Title:

Monitoring warming and elevated CO_2 induced changes in photosynthetic efficiency via canopy spectral reflectance.

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Summary:

The SPRUCE experiment offers unique opportunity to develop and test RS algorithms specifically designed for assessing photosynthetic activity and vegetation stress in the broader context of monitoring climate change impacts across boreal peatlands. Remotely sensed vegetation indices such as the normalized vegetation index (NDVI) have become ubiquitous for assessing vegetation biomass, leaf area index, and absorbed photosynthetically active radiation at canopy scales, while indices such as the photochemical reflectance index (PRI) have been developed more recently to track changes in radiation use efficiency at leaf and canopy scales (e.g., Gamon et al., 1992; Garbulsky et al., 2011). Although PRI is clearly effective for assessing photosynthetic activity and vegetation stress, to date it has not been employed to explore the impact of warming and elevated CO_2 on photosynthesis and productivity. The goal of this research is to monitor PRI and NDVI dynamics across the gradient of temperature and CO_2 treatments at the SPRUCE site. This will be achieved by installing several PRI and NDVI spectral reflectance sensors across a gradient of temperature and CO_2 treatments at SPRUCE.

References:

Gamon, J.A., Peuelas, J., Field, C.B., (1992). A narrow-waveband spectral index that tracks diurnal changes in photosynthetic efficiency. Remote Sensing of Environment, 41: 35-44.

Garbulsky, M.F., Peuelas, J., Gamon, J., Inoue, Y., Filella, Y. (2011). The photochemical re ectance index (PRI) and the remote sensing of leaf, canopy and ecosystem radiation use efficiencies: A review and meta-analysis. Remote Sensing of the Environment, 115: 281-297.