SEDIMENT MONITORING USING SURROGATE METHODS

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Abstract. Sedimentation in streams and reservoirs is a growing environmental, engineering, and agricultural issue. Success in managing and solving sedimentation problems requires improving data quality and the understanding of concentration and flux of fluvial suspended sediment. The collection of sediment-transport data, however, has steadily declined in recent decades largely due to high costs and the difficulty of field methods used for data collection. High temporal resolution data are needed to understand and describe many sedimentation processes in smaller and urbanizing watersheds. New sediment-surrogate technologies and methods can be applied to determine fluvial suspended-sediment fluxes and characteristics at higher resolution, with greater automation and potentially lower cost than traditional methods. Research is being conducted by the U.S. Geological Survey (USGS) to evaluate different sediment-surrogate technologies in comparison to physical sediment samples.

A test site at the Yellow River at Gees Mill Road near Conyers, Georgia (USGS streamgage 02207335), is being used to compare operational characteristics and accuracy of sediment surrogates for the estimation of sediment concentration, flux, and size characteristics. The 260 square-mile Yellow River watershed has a population of about one-half million people and increasing urban land use with about 16 percent impervious surfaces in 2000. Since 2009, over 250 physical suspended-sediment samples were collected concurrently with measurements of streamflow, turbidity, laser diffraction, and acoustic backscatter and attenuation. Acoustic signal data were recorded by acoustic Doppler current profilers operating at 1.2, 1.5, and 3.0 megahertz (Fig. 1). Data from this investigation are being used to evaluate and describe sediment-surrogate technologies and methods. Early results indicate that the surrogates function well, with specific advantages for each surrogate with changing sediment and flow conditions.

Figure 1. Acoustic doppler current profilers operating at frequencies of *(A)* 1.2 megahertz, *(B)* 1.5 megahertz, and *(C)* 3.0 megahertz.