

MINERALOGIC CONTROL OVER THE FLUVIAL GEOCHEMISTRY OF FOUR TRIBUTARY WATERSHEDS IN THE ENOREE RIVER BASIN, SOUTH CAROLINA

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In this study, the water chemistry of Indian and Kings Creeks in the southern part of the Enoree basin were compared to that of Durbin and Brushy Creeks in the northern part of the Enoree Basin. The land cover of Indian and Kings Creeks is forested, whereas the land cover of Durbin and Brushy Creeks is primarily urban. Durbin and Brushy Creeks drain a variety of metagranites, biotite gneisses, and mica schists of the Laurens and Paris Mountain thrust sheets, respectively. Although detailed geologic maps of the Indian and Kings Creek watersheds are not readily available, the best large scale maps suggest that these streams drain metamorphosed diorites, gabbros, and basalts, along with metasediments and felsic metavolcanics in the Charlotte Thrust Sheet. This suggests that any difference in major ion chemistry should be because of the weathering of different primary minerals. Water samples were analyzed for major ion concentrations. Four sediment samples, one from the mouth of each basin were analyzed microscopically for mineral content and by SEM for chemical composition. The streams in the Indian and Kings Creek watersheds were found to have higher Na, Ca, and Mg concentrations than the streams in the Durbin and Brushy Creek watersheds. The Indian and Kings Creek samples also had bicarbonate and silicon concentrations about twice that of Durbin and Brushy Creeks. Initial analysis of the stream sediments the presence of amphiboles and abundant plagioclase in sediments from Indian and Kings Creeks. Plagioclase is rare and amphibole is absent in the sediments from Brushy and Durbin Creeks. The results indicate that mineral solubility differences account for the difference in stream chemistry between the watersheds, and that Indian and Kings Creeks likely drain rocks in the Charlotte Thrust Sheet. Therefore, rock type is the primary control over the major ion chemistry. The concentrations of nutrients such as nitrate, in contrast, are related to land cover to a greater degree.

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