Experimental Design: Glacier Speed and Basal Friction

Solon Invitational 2011

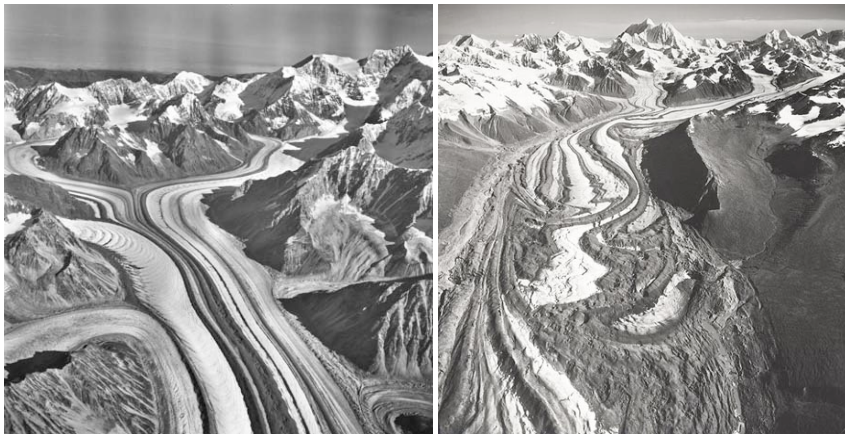

Figure 1: Sustina Glacier, Alaska (before and after surge: left and right respecively)

Introduction:

Glaciers are fluids (ice) that deform and flow under the force of gravity. The surface velocity of a glacier is controlled by the slope of the underlying topography, the friction at the bed (or basal interface), and the properties of the ice itself. Glacier surges (like the one shown in Figure 1) are hypothesized to occur when water beneath the glacier reduces the friction under some areas and cause them to speed up.

Flubber (made from house-hold materials) flows and deforms in a similar manner to ice and can be used as a physical model for glacier flow.

Assigned Topic:

Perform an experiment on the effect basal friction on the speed of a glacier.

Supplied Materials:

- One bag of Flubber
- One rectangular board
- One sheet of high grit sand paper
- One paper towel
- One sheet of tin foil
- One sheet of low grit sand paper
- Two metallic clips
- One container of olive oil
- Twelve toothpicks

Outline for Report:

a. Statement of the Problem
b. Hypothesis
c. Variables
d. Experimental Control
e. Materials
f. Procedure
g. Qualitative Observations During Experiment & Summary of Results
h. Data Table
i. Graph(s)
j. Statistics
k. Analysis of Results
l. Possible Experimental Errors
m. Conclusion
n. Recommendations for Further Experimentation Based on Your Data & Practical Applications