

PARTIAL PRESSURES OF CARBON DIOXIDE IN THE ENOREE RIVER BASIN

[PUGH, John](#), ANDERSEN, C. Brannon, and SARGENT, Kenneth A., Dept. of Earth and Environmental Science, Furman Univ, Greenville, SC 29613, john.pugh@furman.edu

Studies of large rivers have shown that partial pressures of carbon dioxide in river water can range from being in equilibrium with the atmosphere to being 15 times atmospheric values. Rivers with partial pressure of carbon dioxide values exceeding atmospheric values become sources of carbon dioxide to the atmosphere, at least on a seasonal basis. Organic and inorganic carbon concentrations in the Enoree River Basin were analyzed from 172 different locations. Partial pressures of carbon dioxide, derived from measured pH and alkalinity values, range from 2 to 48 times that of atmospheric value with an average value of 13 times atmospheric value. Dissolved organic carbon values range from 1.3 mg/L to 24.0 mg/L with an average value of 4.5 mg/L. The highest values of dissolved organic carbon and partial pressures of carbon dioxide occurred in a tributary watershed located in Sumter National Forest. Carbon isotopic values for dissolved inorganic carbon were measured at eight locations on the Enoree River. Values become more enriched downstream, increasing from -14.6 PDB to -11.2 PDB. The Enoree River basin is a net source of carbon dioxide to the atmosphere, at least during the summer season when most of the samples were collected. This is true for any order of stream associated with any land cover from urban to forested. The most dramatic fluctuations in the values of partial pressures of carbon dioxide occur as a result of both tributary contribution and of organic matter respiration and decay. Downstream of a sewage treatment facility, partial pressures of carbon dioxide, dissolved organic carbon, and heterotroph bacteria counts are all initially greatly elevated and then subside further downstream. Carbon isotope values increase downstream of the sewage treatment facility. Tributaries then dilute the contribution of the sewage treatment plants and modify the concentrations of dissolved inorganic carbon, dissolved organic carbon, and partial pressure of carbon dioxide in the Enoree River.

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