The initiation of motion of grains: grain size and flow 'energy'
Boggs, Ch. 2

Go to the Blackboard site and click on the 'lectures' button, then download the "Hjulstrom and Shields" Excel spreadsheet. You will use this spreadsheet to investigate the controls on incipient motion of grains on a mobile bed.

Open the spreadsheet, if you have not done so already, and click on the "Hjulstrom" tab.

We will discuss the curve in class. After the discussion, consider this question:

1. What are the main limitations of the Hjulstrom curve?

Click on the "Shields" tab. This is a calculator to estimate the boundary shear stress required to move grains of a given size. It is less intuitive than the Hjulstrom curve.

We will discuss the curve in class. After the discussion, consider these questions:

2. What boundary shear stress does it take to move a grain 0.05 cm in diameter in water (density=1.0 g/cm^3)?

3. What happens to the Shields parameter and the grain Reynolds number if you change the fluid from water to air? Does this change the boundary shear stress value required to initiate motion?

4. Finally, when we say that grain size is related to the energy of the system, this is a vague statement. Based on what we've done today, please clarify what we really mean by this statement.