

## **Sorting in gravel bed channels under varying degrees of meandering and sediment supply**

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**Abstract.** In recent years, many river restoration projects have aimed to restore natural channel stability and dynamism through re-establishment of channel meanders lost to historical channelization. Meander behavior is highly complex and for this reason, in the restoration of meanders, a firm understanding of flow patterns and morphological trends in topography and sediment sorting is crucial to effective channel design. While straight channels feature coarse bars and fine pools, meandering channels tend to develop fine point bars and coarse pools. The objective of this study is to use numerical modeling and physical experiments to explore the interactions of free and forced bars in meandering channels of mixed grain size sediment and variable sediment supply, with the goal of identifying threshold values of curvature where reversal of sediment sorting occurs. We used two-dimensional morphodynamic models, Nays2DH and FaSTMECH, to simulate equilibrium bed topography and sorting conditions under constant water discharge for five different channel configurations, each consisting of a single meander bend, with crossing angles ranging from 0 to 20 degrees. Initial modeling results reveal that the strongest sorting patterns were achieved with higher degrees of curvature and the weakest were attained in the straight channel. In the largest meander, the bars (pools) were located slightly downstream (upstream) of the inside bend and upstream (downstream) of the outside bend and featured finer (coarser) sediment. Ongoing work is exploring the importance of curvature-driven secondary flows by adjusting the relative strength of streamline curvature on cross-stream sediment transport, and the response of point bars to changes in upstream sediment supply.