

AUTOTUTORIAL 6: HYDROGEOMORPHIC PROCESSES

Background: A common purpose of hydraulic analysis in fluvial geomorphology is to assess the mechanisms underlying landform changes. In this tutorial you will take model outputs and compute shear stress, Shields stress, and flow competence rasters and then evaluate the patterns you see.

Objective: Practice the steps involved in mapping patterns of potential channel change.

Materials: sedtrans.zip file, ArcGIS, MS Word.

Homework assignment:

- 1) Read Chapter 9 of the textbook.
- 2) Follow the steps from Chapter 5 to create depth and velocity TINs and 3-foot rasters using the provided 2D model output file.
- 3) Use the equations on p. 131 of the textbook and Spatial Analyst to make a raster of bed shear stress (τ_b). Assume a Manning's roughness (n) of 0.04. Look up the density of water assuming a water temperature of 65° F.
- 4) Use the equation at the top of p. 133 to make a raster of Shields stress (τ^*). Assume a uniform representative grain size of 60 mm. Classify the raster according to the Shields stress bins described in the paragraph after the equation.
- 5) Use the equation at the bottom of p. 133 to make a raster of flow competence (d_c). Assume a critical Shield stress of 0.045. Classify the raster according to the Wentworth sedimentological size classes of sand/silt/clay (<2 mm), gravel (2-64 mm), cobble (64-256 mm), and boulder (>256 mm).
- 6) Write up a brief summary of your work. Provide your interpretation as to what the sediment transport regime is like in the model domain.

Helpful info:

Please read the README text file to get the latest updates and troubleshooting tips before starting the tutorial.