1161-62-212   **Ryan Pittman**, **John M Grego** and **David B Hitchcock*** (`hitchcock@stat.sc.edu`), 216 Leconte College, Columbia, SC 29208-0001. *Concurrent Functional Regression to Reconstruct River Stage Data during Flood Events.*

On October 4, 2015, the Cedar Creek gage at Congaree National Park stopped reporting stages, and readings did not resume until around two weeks later due to record-breaking rainfall that led to some of the worst flooding in South Carolina history. Our goal is to reconstruct the Cedar Creek stage during the missing two weeks, using a sample of ten historical flood events from the last 25 years. The Congaree River gage in Congaree National Park remained functioning throughout the October 2015 flood. The stages from the two gages are directly related during floods. We introduce a new method to objectively determine the start and end points of each flood event in the sample and then use these events to predict the missing Cedar Creek stage. We treat the stage as functional data and use a concurrent functional regression model to establish the relationship between the two locations during each timepoint of prior flood events. Once this relationship is found, the known Congaree stage is used to predict the missing Cedar Creek stage during the 2015 flood. The results show that there is a strong functional relationship between the two locations, and that the crest of Cedar Creek is predicted to have been a historic high of above 17 feet, compared to a previous high of just over 16 feet. (Received August 17, 2020)