Biogeochemical Responses to Fire Seasonality and Frequency in a Temperate Mixed-Grass Savanna: Charcoal Carbon. (S07-boutton121534-Poster)

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Abstract:

Vegetation fires result in storage of 0.05-0.2 Pg C/yr as highly refractory charcoal (black carbon) in soil. Because charcoal-C is relatively inert and resistant to decay, it is an important sink for atmospheric C, and may comprise a significant fraction of the 'missing C' in the global C budget. However, direct measurements of charcoal storage and dynamics are lacking for most ecosystems. We quantified soil charcoal C in mixed-grass savanna protected from fire for >30 yrs, and in plots burned in winter (1991, 1993, 1995) or summer (1992, 1994). Soils were sampled in 1996, and the <53 um fraction was isolated and photo-oxidized. Charcoal-C in this fraction was quantified by solid-state C-13 NMR using the aryl-C signal. Densities of charcoal-C (0-20 cm) were lower in unburned controls (344 g char-C/m2) than in winter fire (365 g char-C/m2) or summer fire (375 g char-C/m2) treatments. Charcoal-C comprised 13-17 % of soil organic C (0-20 cm) across all treatments. Results have implications for scientists and policy makers who are now evaluating the potential for land management practices to alter ecosystem C storage and influence atmospheric CO2 concentrations and climate.

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Presentation Information:

Presentation Date: Wednesday, November 13, 2002 Presentation Time: 3:00-5:00 pm Poster Board Number: 2111

Keywords: charcoal carbon, black carbon, Carbon-13, soil organic carbon