

FLUVIAL GEOCHEMISTRY OF THE ENOREE RIVER BASIN, I: UPPER ENOREE RIVER, BEAVERDAM CREEK, AND MOUNTAIN CREEK WATERSHEDS

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The Upper Enoree (21 km²), Beaverdam Creek (25 km²), and Mountain Creek (31 km²) watersheds drain a developed area north of Greenville, SC. The watersheds are underlain by high-grade metamorphic rocks of the Paris Mountain and Six Mile thrust sheets with thick saprolites and ultisols. The purpose of this study was to determine how an area that has undergone transformation from agricultural/forested to urban/suburban modifies the chemical composition of relatively small streams.

Forty-five localities were sampled weekly over a period of seven weeks during the summer of 1999. During this time period, South Carolina experienced an extended drought, so most of the grab samples represent base flow. Dissolved oxygen, pH, and temperature were measured in situ, and turbidity was measured in the laboratory. Cation concentrations were measured using ICP-AES, anion concentrations were measured using ion chromatography, and alkalinity was determined using the low alkalinity titration method. The water composition of the three streams is a Na-H₄SiO₄-HCO₃ type typical of that resulting from the weathering of silicate minerals. All samples indicate over saturation with respect to quartz. Mineral stability diagrams suggest weathering of feldspar to kaolinite is an important process, consistent with the soil types and saprolite of the area. Na+K:Si ratios, however, are more consistent with the weathering of feldspar to smectite, though this could be the result of excess cations associated with precipitation.

Nitrate chloride concentrations indicate a small, but noticeable human impact on all of the watersheds. Nitrate concentrations probably associated with suburban housing were highest in the Upper Enoree and Beaverdam Creek watersheds, but lower than expected in the Mountain Creek watershed given the amount of development. The most obvious human impact on any of the watersheds is metal contamination of the headward portion of the Upper Enoree watershed from a point source discharge.

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