Energy Minimization and Channel Morphology: Interactions Between Sedimentary and Vegetative Controls

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Abstract. The relative erodibility of bed and bank materials controls adjustments of channels to excess stream power. Analytical methods for determining the equilibrium cross-section of a channel typically rely on some extremal hypothesis of energy minimization such as minimum stream power or minimum Froude number. In this presentation, thermodynamic hypotheses are contrasted with sedimentary and vegetative controls on lateral adjustments in alluvial channels. A hypothesis regarding interactions between temporal scales for vertical versus lateral adjustment and boundary controls on channel form is described. In particular, the influence of bank vegetation on channel form, resilience, and the potential for achieving disparate minimum energy conditions is examined.