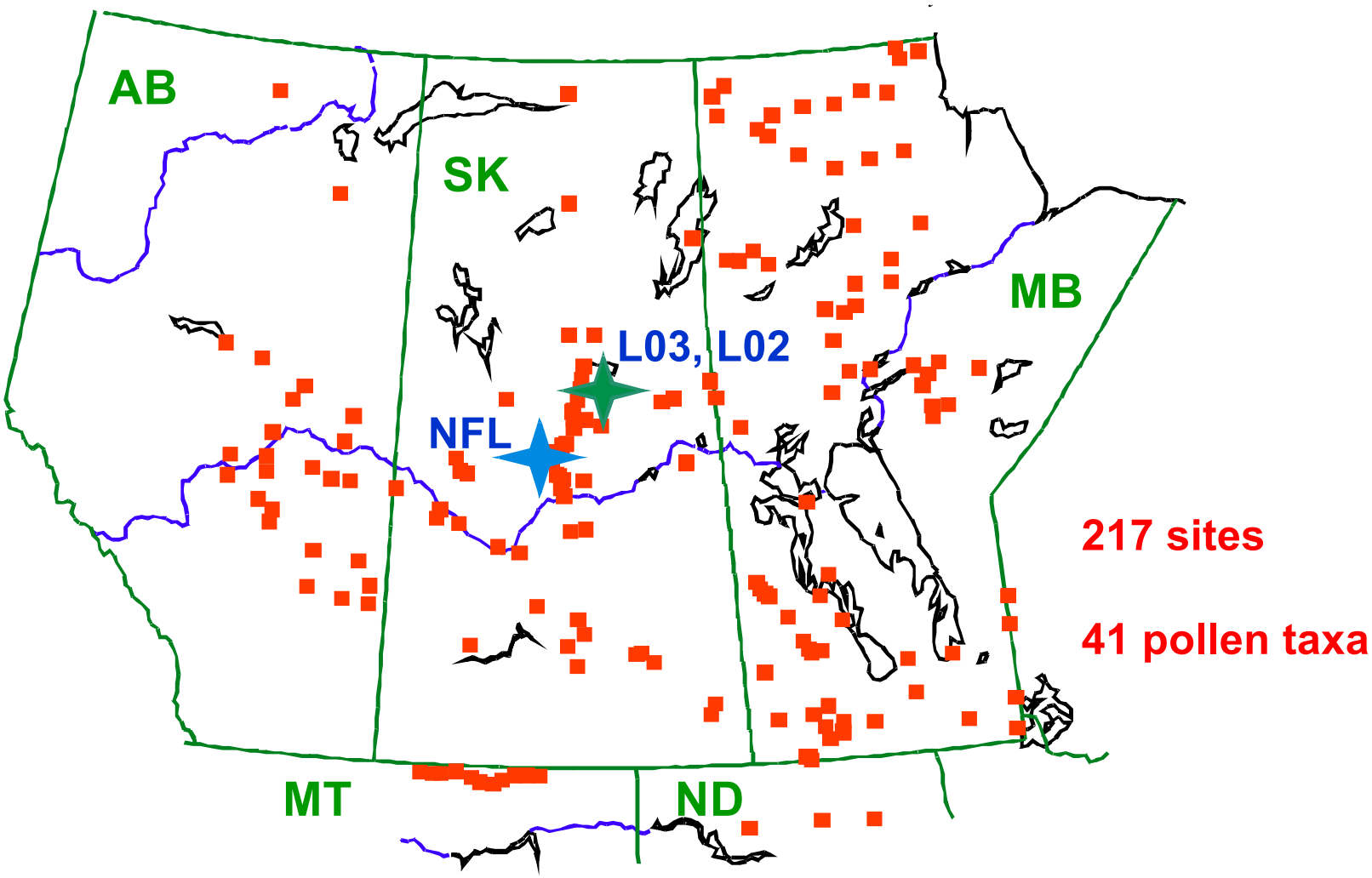


Little Ice Age (AD 1376-1885)

Betula **dominated**

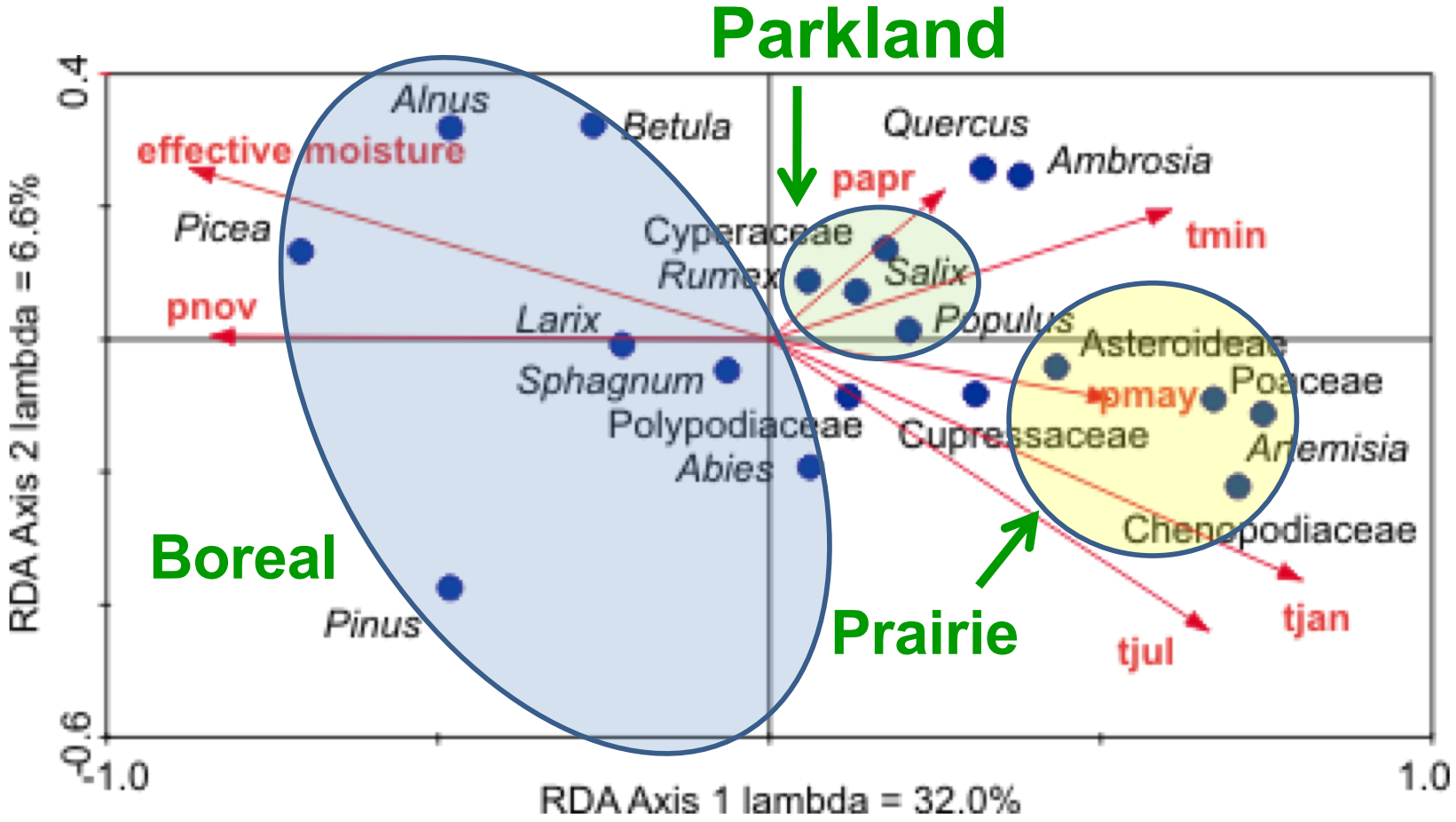


"Prairie-southern boreal" subset of Whitmore *et al*. (2005) paired pollen-climate dataset



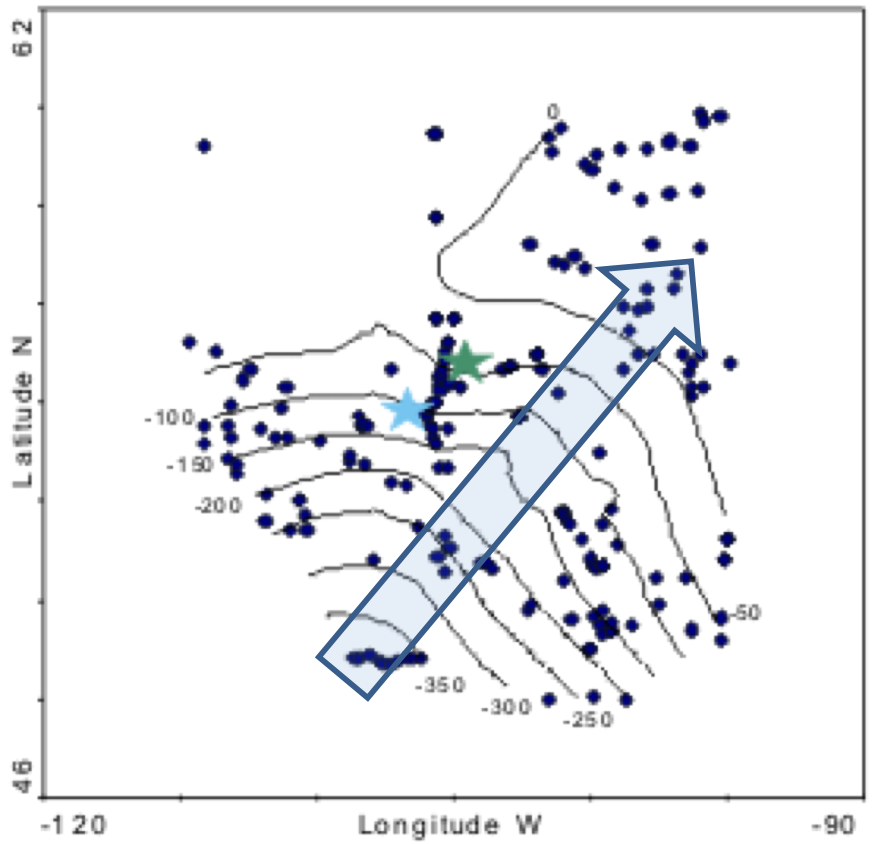
Prairie-southern boreal subset can be used to infer effective moisture

(following methodology of St. Jacques *et al.*, 2008)



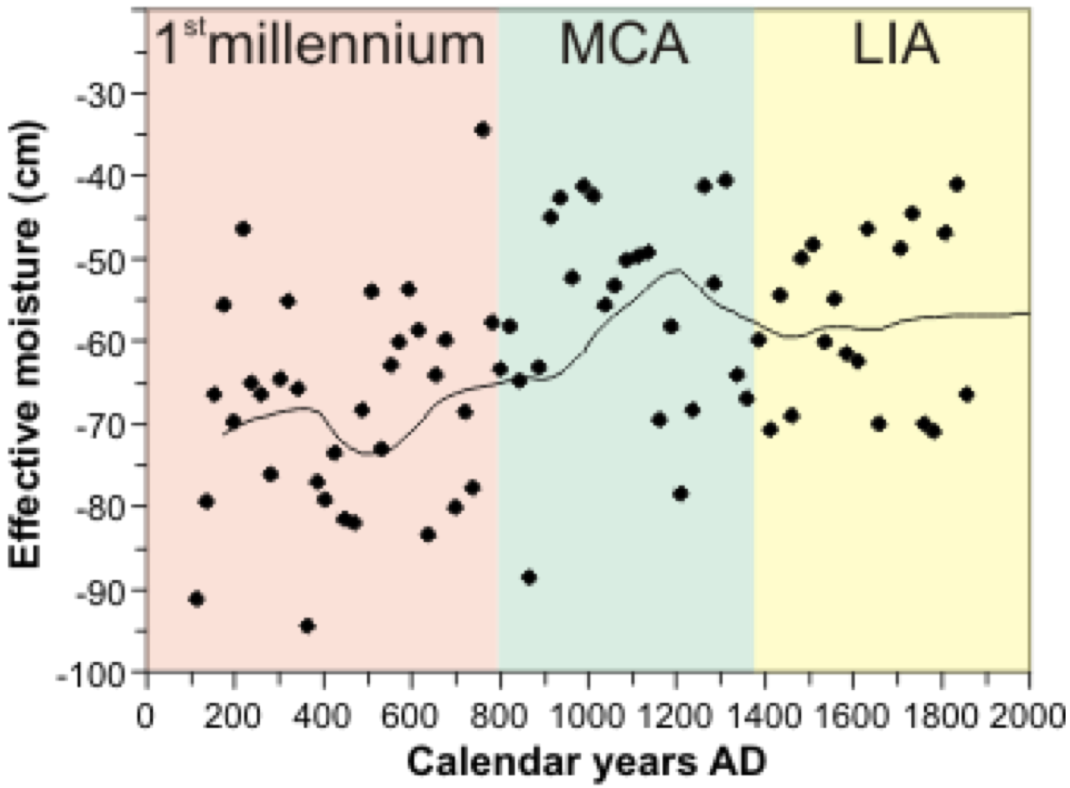
25% total pollen variability explained by effective moisture

Prairie Effective Moisture Gradient



Important gradient (Hogg, 1994)

North Flat Lake Effective Moisture Reconstruction

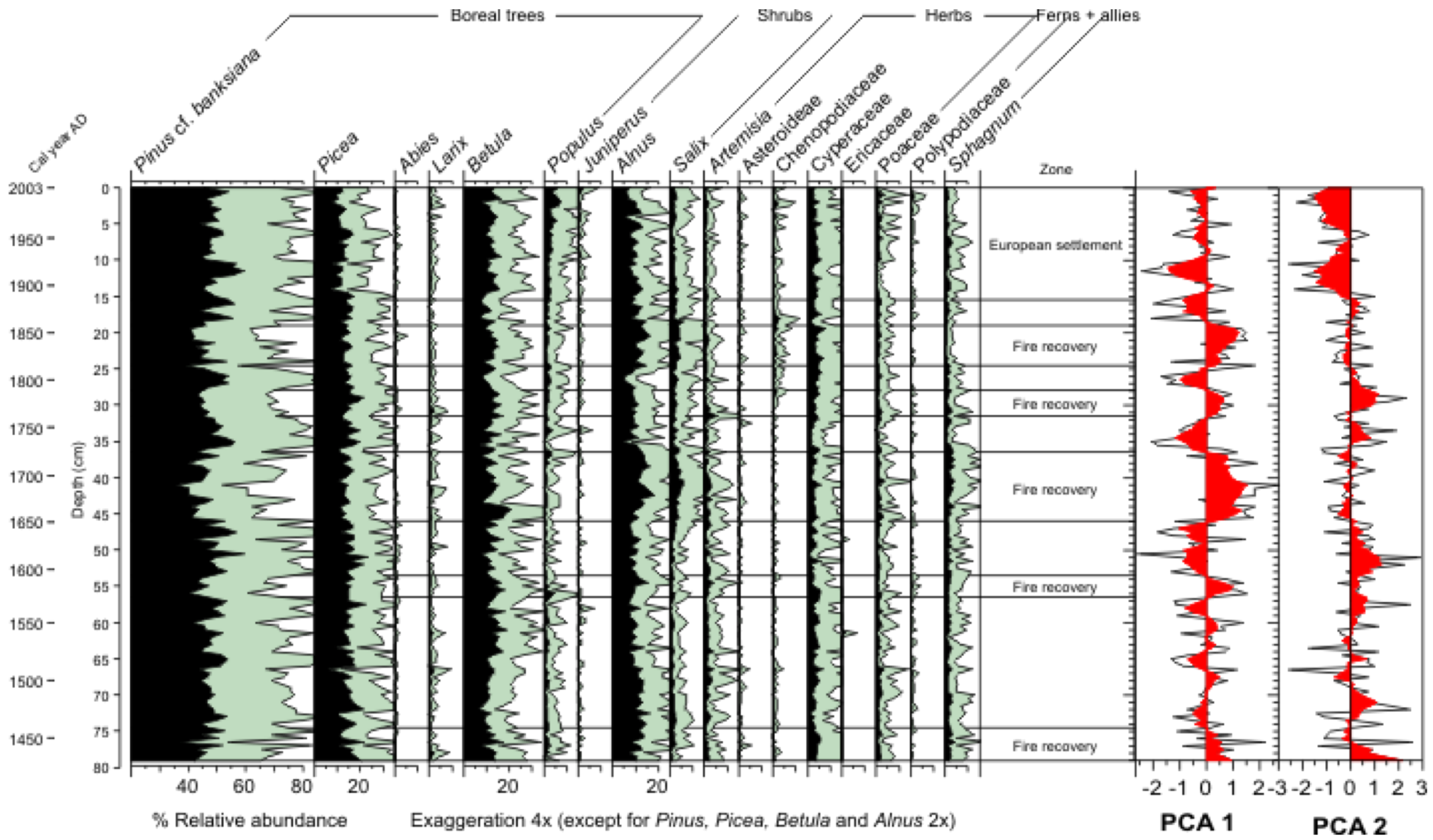


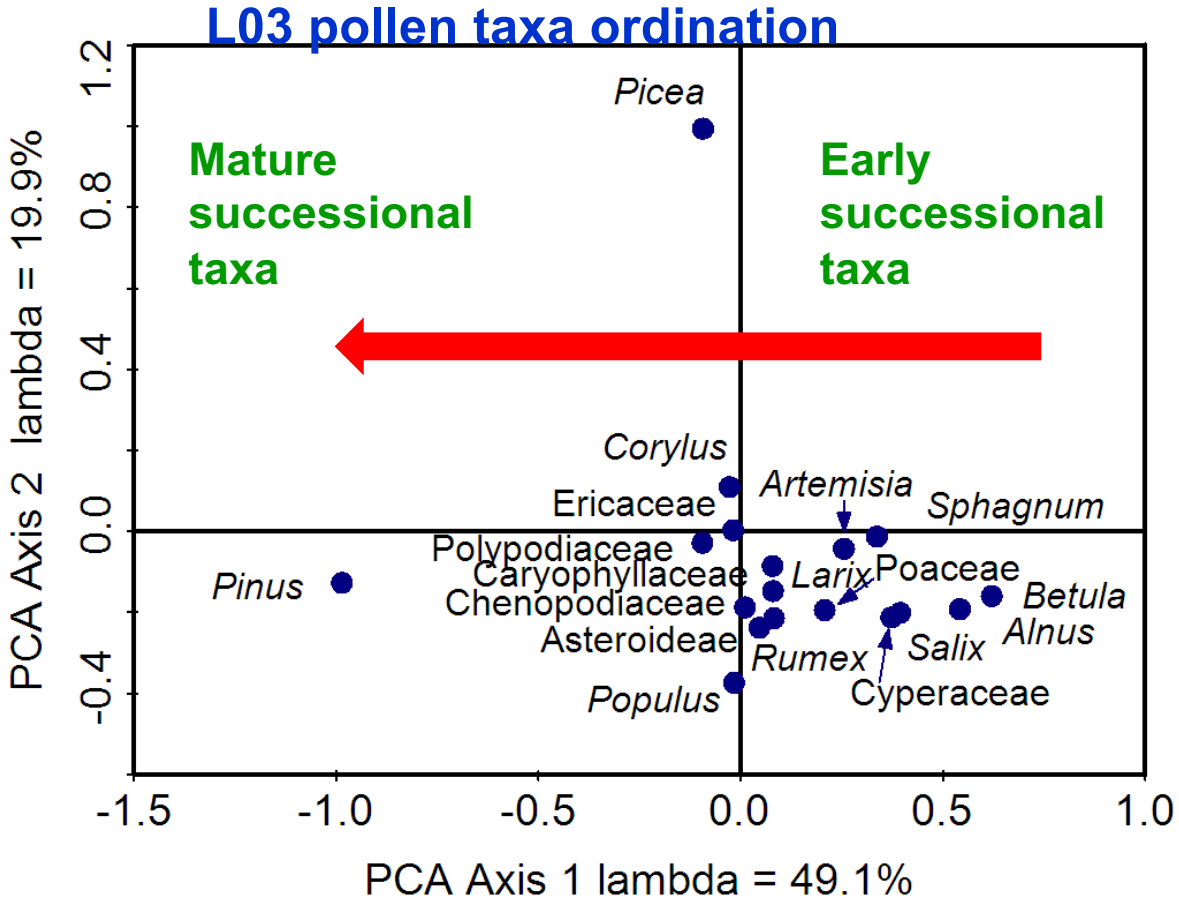
WA-PLS 2 used ($r^2 = 0.71$).

Corroborated by Humboldt Lake, SK, diatom-inferred salinity record (Laird *et al.*, 2003).

Manito Lake, SK, suggests cold 1st millennium (Ginn and Last, *in prep.*).

Lake L03 Pollen Relative Abundances

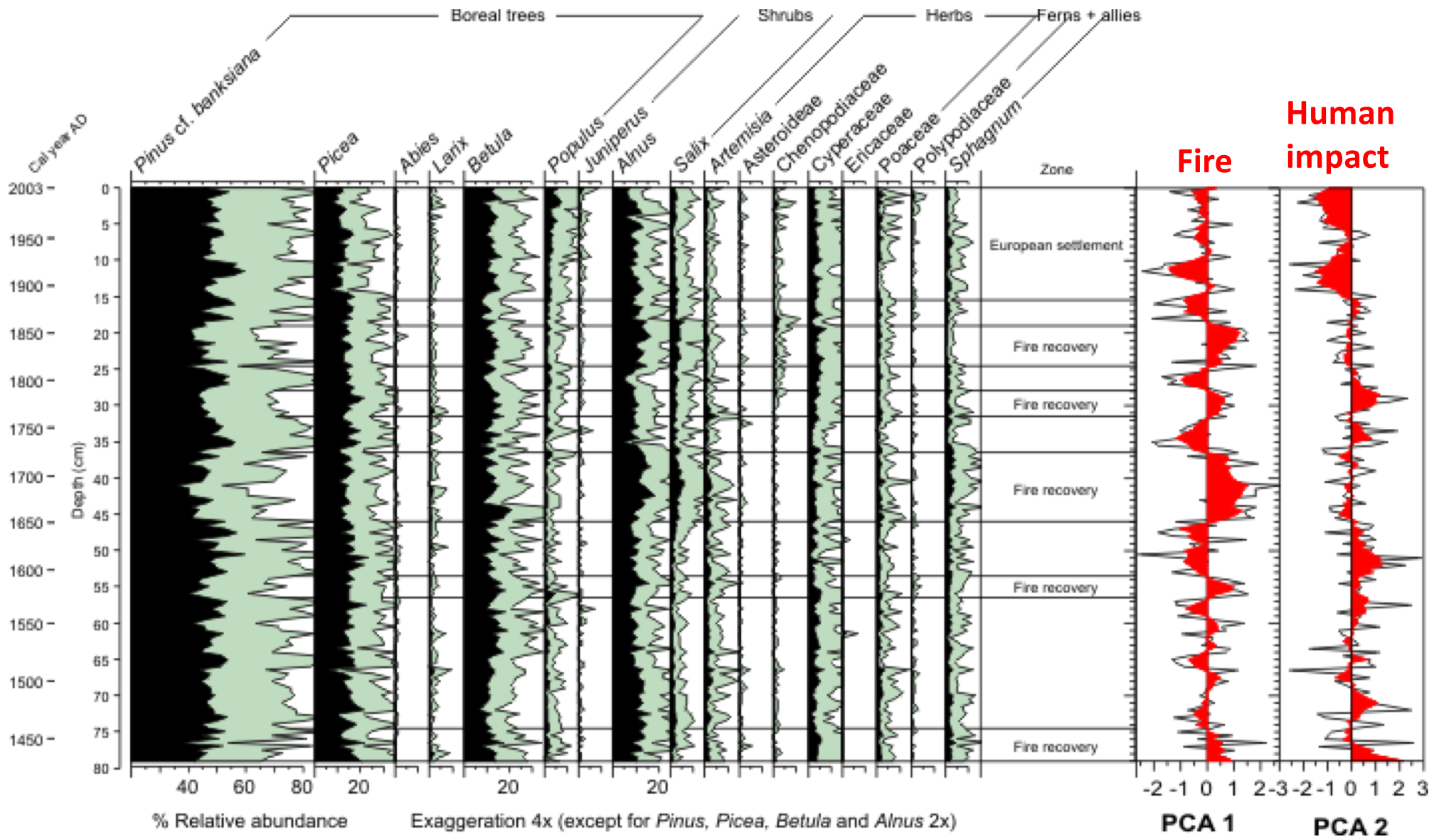




Fire: major disturbance in the boreal forest

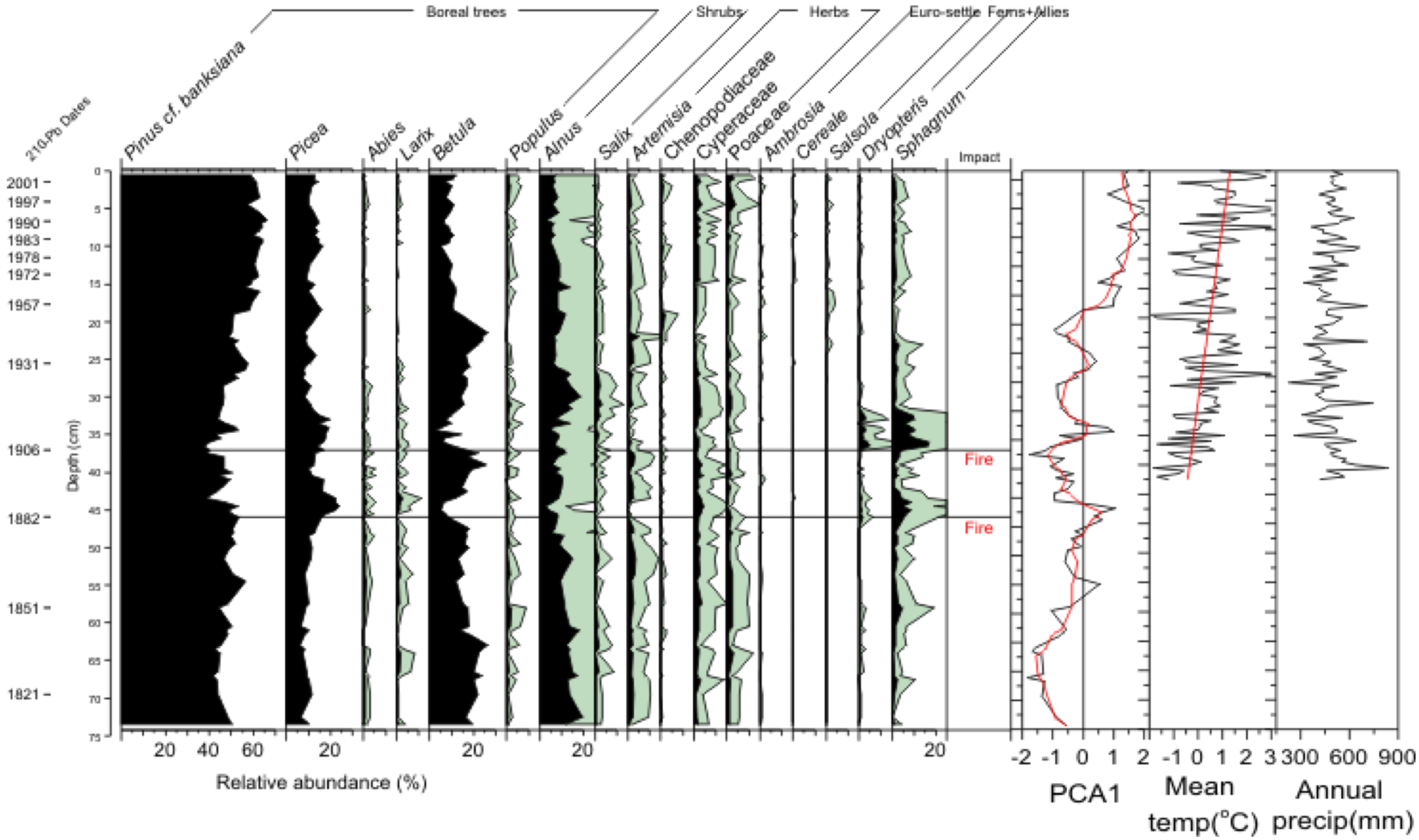
Photo: Melissa Ranelli

Lake L03 Pollen Relative Abundances: A Fire Record



Fire frequency less early Little Ice Age?

Lake L02 Pollen Relative Abundances:
Historical fires and increasing temperatures



Actual changes due to absolute declines in *Betula* and *Alnus*.

Conclusions:

- North Flat Lake pollen-climate transfer function analysis shows a very arid first millennium AD, a moist MCA, and a drier LIA.

- Lake L03 shows a more active fire regime in the late LIA (AD 1662-1890), than in the early LIA (AD 1430-1661).

- The most recent century stands out as distinct in both Lake L02 and L03, with taxa changes consistent with drying and fire suppression.

- Interpretable changes are detectable in late Holocene, high-resolution pollen records from the boreal forest and aspen parkland. Their analysis is greatly aided by ordination and transfer function statistics.

Acknowledgements

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SUSTAINABLE FOREST MANAGEMENT NETWORK

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CANADIAN MODEL FOREST NETWORK

RÉSEAU CANADIEN DE FORÊTS MODÈLES