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Representative characterization of riverine composite suspended sediments

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The transfer of fine sediment constitutes an important linkage between the stream channel and the catchment surface, and its physical and chemical properties are critical to the quality of river systems. It is now accepted that fine sediment predominantly exists in the form of composite particles (flocs). As such, there is increased recognition of the difficulties associated with monitoring the behaviour of fine particles in the natural environment; technological limitations often necessitate that the analysis of sediment is conducted in disparate ex situ conditions. This study reports some preliminary results of experimental work involving a LISST portable laser diffraction particle sizer, which reports particle size distributions in 32 size classes in the range of 2.5 to 500 μm. The particle size of suspended sediment was measured (1) in situ during a storm flow in a river in Southwest England, with separate bottle samples collected simultaneously. The particle size of the bottle samples was then remeasured with the same instrument (2) on the bank top, (3) upon returning to the laboratory and (4) the following day in the laboratory. The resulting measurement series showed a sequential and significant increase in the median particle size of the bottle samples compared with the original in situ measurements, and this corresponded to the duration of sample storage. Observation of the respective size distributions showed a progressive depletion of the smallest size classes, indicating significant particle flocculation during sample storage. This demonstrates that measurements of the physical properties of cohesive sediment are only representative if they are taken in situ to the environment of interest. Since the physical properties of particles dictate the potential for the transfer of fine sediment and associated substances, it follows that in situ

monitoring of particle size is critical to the understanding of sediment pathways.