

Paper No. 13-21**Presentation Time:** 1:00 PM-5:00 PM***DISSOLVED CARBON DISTRIBUTION AND FLUX IN THE FORESTED UPPER SALUDA RIVER WATERSHED, SOUTH CAROLINA***

[SAUER, Katherine](#)¹, ANDERSEN, C. Brannon², LEWIS, Gregory P.³, SARGENT, Kenneth A.², and NIEMITZ, Jeffrey¹, (1) Geology, Dickinson College, Carlisle, PA 17013, sauer@dickinson.edu, (2) Earth and Environmental Science, Furman Univ, Greenville, SC 29613, (3) Biology, Furman Univ, Greenville, SC 29613

Human alteration of the global carbon cycle has led to a need for a better understanding of carbon cycling and transport in river systems. In this study, water samples from the 745 km² upper Saluda River watershed in northwestern South Carolina were analyzed to estimate the distribution of carbon species and carbon fluxes in a pristine piedmont watershed.

Samples were collected at 55 sites during the summer of 2002. Samples were analyzed for dissolved inorganic carbon (DOC), dissolved organic carbon (DIC), and carbon isotope values. The partial pressure of carbon dioxide with respect to atmospheric concentration ($E_p\text{CO}_2$) was calculated from in situ temperature and pH values and alkalinity data. Carbon fluxes were calculated for a site at a USGS gaging station.

DIC concentrations range from $10^{-3.7}$ mol C/L to $10^{-3.0}$ mol C/L with an average of $10^{-3.5}$ mol C/L. Bicarbonate is the dominant carbonate species in the streams (average of 61%), followed by carbonic acid (average of 39%). All of the sites are over saturated with respect to atmospheric carbon dioxide, with $E_p\text{CO}_2$ values ranging from 4 to 50 times atmospheric pressure. The lowest $E_p\text{CO}_2$ values are found in the headwaters of steep sloping terrain, whereas higher values are found in low-lying terrain. The concentration of DOC ranges from $10^{-4.0}$ mol C/L to $10^{-3.5}$ mol C/L with an average of $10^{-3.7}$ mol C/L. The primary source of the DOC is the headwaters, which would be expected in a forested watershed. The average distribution of dissolved carbon in the watershed is 64% DIC and 36% DOC. The flux of total dissolved carbon in the watershed is estimated to be between 3500 and 4000 kg/day during the summer. Carbon isotope values ($\delta^{13}\text{C}$) range from -18 o/oo to -10 o/oo and tend to become enriched in ^{13}C downstream. $E_p\text{CO}_2$, DIC, and DOC do not show significant relationships with nitrate, dissolved silicon, or total heterotroph bacteria populations.

The data indicate that weathering of silicate minerals and respiration of decaying organic material is the primary source of dissolved carbon in the watershed. Dissolved organic carbon released by biological processes constitutes a smaller percentage of the carbon load. Stream gradient may be the major control over the level of carbon dioxide over saturation in the watershed.

[South-Central Section \(37th\) and Southeastern Section \(52nd\), GSA Joint Annual Meeting \(March 12–14, 2003\)](#)
[General Information for this Meeting](#)

Session No. 13--Booth# 21

[Undergraduate Research Session \(Posters\)](#)

University of Memphis Conference Center: Holiday Inn, Ballroom 2/3

1:00 PM-5:00 PM, Thursday, March 13, 2003

© Copyright 2003 The Geological Society of America (GSA), all rights reserved. Permission is hereby granted to the author(s) of this abstract to reproduce and distribute it freely, for noncommercial purposes. Permission is hereby granted to any individual scientist to download a single copy of this electronic file and reproduce up to 20 paper copies for noncommercial purposes advancing science and education, including classroom use, providing all reproductions include the complete content shown here, including the author information. All other forms of reproduction and/or transmittal are prohibited without written permission from GSA Copyright Permissions.
