The Co-Evolution of Grain Size Distribution, Bed Topography, and Bedload Transport in Alluvial Channels, Reynolds Creek, Idaho

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Feedbacks between bedload transport and bed topography are not well understood due in part to a lack of sufficient quantitative datasets. This study will deliver a high resolution temporal and spatial characterization of formative mechanisms involved in channel stability and depositional channel architecture. This project examines channel evolution by taking advantage of a planned stream modification that, using construction equipment, will smooth and steepen an approximately 100m reach of Reynolds Creek, Idaho. Direct field measurements of bed topography, bedload transport, and channel morphology will document how the channel evolves from this perturbed state. Comparisons between repeat total station surveys and ground based LiDAR scans of the channel bed will be used to quantify changes in bed topography over centimeter to tens of meters scales for comparison amongst and between fluvial systems. Scour chains customized with accelerometers installed vertically into the bed will also record the timing of bed adjustments. The high resolution topographic data, time lapse cameras, and grain size distribution data will also provide insight into how the caliber and fraction of coarsest grains in bed substrate and bedload affect channel evolution and stability. Radio Frequency Identification tagged and accelerometer embedded particles will record bedload transport conditions. The ultimate goal of my research project is to improve sediment transport and grain size distribution predictions in alluvial systems by quantifying feedbacks between bed topography, sediment supply, grain size distribution, and discharge in a natural channel.