Supplementary materials for

Soil carbon stocks not linked to aboveground litter input and chemistry of old-growth forest and adjacent prairie

Karis J. McFarlane[1], Stefania Mambelli[2], Rachel C. Porras[3], Daniel B. Wiedemeier[4,5], Michael W. I. Schmidt[4], Todd E. Dawson[2], and Margaret S. Torn[3]

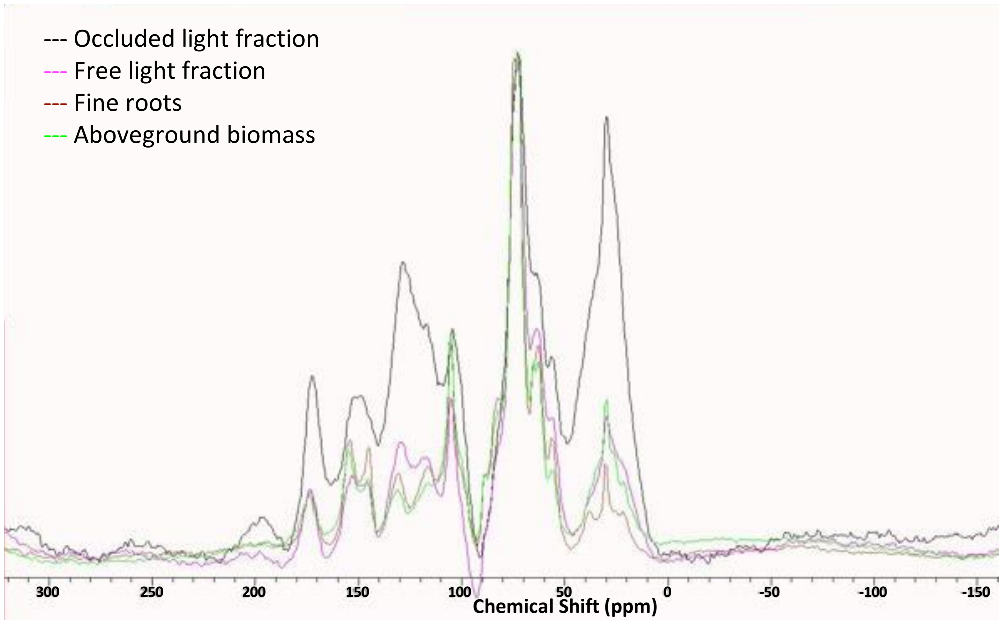
Table S1. Study Site Characteristics

	Atlas Grove Redwood	Boyes Prairie
Latitude/Longitude (°)	41.3625/-124.0203	41.3667/-124.0167
Elevation (m)	55	35
USDA Soil Series	Mystery	Ferndale
USDA Soil Taxonomic Class	Coarse-loamy, mixed, superactive, isomesic, Oxyaquic Eutrudepts	Fine-silty, mixed, superactive, nonacid mesic Typic Udifluvents
Dominant vegetation species[1]	*Sequoia sempervirens, Acer macrophyllum, Rhamnus purshiana, Pseudotsuga menziesii, Tsuga heterophylla, Umbellularia californica*	*Danthonia californica*, *Poa pratensis*, *Holcus lanatus, Carex* sp., *Hypochoeris radicata*, *Plantago lanceolata*, *Pteridium aquilinium*, *Dactilis glomerata*, *Rubus vitifolius*, *Rosaceae*
Understory vegetation species[1]	*Polystichum munitum*, *Gaultheria shallon, Vaccinium ovatum*, *Oxalis oregana*	NA

[1]Redwood vegetation from Sillet and Van Pelt, 2007. Prairie vegetation from Veirs, 1987 and Stassia Samuels, personal communication, 2011.

Figure S1. Example ^{13}C-NMR spectra for (a) Coast Redwood Forest and (b) Coastal Prairie occluded light fraction (black), free light fraction (magenta), fine roots (brown), and aboveground biomass (green).

(a) Redwood



(b) Prairie

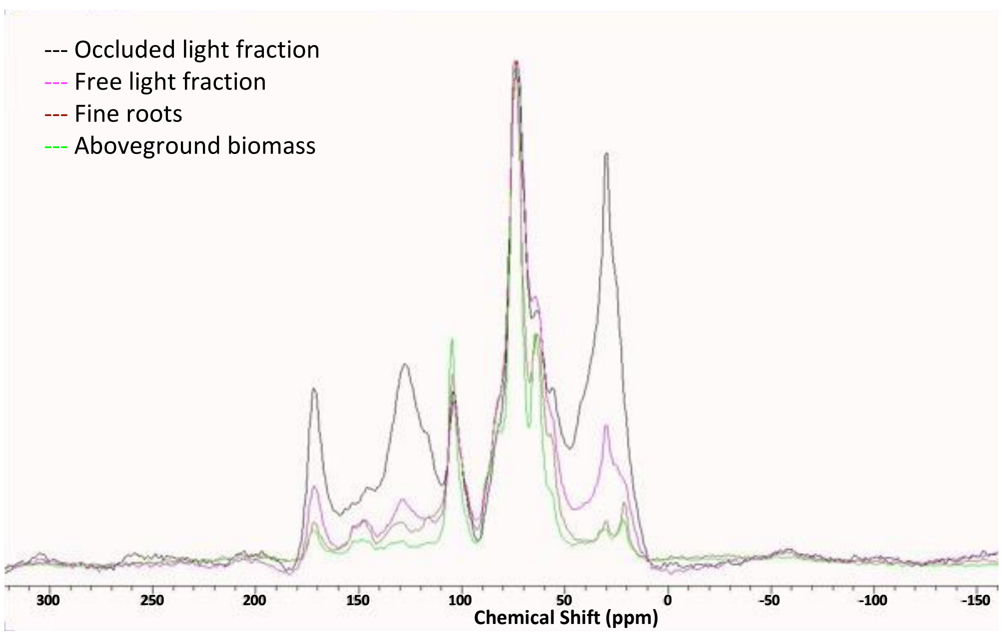
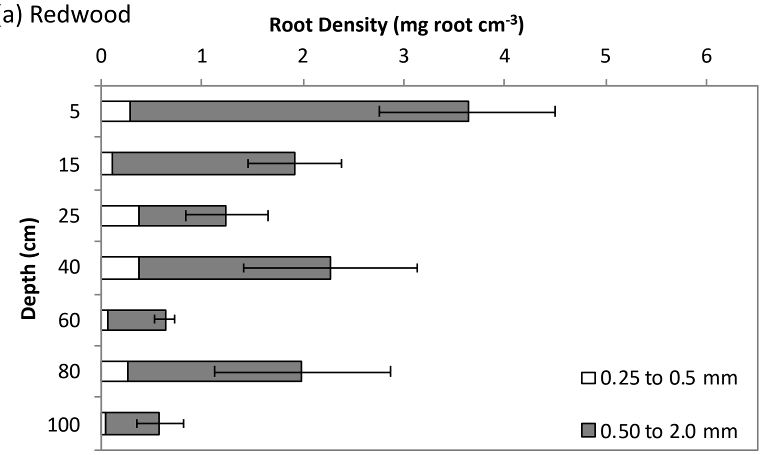
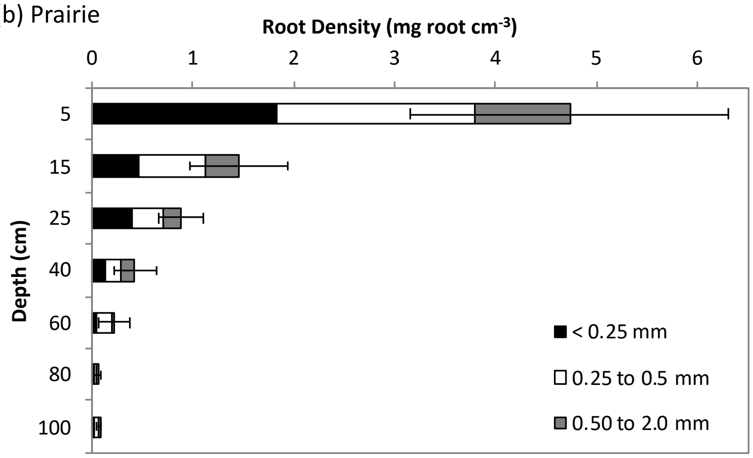


Figure S2. Fine root biomass in (a) Coast Redwood Forest and (b) Coastal Prairie. Data are means ± SE of the total mean. n = 3 cores for Prairie and 6 for Redwood. The distribution of roots among diameter classes did not change significantly with depth.

(a) Redwood



(b) Prairie



A subset of redwood roots was sorted into live and dead roots based on tensile strength and root morphology. By mass, 42 % was live root biomass while 58 % was necromass. The proportion of live vs. dead roots did not differ among diameter classes or soil depths and root C and N concentrations did not differ between live and dead roots. A subset of Redwood roots was taken to holocellulose following the Soxhlet solvent extraction described in Gaudinski et al 2005. No consistent patterns with depth or root characteristics and ^{14}C were observed. Data are available in the supplementary data file.

Gaudinski, J. B., Dawson, T. E., Quideau, S., Schuur, E. A. G., Roden, J. S., Trumbore, S. E., Sandquist, D. R., Oh, S.-W., and Wasylishen, R. E.: Comparative Analysis of Cellulose Preparation Techniques for Use with 13C, 14C, and 18O Isotopic Measurements, Analytical Chemistry, 77, 7212-7224, 10.1021/ac050548u, 2005.

Figure S3. Signal intensities in the (a) Alkyl, (b) O-alkyl, (c) Aromatic, and (d) Carbonyl chemical shift ranges from ^{13}C-NMR spectroscopy. For fractions, numbers after the underscore signify the middle of the depth increment. Letters indicate statistically significant differences at $\alpha = 0.05$ among organic matter fraction (aboveground litter and biomass, “Above”; belowground biomass “Below”; free light fractions, fLF; and occluded light fractions, oLF) and vegetation cover (Prairie and Redwood) as there was a significant interaction between organic matter fraction and vegetation cover. Values are means ± standard error and n ranges from 2 to 8 as samples were pooled into the categories shown.

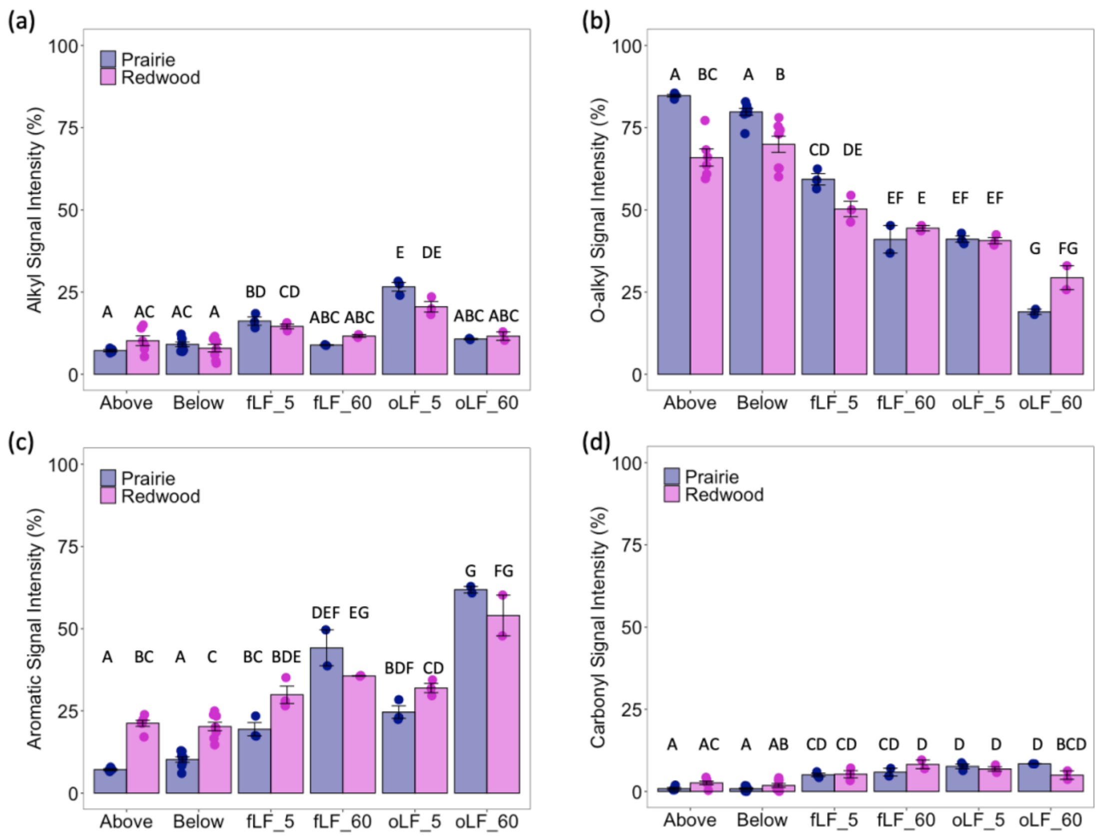


Figure S4. (a) Carbohydrate, (b) Lipid, (c) Lignin, and (d) Protein as a portion of total observed C from the molecular mixing model derived from ^{13}C-NMR spectroscopy. For fractions, numbers after the underscore signify the middle of the depth increment. Letters indicate statistically significant differences at $\alpha = 0.05$. Lowercase letters indicate differences among organic matter fraction (aboveground litter and biomass, “Above”; belowground biomass “Below”; free light fractions, fLF; and occluded light fractions, oLF). Uppercase letters indicate differences among organic matter fraction and vegetation cover as there was a significant interaction between organic matter fraction and vegetation cover. Values are means ± standard error and n ranges from 2 to 8 as samples were pooled into the categories shown.

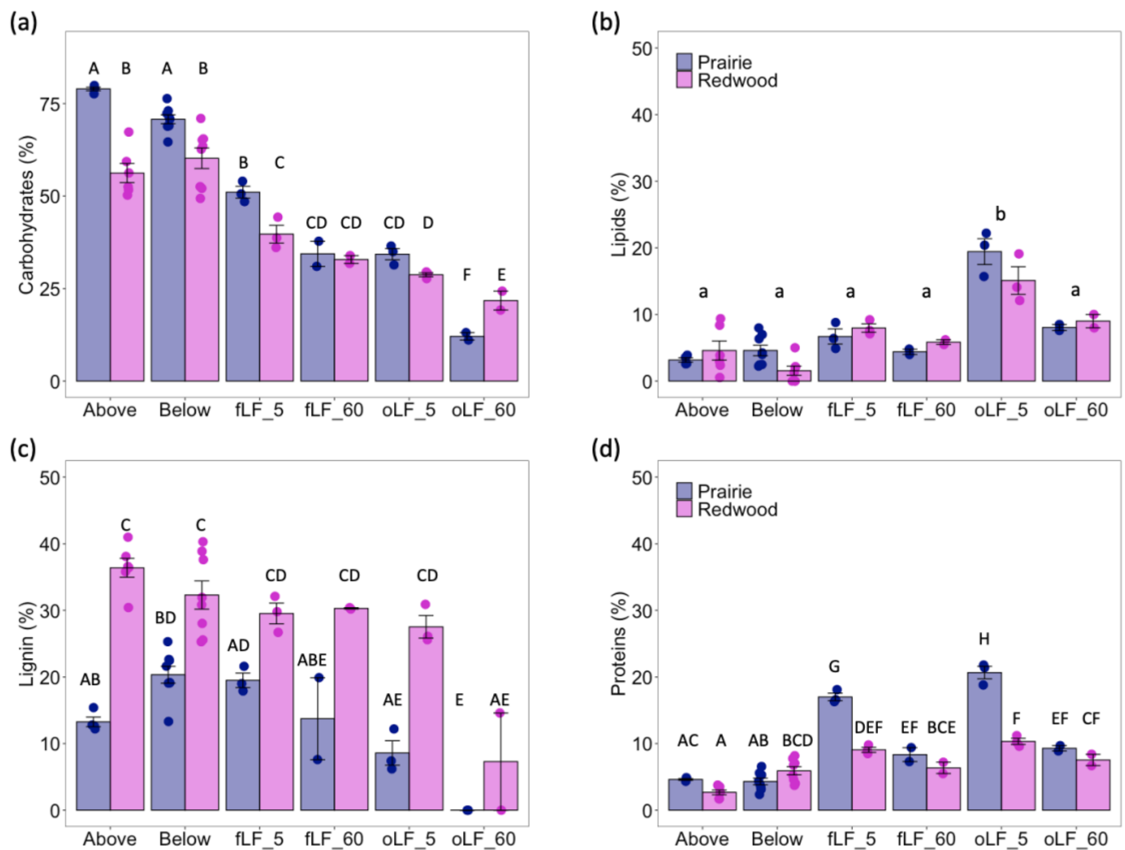


Figure S5. Bulk soil characteristics by middle increment depth for Coast Redwood Forest and Coastal Prairie. Data are means ± 1 SE. n = 7 for Redwood and 5 for Prairie for (a) C concentration, (b) N concentration, and (c) bulk density. For (d) Py C measured as BPCA, n = 3 for 0–10 cm and 50–70 cm and n = 1 for 10–20 cm and 30–50 cm. Depths > 0 cm are for the forest floor (O-horizon), which was only present in redwood forest. Data are means ± 1 SE.

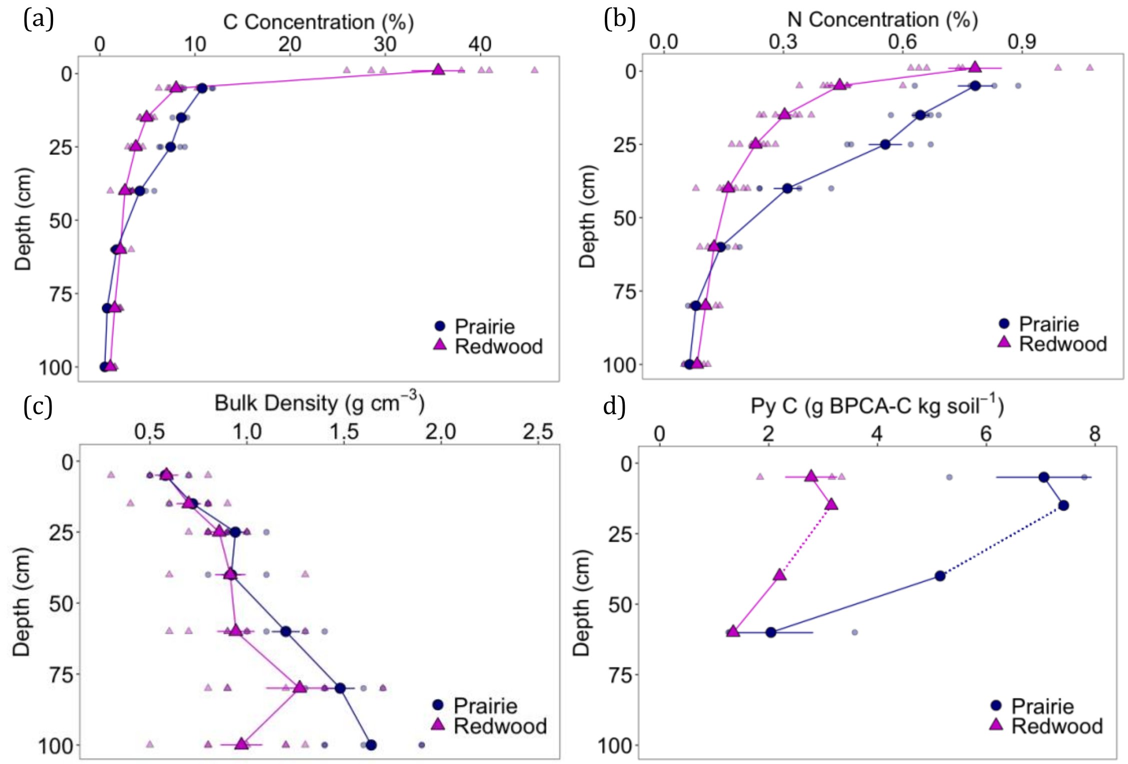


Figure S6. Bulk soil characteristics by middle increment depth for Coast Redwood Forest and Coastal Prairie. Data are means ± 1 SE and n = 3.

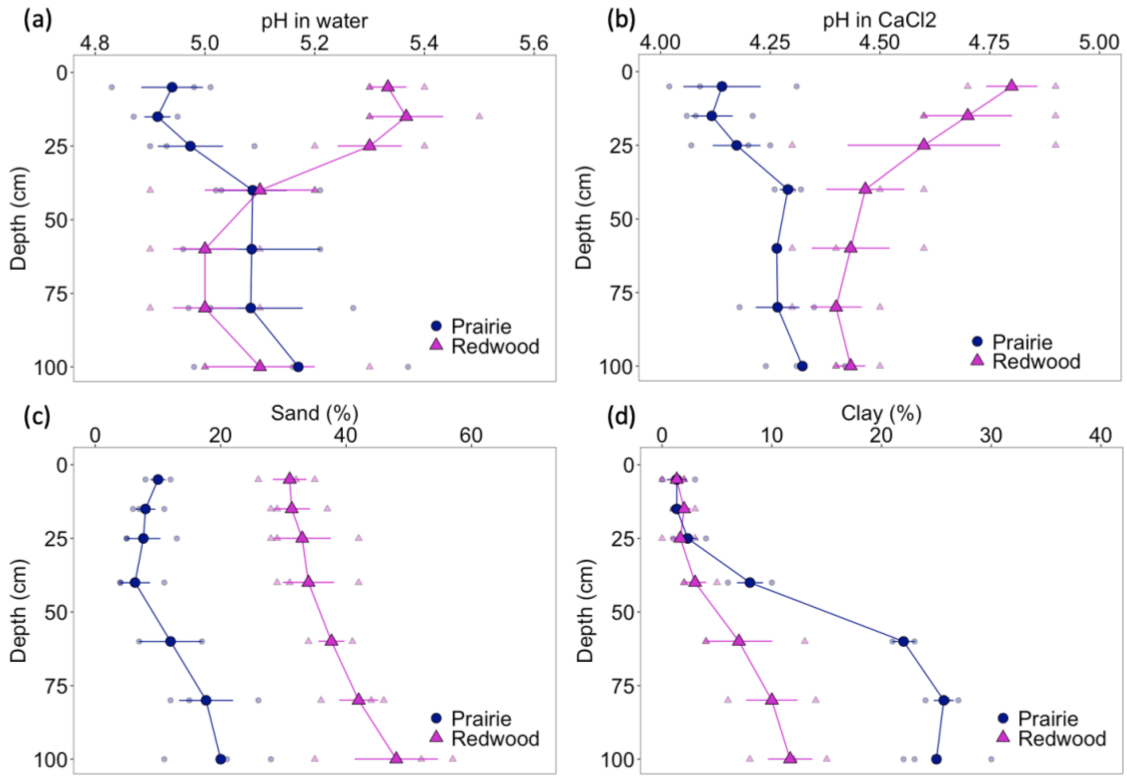


Figure S7. Distribution of (a) carbon and (b) nitrogen in density fractions from Coast Redwood Forest (R) and Coastal Prairie (P) for 0–10 cm and 50–70 cm depths. Data are means ± SE of the total mean. n = 3 for each site.

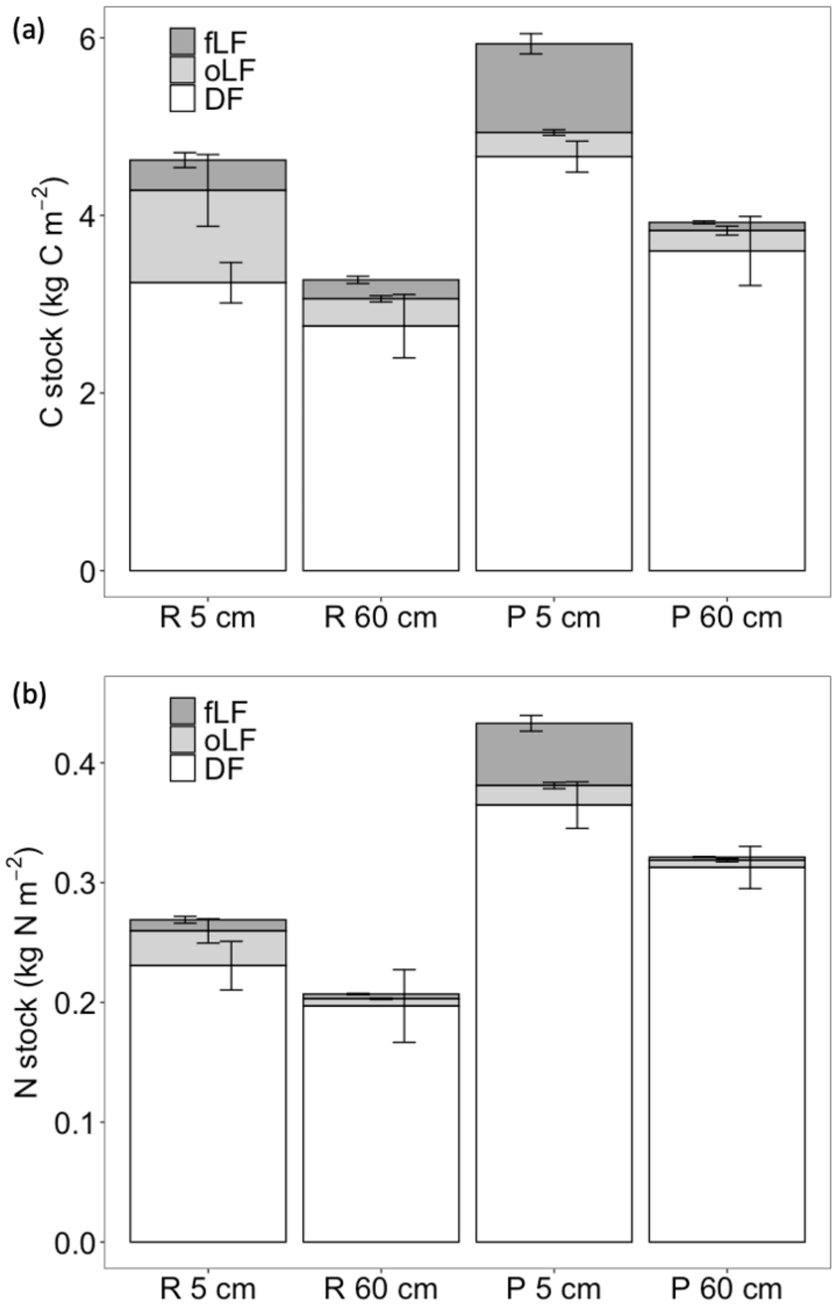


Figure S8. (a) Char and (b) Carbonyl C as a portion of total observed C from the molecular mixing model derived from ^{13}C-NMR spectroscopy. (c) Char-corrected Aromaticity (AR*) and (d) Char-corrected Combined Indices. For fractions, numbers after the underscore signify the middle of the depth increment. Lowercase letters indicate differences among organic matter fraction (fraction (aboveground litter and biomass, "Above"; belowground biomass "Below"; free light fractions, fLF; and occluded light fractions, oLF) and depth. Uppercase letters indicate differences among organic matter fraction, depth, and vegetation cover as there was a significant 3-way interaction. Values are means ± standard error and n is 3 for surface and 2 for deep light density fractions.