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Ground‐Truthing Remote Sensing of Peatland Vegetation Under Heat and Drought Stress

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Protecting and restoring peatlands requires quantitative measures of ecosystem health, function, and resilience, across vast, remote areas and long time periods. Peatlands are experiencing higher temperatures and more extreme patterns of rainfall, making monitoring their vegetation health increasingly urgent. Remote sensing provides a uniquely scalable tool for monitoring peatland health and restoration at national scales, but to unlock its full potential we must understand the biological processes behind the wealth of data.
We address this challenge through controlled ground-truthing experiments that investigate how heat and water stress affect the thermal, reflectance, and fluorescence signals of peatland vegetation over time. By integrating physiological measurements with optical remote sensing and emerging high‐resolution thermal imaging technologies, we aim to establish mechanistic links between peatland vegetation stress responses and remotely sensed signals.This project focuses on the Sphagnum genus, a keystone genus in peatland formation and persistence. Understanding how thermal and optical signals across different Sphagnum species respond under heat and drought stress is critical for developing operational methods of remotely sensing peatland health in a changing climate.
By linking physiological responses to stress with combined thermal and optical remote sensing signals, our research will enhance our ability to harness Earth observation and machine learning advances to monitor, protect, and restore peatlands as critical ecosystems for climate mitigation.