Paper No. 33-0

SILICA RETENTION BY SMALL SURFACE IMPOUNDMENTS IN THE UPPER PIEDMONT OF SOUTH CAROLINA

SIMS, Erin[1], MOLLER, Sven[2], PETERS, Chris[3], SJOLIN, Jennifer[4], ANDERSEN, C. Brannon[1], LEWIS, Greg P.[5], and SARGENT, Kenneth A.[1], (1) Dept. of Earth and Environmental Science, Furman Univ, Greenville, SC 29613, erin.sims@furman.edu, (2) Geology Dept, Pomona College, Claremont, CA 91711, (3) Dept. of Geology, Sul Ross State Univ, Alpine, TX 79832, (4) Dept. of Geosciences, Trinity Univ, San Antonio, TX 78212, (5) Dept. of Biology, Furman Univ, Greenville, SC 29613

Human activities alter the biogeochemical cycle of silicon (Si). In particular, recent studies point to large reservoirs as sinks for Si transported by rivers. In the southeastern United States, however, small surface impoundments far outnumber large reservoirs. Our goal was to determine the degree to which small impoundments could reduce concentrations of Si in streams. We sampled seven small impoundments (ponds) in the Saluda and Enoree River basins of South Carolina. Land cover of the ponds' watersheds ranged from forested to urbanized. We collected water samples upstream, within, and downstream from the ponds at a total of 30 locations. Samples were analyzed for major cations and anions, pH, and alkalinity. Counts of planktonic diatoms were made to determine if changes in Si concentration were related to diatom abundance.

Silicon concentrations decreased within the ponds. Upstream Si concentrations ranged from 75-340 uM/L. Within the ponds, Si concentrations decreased by as much as 75% from upstream concentrations. However, Si concentrations decreased by as little as 1% in the one pond (Tankersley Lake) located in a primarily forested watershed. In some cases, Si concentration increased downstream of the ponds, apparently because of an influx of Si in groundwater. Soluble reactive phosphorus concentrations were always at or near detection limit. Nitrate concentrations also decreased in the ponds, with the smallest decrease and lowest concentrations observed in Tankersley Lake. In contrast, the concentration of chloride, a biologically conservative solute, did not decrease within the ponds. Although we assume that the decrease in Si concentrations resulted from Si uptake by diatoms, we found no significant relationships between planktonic diatom abundance and the decline in Si concentration. However, our sampling for diatoms was limited. Also, we did not sample benthic diatoms, which may be important in these shallow ponds.

Although we did not measure Si fluxes, our study suggests that small impoundments can retain Si in streams. Our study also suggests that impoundments in urban landscapes retain Si more effectively than impoundments in forested landscapes. Finally, additional research on the role of groundwater inputs of Si to streams is needed.

North-Central Section (36th) and Southeastern Section (51st), GSA Joint Annual Meeting (April 3–5, 2002)

Session No. 33--Booth# 28
Undergraduate Research (Posters)
Heritage Hall: East

1:00 PM-5:00 PM, Thursday, April 4, 2002