Comparison of Organic Matter Composition from Shifting Vegetation Communities Due to Increased Inundation of a Subarctic Mire in Abisko, Sweden

A.E. Normand (University of Florida, Soil and Water Science); A.N. Smith (University of Florida, Chemistry); M.W. Clark, K.R. Reddy (University of Florida, Soil and Water Science)

Introduction

Climate change over the next century will affect vegetation communities in peatlands due to increased precipitation and temperature. These changes have resulted in increased inundation of a subarctic mire ecosystem near Abisko, Sweden. Three vegetation community types that dominate the system have shitfted from drained palsa areas with woody herbaceous vegetation, to saturated *Sphagnum spp.* zones, and finally to wet fen dominated by *Eriophorum spp.* The altered hydrologic regime selecting for vegetative communities will dictate the quality of litter inputs and soil. In this study, we examined the varying organic matter quality of the vegetation and soil from the community types using CPTOSS ^{13}C SS NMR.

Experimental

When present, live, standing dead, below ground biomass, detritus, and surface soil (0-2 cm) were collected from fen, *Sphagnum*, and palsa communities across a 26 m transect. CPTOSS ^{13}C SS NMR sprectra of dried, ground samples were obtained using a Bruker Avance II 500 MHz Spectrometer with a 3.2 mm H/C/N MAS probe at the AMRIS Facility. Spectra peaks were integrated to determine percent of C functional groups: carboxyl, phenolic, aromatic, di-O-alkyl, O-alkyl, methoxyl, and alkyl (Fig. 1).

Results and Discussion

Di-O-alkyl and O-alkyl peaks dominated all spectra (55-73%; Fig. 2). In respect to live vegetation, the O-alkyl percent was greatest in the *Sphagnum* spectrum followed by fen, and palsa had a substantial signal from the alkyl region. The alkyl/O-alkyl ratio is an index of organic matter stability and decomposition relating to the progressive decrease of carbohydrates and increase of lipids and lignin[1]. In each community, the alkyl/O-alkyl ratio increased from standing vegetation to soil. The ratios of soil are fen - 0.33, *Sphagnum* - 0.19, and palsa - 0.23. This indicates that initially labile fen vegetation is readily decomposed to more stable material while *Sphagnum* remains fairly labile.

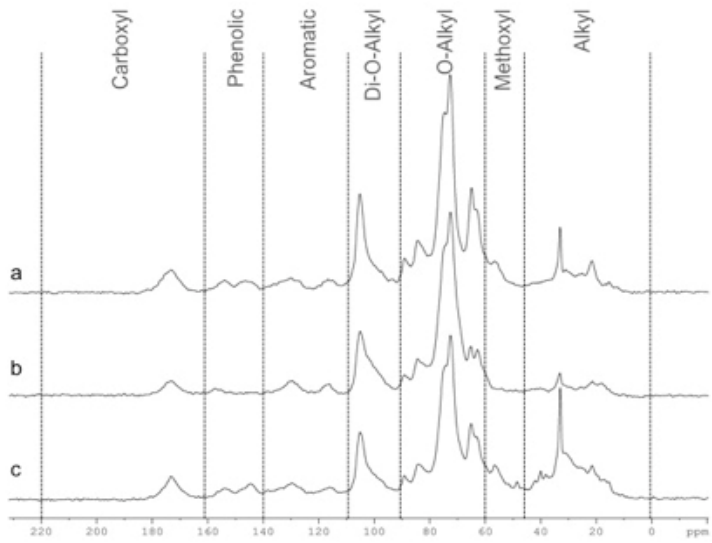

Figure 1. NMR spectra from (a) live fen, (b) *Sphagnum*, and (c) palsa.

Conclusions and Future work

The molecular composition of the vegetation inputs dictates decomposition and stability of the soil. Soil organic matter using NMR will be investigated in future work.

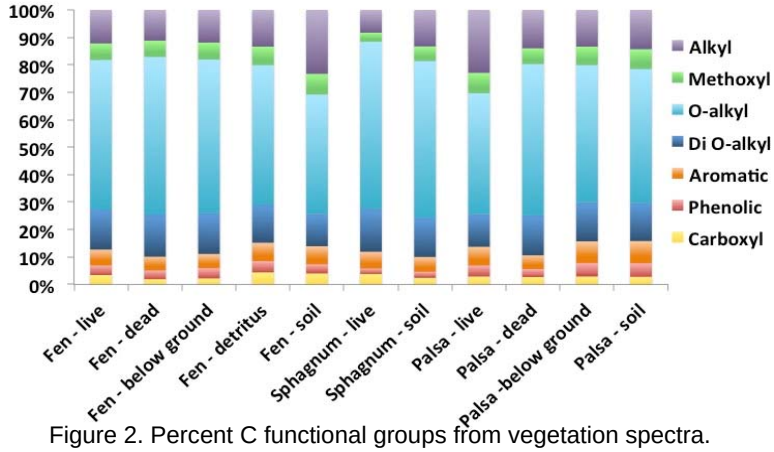

Figure 2. Percent C functional groups from vegetation spectra.

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References

[1] Baldock, J.A. *et al*., Australian Journal of Soil Research, **35:5**, 1061-1083 (1997).