# Carbon Fractions in the Organic Soils of the Everglades Agricultural Area in South Florida

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## Introduction

The organic soils of the Everglades Agricultural Area (EAA) have been experiencing soil subsidence since the time of their drainage in 1914. This study aimed to characterize the carbon of these organic soils. Solid state $^{13}C$ NMR spectroscopy was used to determine the relative abundances of the C functional groups present in these soils prior and after hot water and 6 M HCl extractions. The analyzed soils were collected in areas of shallow and of deep EAA soils at different soil depths.

## Experimental

Selected samples were analyzed by magic angle spinning (MAS) 13C ssNMR spectroscopy. Analyzes were performed in a 600 MHz Bruker Avance III spectrometer using a 3.2 mm E-free H/C/N probe at the UF AMRIS facility. Dry soil samples (25-30 mg) were finely ground and packed into 3.2 mm zirconia rotors for the analyzes. Cross Polarization with Total Sideband Suppression (CPTOSS) (Dixon et al., 1982) was utilized. An acquisition time of 20 msec. with 8192 scans, and a 2.0 sec. recycle delay was used.

## Results and Discussion

The NMR spectra of the soil prior to extraction and the residue after hot water extraction do not differ in the distribution of the NMR spectra regions. This spectra (Fig. 1) is dominated by a peak in the total alkyl region (0-45 ppm), while there are also peaks in the methoxyl region (45-60 ppm), two peaks in the carbohydrate region (60-110 ppm), two peaks in the aromatic region (110-160 ppm), and a peak in the carboxyl region (160-220 ppm). The NMR spectra of the recalcitrant C (Fig. 2) showed that the two carbohydrate peaks were considerably reduced, while there were gains in the aromatic peaks.

## Conclusions

The prolonged drainage of the EAA peats has made these soils enriched in aliphatic compounds more resistant to degradation.

The recalcitrant C pool in EAA soils is dominated by aromatic compounds while carbohydrates are depleted.

## Acknowledgements

The National High Magnetic Field Laboratory is supported by the National Science Foundation through NSF/DMR-1157490/1644779 and the State of Florida.

## References

Dixon, W. T., *et al*., Journal of Magnetic Resonance, **49,** 341-345, (1982)

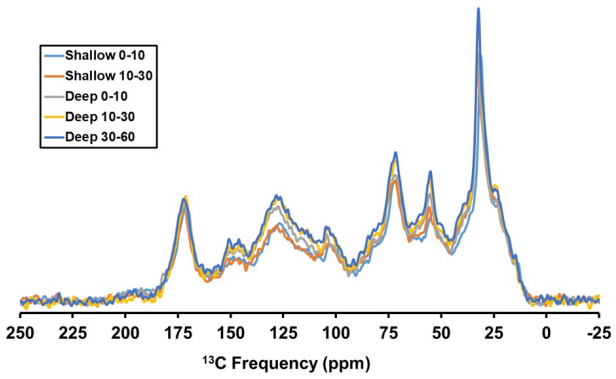


**Fig.1** NMR spectra of soils prior to extraction. Different colors indicate different soils at different soil depths. Overlaid spectra were normalized to the total weight of each soil sample.

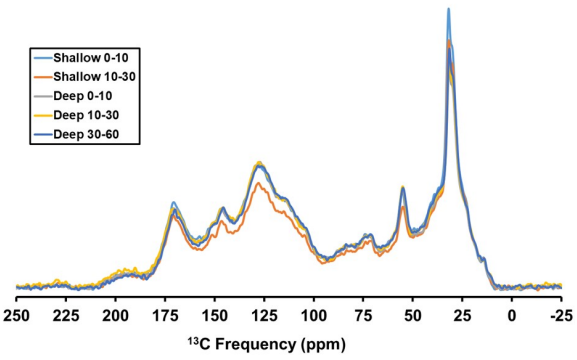


**Fig.2** NMR spectra of recalcitrant carbon. Different colors indicate different soils at different soil depths. Overlaid spectra were normalized to the total weight of each soil sample.