Name(s)

Dillon Gonzalez

Project Number

S0910

Project Title

The Effect of Rheology on Reverse Faults Using a Fault Deformation Machine.

Abstract

Objectives

The purpose of this experiment is to prove that smaller sized particles will take longer to fault than larger sized particles in reverse faulting. It was hypothesized that if smaller sized particles have a greater surface contact area, then an increased friction will allow the particles smaller in size to be more rigid than those larger in size, resulting in the smaller particles requiring more time to fault.

Methods

Constructed and used a fault deformation machine to subject materials with varying particle sizes (clay, sand, and gravel) to compressional forces to model the formation of reverse faults. By measuring the amount of force required for a material to fault, the amount of faults produced in a material, and the length of the faults in a material, it can be determined which material is the strongest and therefore the most resistant to reverse faulting.

Results

After testing each of the three materials ten times, the results show that clay took longer to fault than both gravel and sand, and sand took longer to fault than gravel. Clay also had the lowest average number of faults, and sand had the second lowest number of faults, leaving gravel with the highest average of faults present. Due to clay s absence of faults, it had the shortest average length of faults, followed by gravel with the second lowest average length of faults, and sand having the highest length of faults on average.

Conclusions

After subjecting each material used to compressional force ten times each, it can be concluded that smaller sized particles take a greater amount of time to fault than larger sized particles due to the frictional forces experienced between the differently sized particles. This is due to the smaller sized particles having a high degree of friction because of the increased surface contact area between the individual particles. Contrarily, particles larger in size have less surface contact area in comparison to their overall size leading to less friction. This results in the smaller sized particles having a higher rigidity than those larger in size. Because of this, more compressional force, represented by turns of the crank, is required in order to overcome the strength of the material. Consequently, the larger sized particles will take less time to fault due to the weaker rigidity that they have.

Summary Statement

A fault deformation machine was used to subject materials with varying particle sizes to compressional forces to model the formation of reverse faults.

Help Received

I received help and guidance on the formulation and execution of a project from Dr. Heather Ford and graduate student Gillian Goldhagen from the University of California Riverside's Department of Earth Sciences.