



## Sources and composition of high-molecular-weight dissolved organic carbon in a southern Louisiana tidal stream (Bayou Trepagnier)

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**ABSTRACT:** The composition and cycling of high-molecular-weight dissolved organic carbon (HMW-DOC) were examined in a tidal stream (Bayou Trepagnier) with seasonally high DOC concentrations (1.0-5.6 mM).  $^{13}\text{C}$  nuclear magnetic resonance ( $^{13}\text{C}$  NMR) was used to examine the bulk chemical composition of natural HMW-DOC from two field sites over 1.5 yr. The HMW-DOC at both sites was dominated by aliphatic (41%), carbohydrate (33%), and carboxyl (16%) carbon, with relatively low aromatic carbon abundance (10%). A comparison of  $^{13}\text{C}$  NMR signatures of bayou HMW-DOC and leachate HMW-DOC collected from leaf litter and soils revealed that plant litter leachate appears to be a more important source of HMW-DOC than soil. Dominant sources of HMW-DOC were likely allochthonous inputs of terrestrial plant litter with periodic inputs of soil organic matter during flooding events. The low aromaticity of bayou HMW-DOC may reflect the influence of low-oxygen conditions, which inhibit the decomposition of particulate aromatic macromolecules such as lignin and humic material to HMW-DOC. Lignin-phenol biomarker concentrations ( $d_{\text{el}}$ , in mg/100 mg OC) were much lower in HMW-DOC (1.2) than in plant (5.2) and soil (6.8) organic matter, indicating that a significant fraction of this highly aromatic material was not degraded to HMW-DOC. Finally, this study demonstrated that lignin and other compounds from terrestrially derived organic matter in sediments and adjacent soils are not a significant source of more soluble moieties that enter the HMW-DOC pool of the bayou.

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