GO **BEYOND BOUNDARIES**

The Holocene Pyroecology *of* MEF Site S2

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The New York Times (2025)

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Project Aims

- *Reconstruct* **local** and **regional** Holocene **wildfire activity** within the MEF forested peatlands (S1 & S2)
- *Assess* the **continuity** in local and regional **fire records** between MEF peatland sites
- *Contextualise* modern assessments of the **carbon balance** in NA forested peatlands under climate change

S2 Site

Densley-forested **“kettle hole” peatland** – glacial retreat ice-block depression (~15-10kyr)

Picea mariana dominated, with *Larix laricina* and minor *Pinus strobus* (inc. lagg).

Mosses include *Sphagnum* spp. (*medium*), *Pleurozium s.*, and *Polytrichum* spp. and shrubs include *Chamaedaphne calyculata* and *Rhododendron groenlandicum* (dominant).

Verry & Janssens (2011)

Approach

6 mm
sub-sampling
~450
subsamples

Reference Collection

½ *for* **Macrofossil** Analysis

- **Charcoal Processing** → **Raman Spectroscopy**
- **Macrofossil Identification** → **Charcoal Image Analysis**

→ **Calorimetric, Volumetric** & **Morphometric** Fire Reconstruction

½ *for* **Geochemical** Analysis

- **Bulk Density** → **Isotope** Analysis
- **C:N** → **Carbon Accumulation**

S2 Core


0 10 20 30 40 50
40 50 60 70 80 90
80 90 100 110 120 130
120 130 140 150 160 170
160 170 180 190 200 210
200 210 220 230 240 250
240 250 260 270 280 290

S2 Core


Last 100 years?
Cyclical Terrestrialization "Failed Bogs"
~12,000 yr?
Post-glacial Lake Clay/Silt

S2 Core


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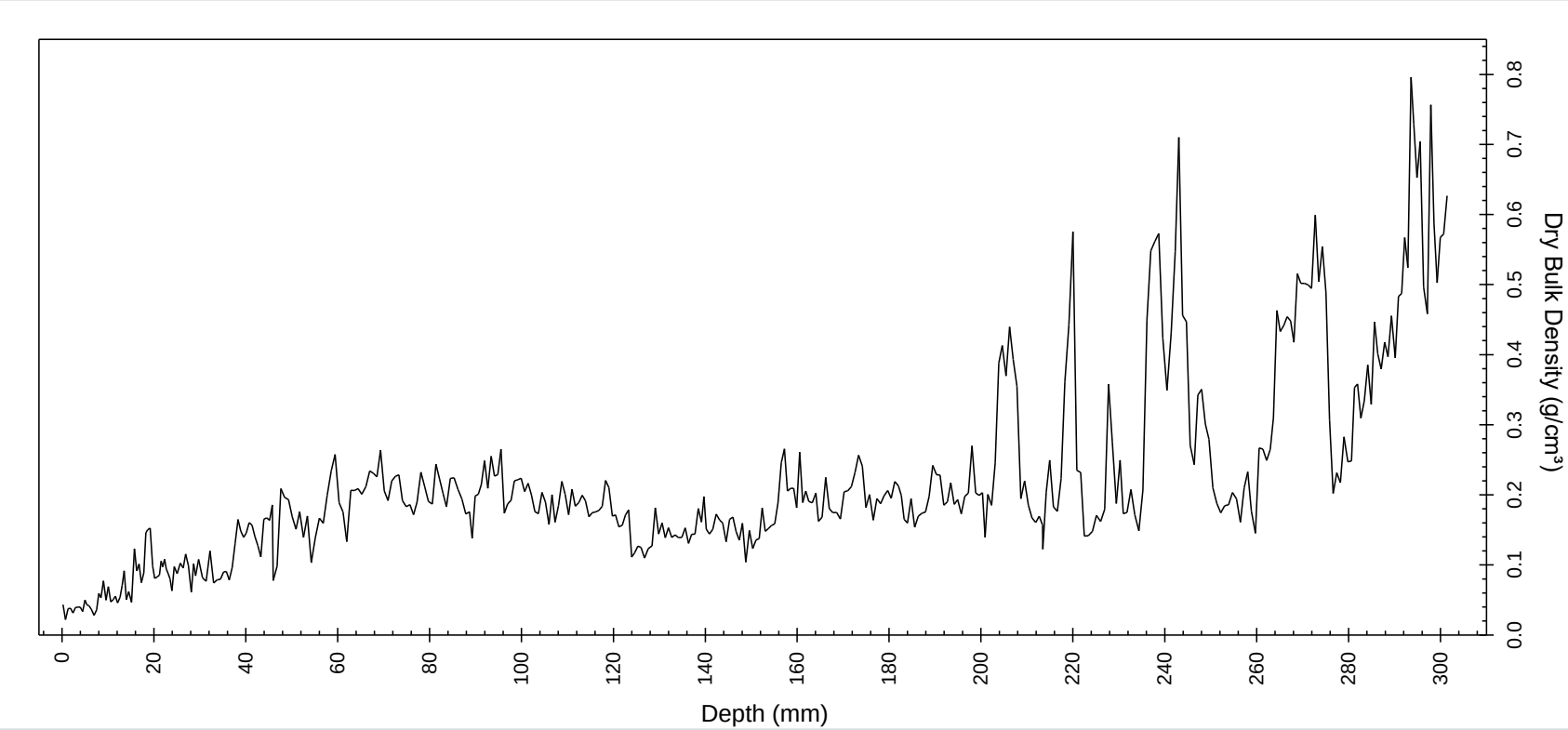
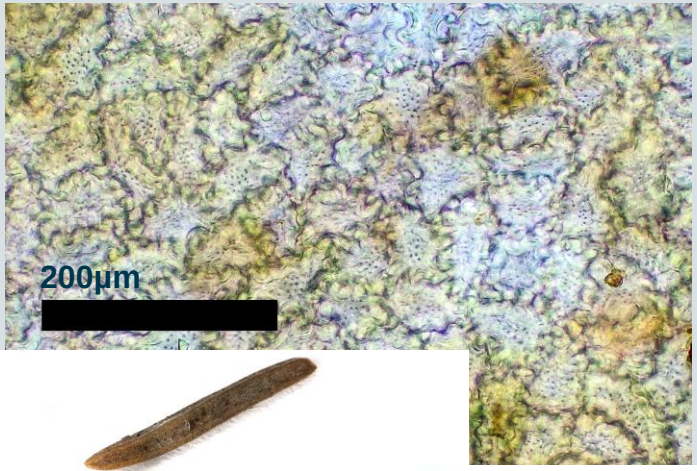
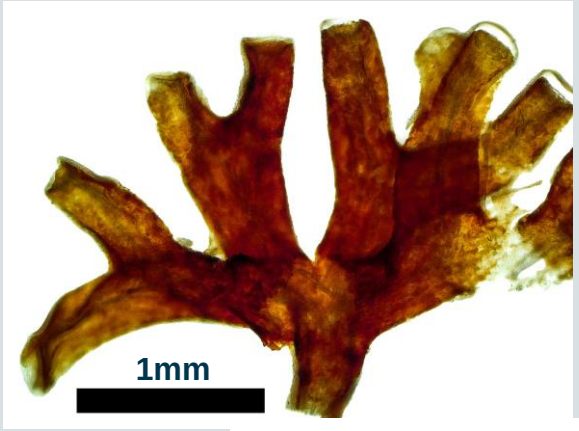
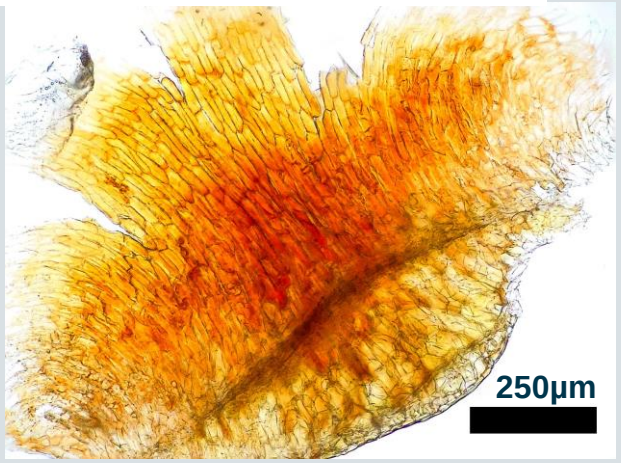
Bulk Density



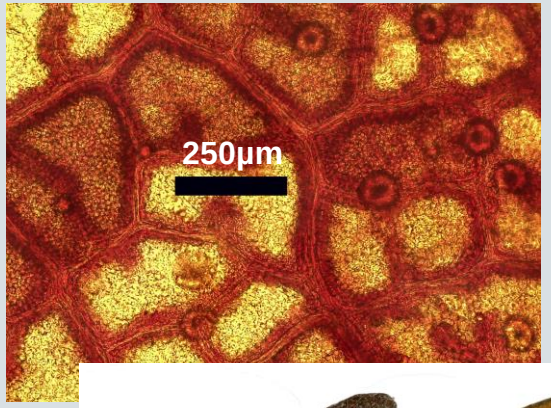
Macrofossil Analysis

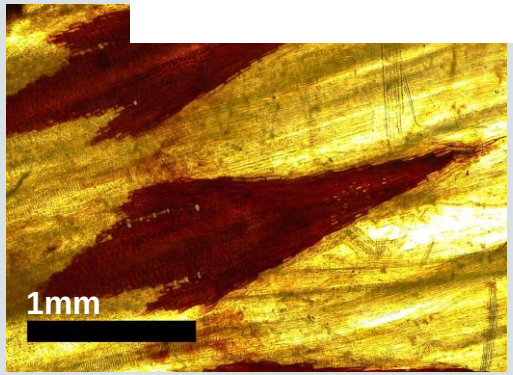


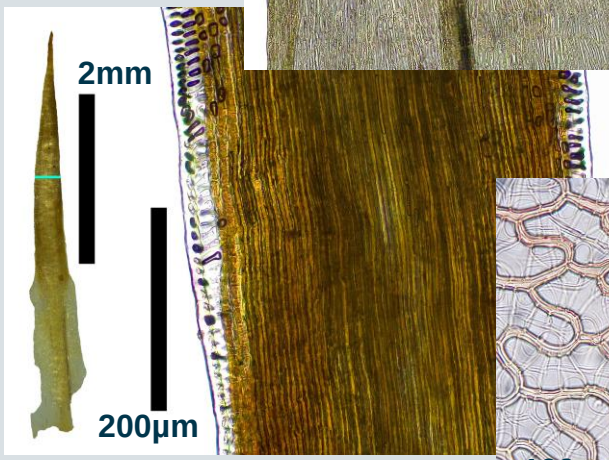


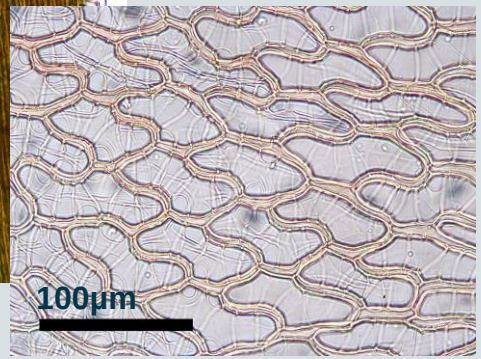


Macrofossil Analysis









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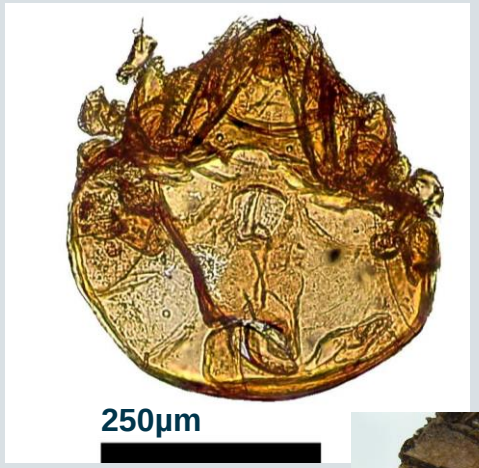
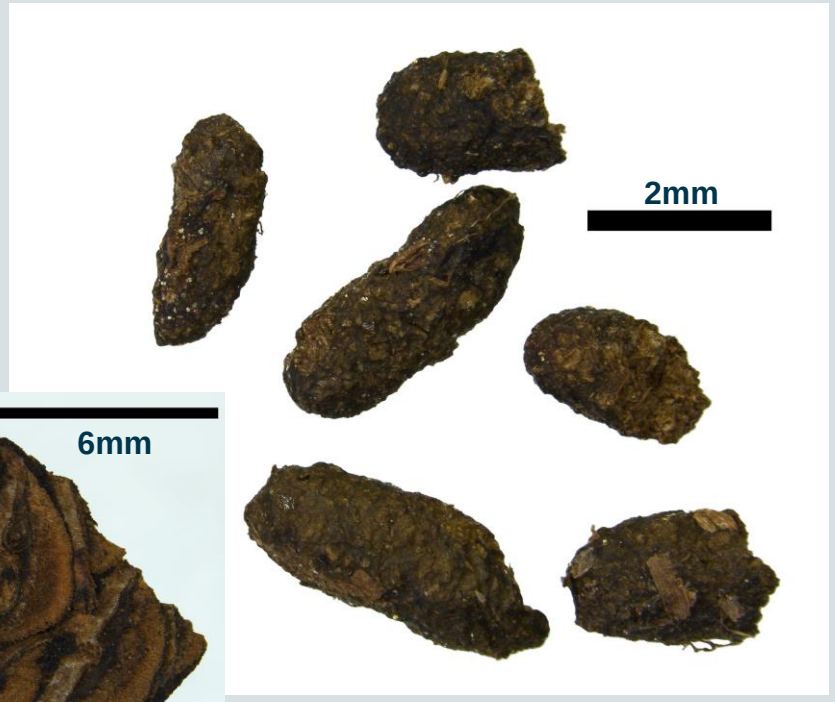
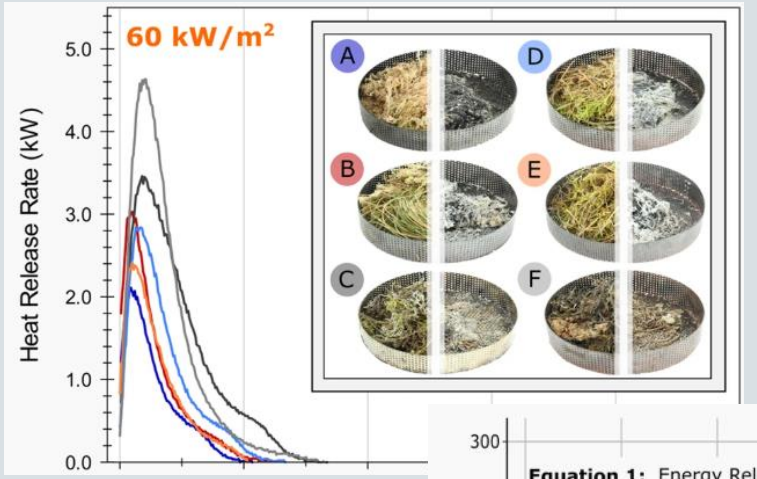
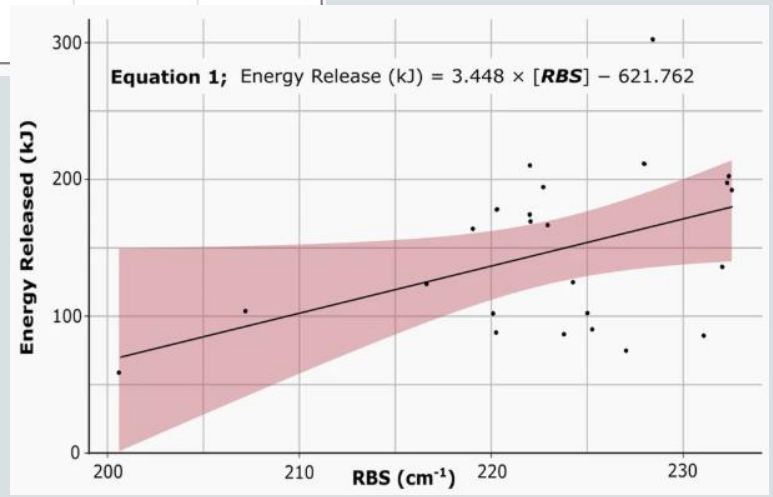




Fire Reconstruction



Theurer et al. (2024)



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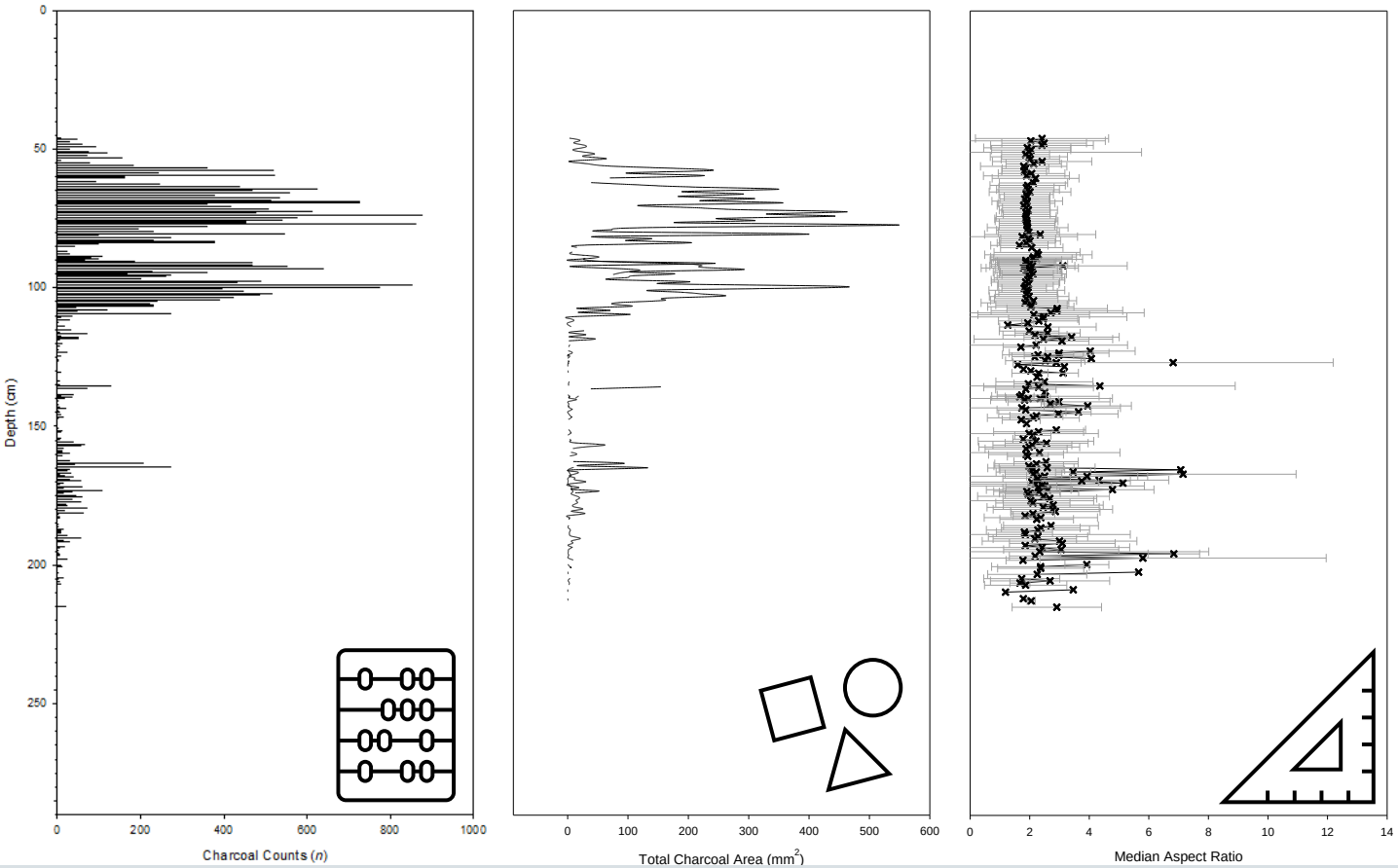

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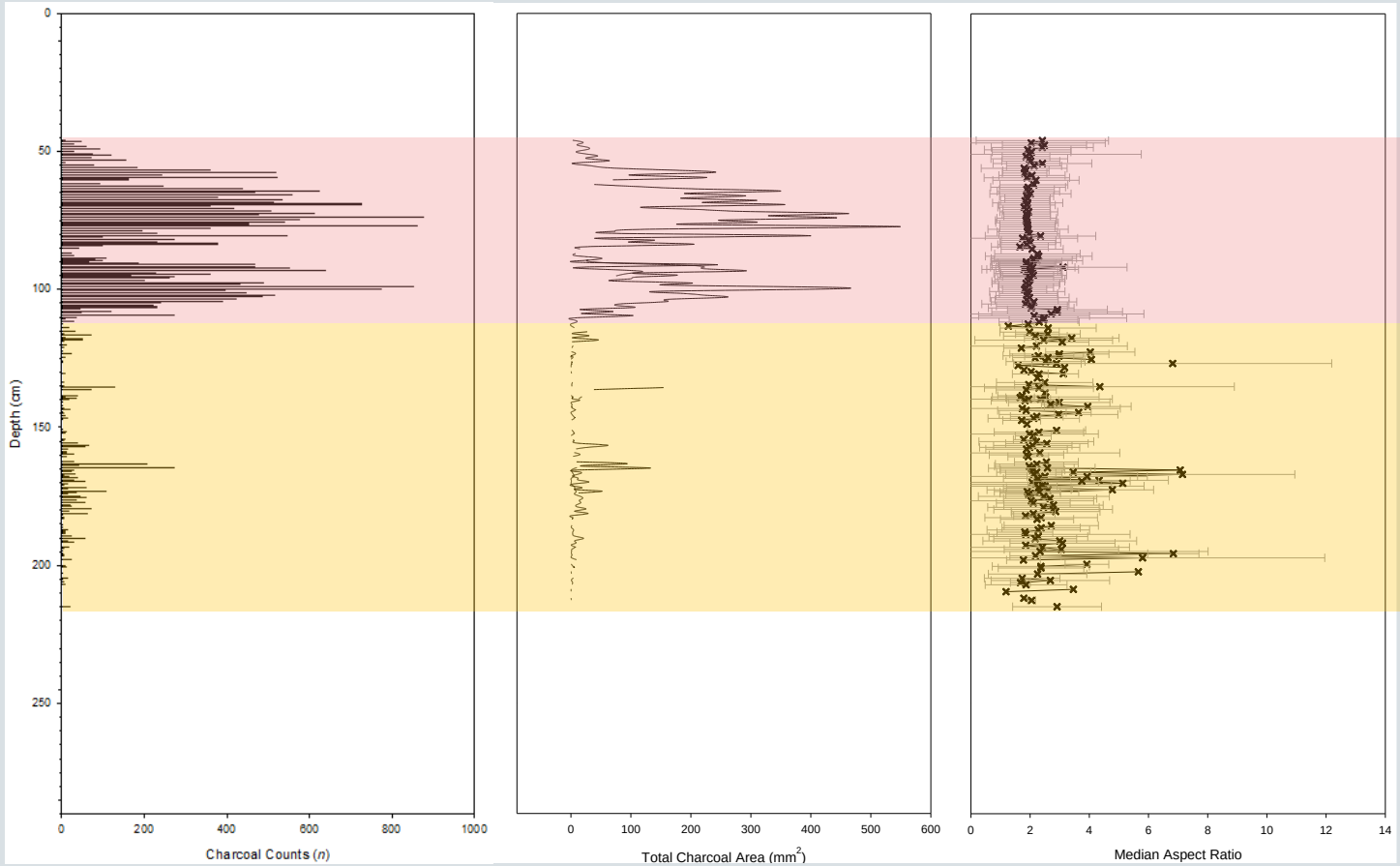
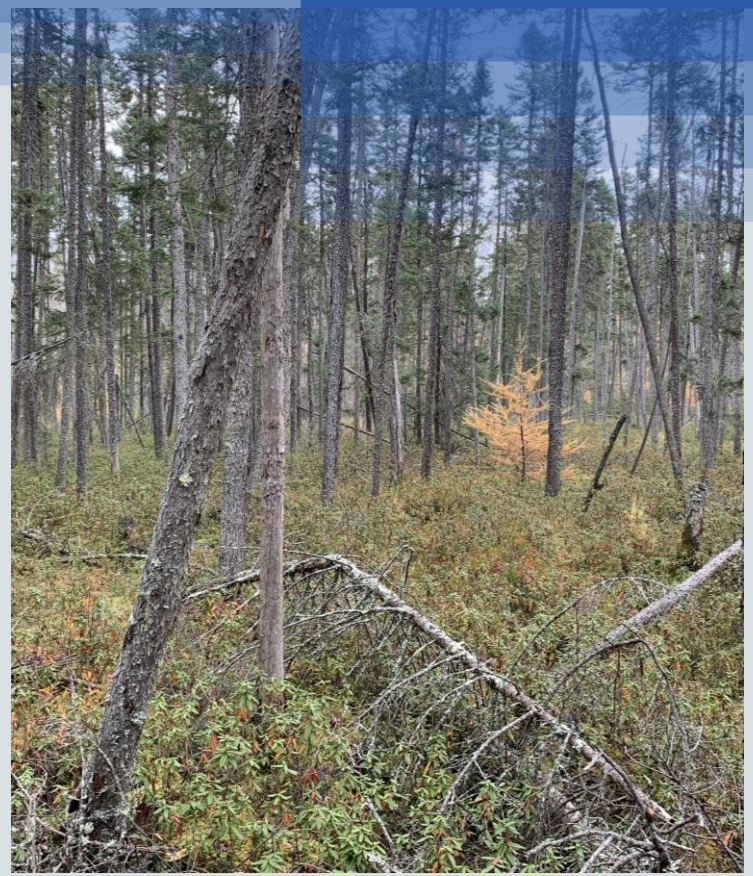


Increased Evidence of Fire Activity
Greater Fire Frequency?
Low Fuel Variability – Wood/Shrubs/Mosses

Reduced Evidence of Fire Activity
Lower Fire Frequency?
High Fuel Variability – Graminoid Inclusion



Next Steps

Radiocarbon → Accumulation Rate

C:N → Carbon Accumulation Rate

Fire Intensity Reconstruction

Pyrogenic Carbon Balance (Source/Sink)