

A decorative graphic on the left side of the slide. It features a central flower-like shape composed of several petals. The petals are filled with a close-up photograph of bright green moss. Surrounding the flower are four solid green circles of varying sizes: a large one at the top left, a medium one at the top center, a small one at the bottom left, and another medium one at the bottom center.

Microbial Biomass Carbon & qPCR Analysis of SPRUCE

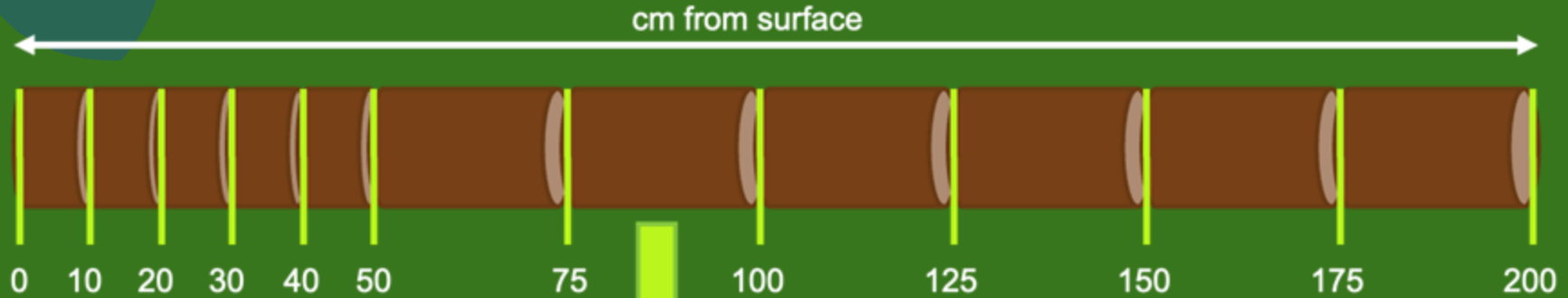
Skylar Calkins, Josh Birkebak
& Chris Schadt



Why Microbial Biomass Carbon (MBC)?

- Separate carbon from living microbes vs. in peat
- How are microbes impacted by changes in elevated CO_2 and temperature?
- Better parameterize biogeochemical models

EXPERIMENTAL SETUP



CHLOROFORM FUMIGATION EXTRACTION



- Chloroform for 48 hours
- Lyse microbes
- Release organic carbon



ANALYSIS VIA ELEMENTAR



- Catalytic high-temperature combustion
- NPOC $\rightarrow$ TOC $\rightarrow$ MBC

$$\text{NPOC}_{\text{sample}} = \text{TOC}_{\text{sample}} * (\text{Volume}_{\text{K}_2\text{SO}_4} / \text{Weight}_{\text{sample}})$$

$$\text{MBC} = (\text{NPOC}_{\text{fumigated}} - \text{NPOC}_{\text{unfumigated}}) / K_{\text{ec}}$$

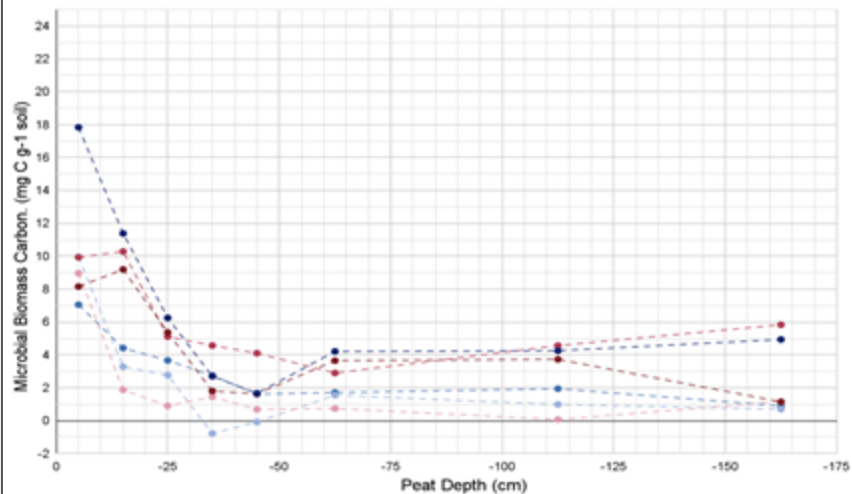
$$K_{\text{ec}} = 0.45 \text{ (efficiency constant for acid soils)}$$



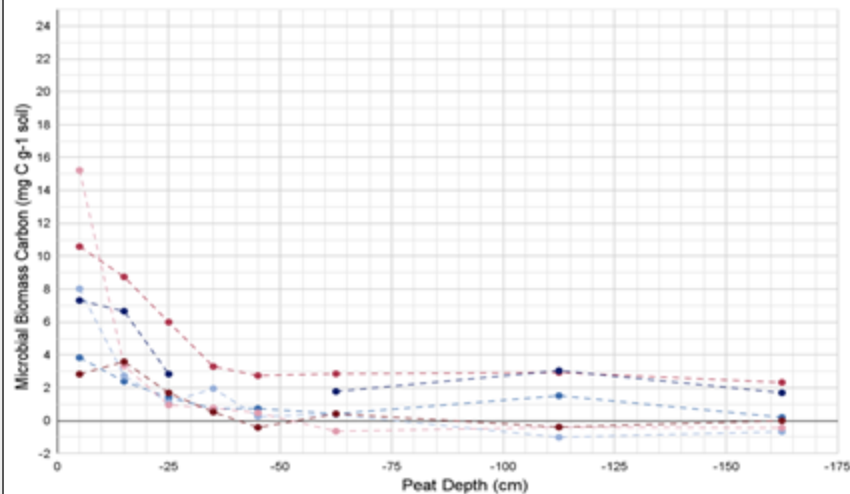
Microbial Biomass Carbon Assays



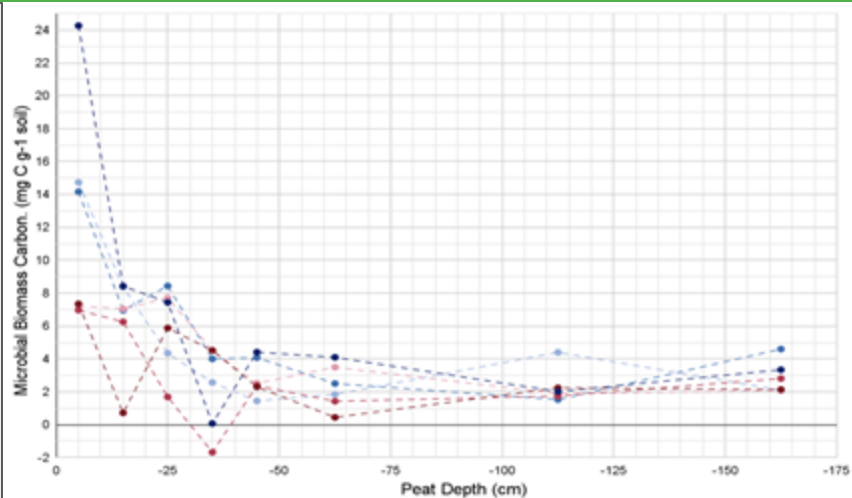
June 2021



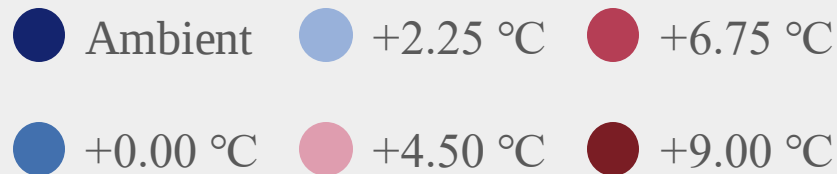
June 2022



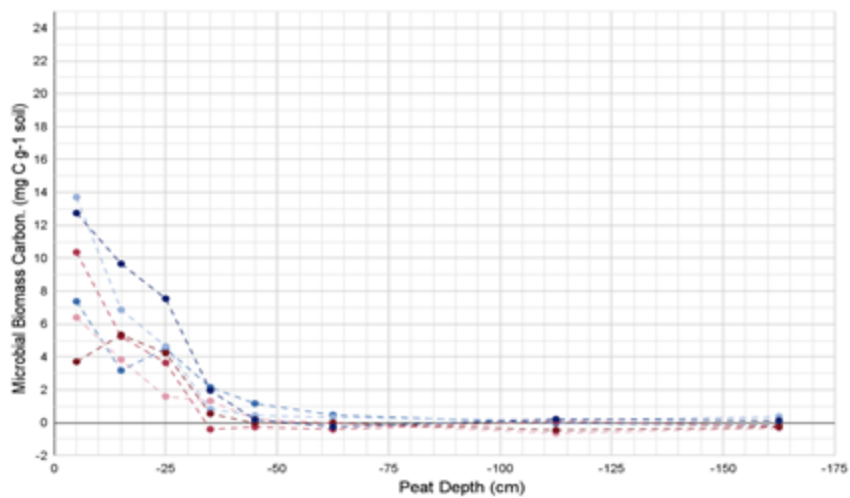
August 2021



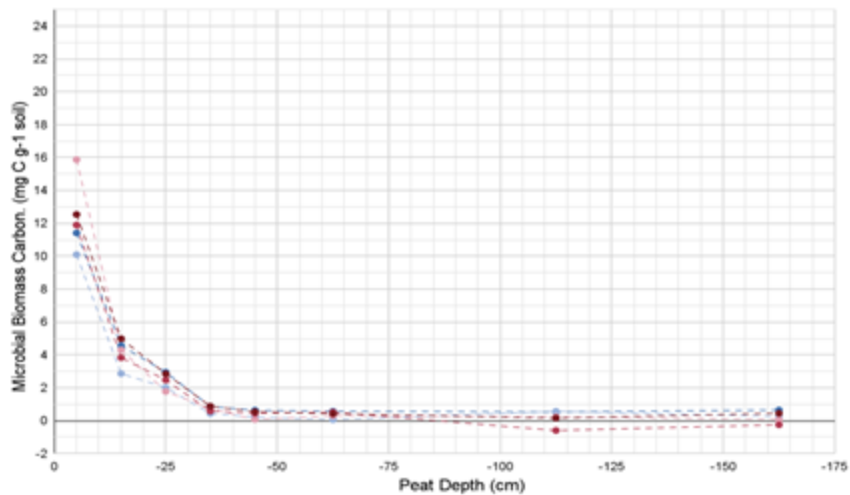
Temperature Treatment



August 2024



October 2024



Temperature Treatment

Temperature Treatment

+0.00 °C

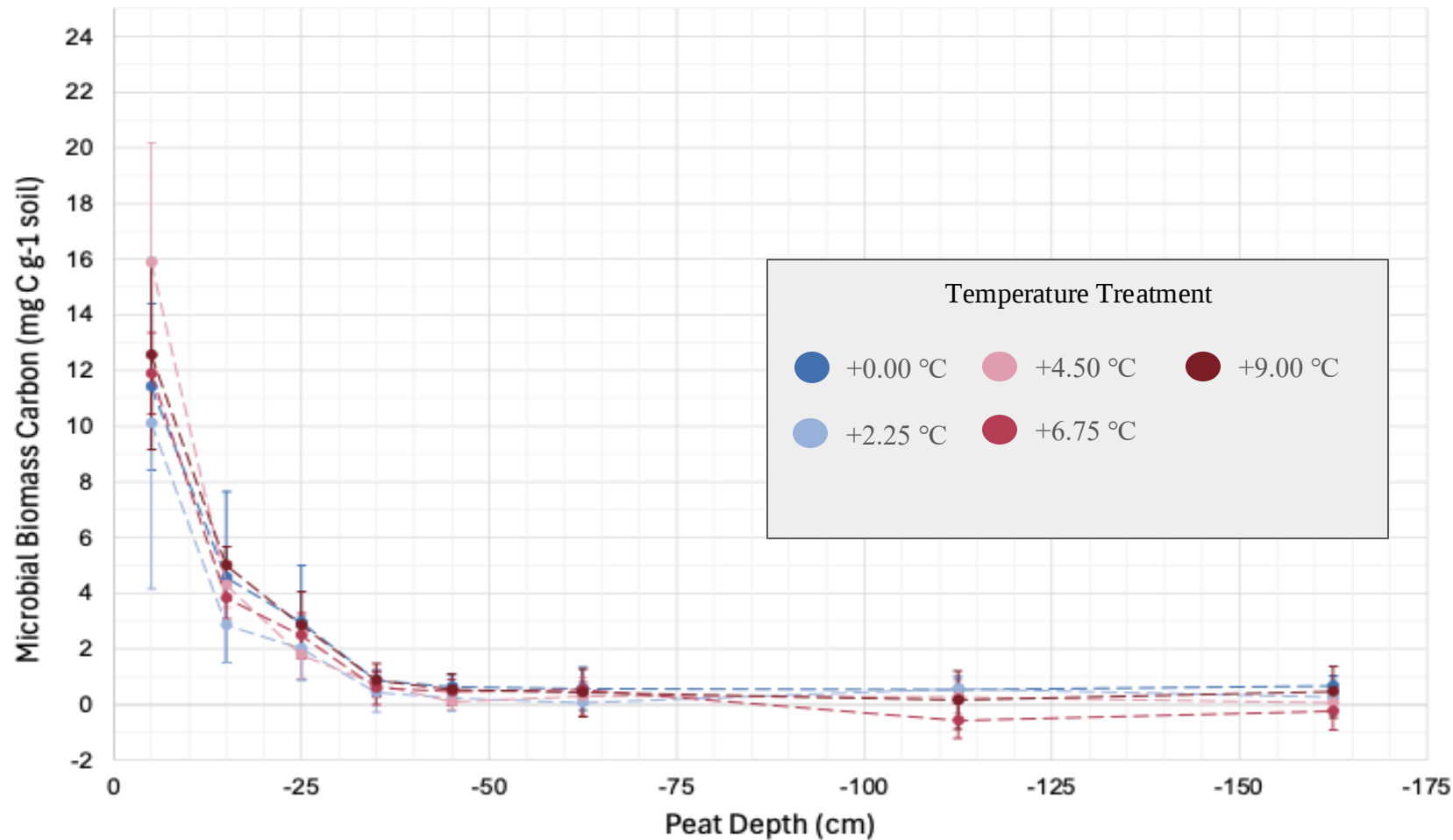
+4.50 °C

+9.00 °C

+2.25 °C

+6.75 °C

October 2024





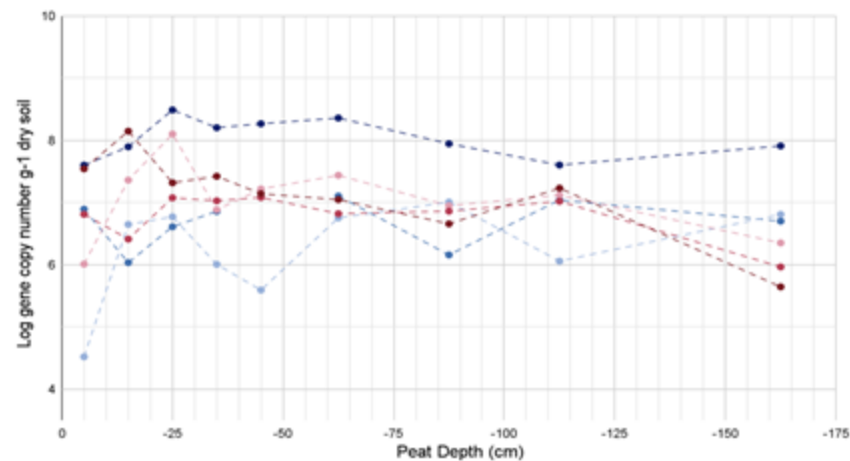
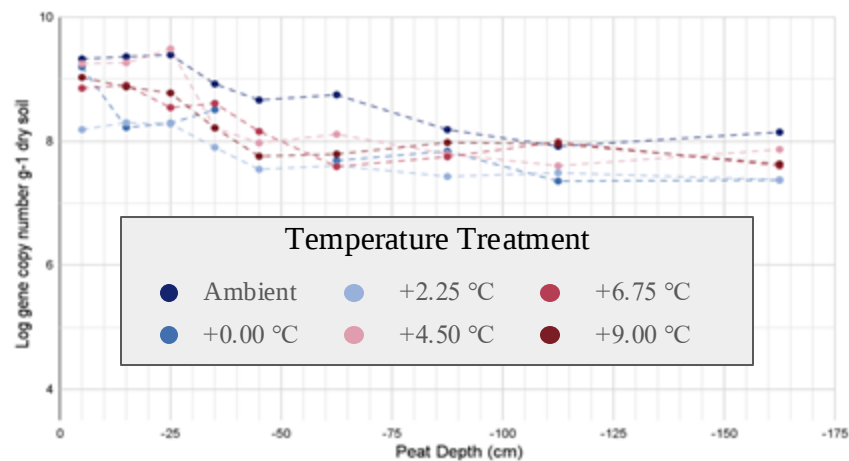
qPCR Gene Copy Number Assays



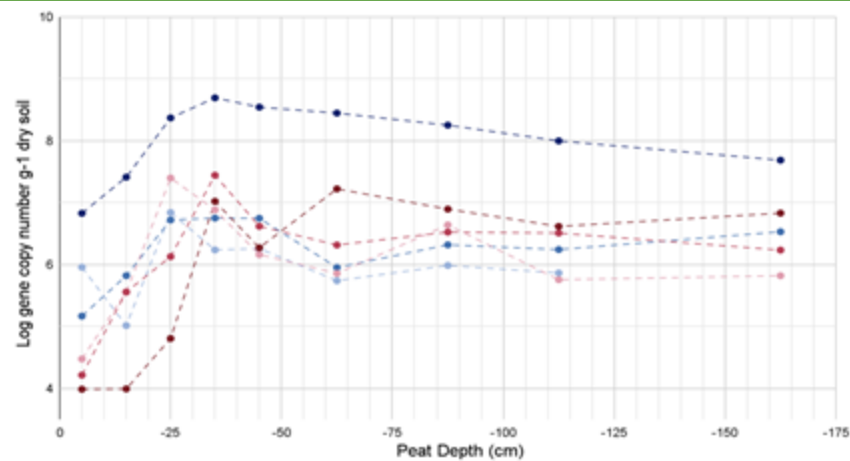
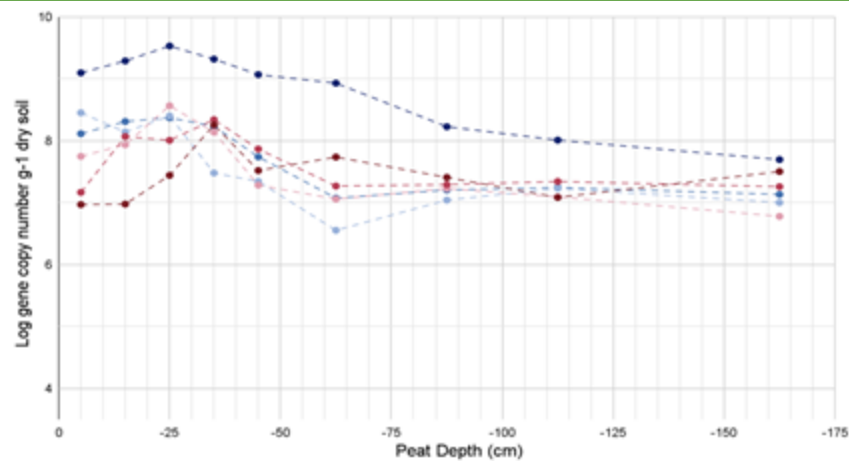
Bacteria

Archaea

June 2021



August 2021

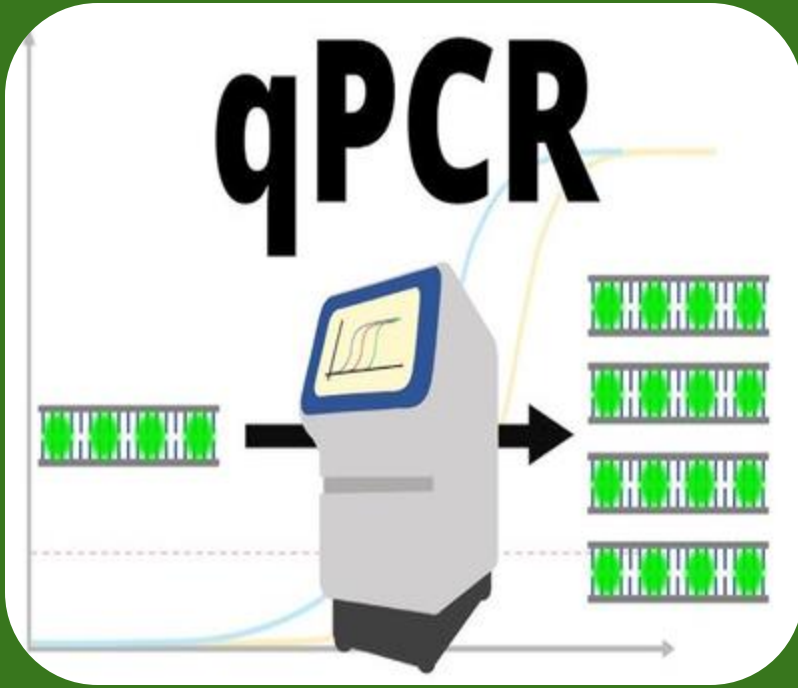




Ongoing Work



qPCR and Gene Copy Number



- Completing 2024 sample sets for bacteria, archaea and fungi qPCR
- Validating a new protocol for methanogen (*pmoA*) and acetogens (*fthfs*) qPCR