



Research on Streambed Micro-Structures of Coarse-Grain Streams

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The principal objectives of this research are to investigate the full range of hydraulic and geomorphologic conditions conducive to creating and maintaining cluster bedforms, and to investigate the corresponding effects of clusters on near-bed turbulence, flow resistance, and channel bed stability. Secondary objectives include: (i) identify the full range of stream conditions under which clusters occur, in terms of flow, stage, gradient, grain size, grain sorting, grain mobility, and bedform type; (ii) provide a complete cluster characterization in terms of cluster geometric features (shape and size) and spacing; (iii) characterize the variations in hydraulic parameters, such as velocity, shear stress, and near-bed turbulence across the channel and around cluster bedforms, and quantify how these spatial variations in hydraulic parameters affect the evolution of sediment clusters; (iv) examine the fate of individual sediment particles within and outside of cluster bedforms through video monitoring and use of tracer particles in the field; (v) define the critical Shields parameter of particles within and outside of a representative number of clusters; (vi) determine the role of sediment clusters in delaying bedload transport and maintaining channel bed stability; (vii) perform comparative studies between the field and laboratory observations; and (viii) modify existing bedload formulas to account for the modification of the near-bed flow frictional characteristics by the clusters and the magnitude difference in the critical Shields parameter for particles found within and outside clusters.