Glacier Flow Predictive Modeling via Flubber

Overview

This lesson/project/lab has students predict via multiple drawings and time lapse photography predictive Flubber flow before the placement of barriers and other obstacles in front of the Flubber. Contour lines in two directions are drawn on both the paper prediction and the Flubber for comparison purposes.

Following predictive drawing completion glacier flow (Flubber flow), with obstacles in place, was then observed and time lapse photographed. Students conclude the exercise with a written comparison of hypothesis and reality.

Students were part of a previous experience in which they observed a simple flow experiment of Flubber moving down a stream table without any obstacles. This gave them background needed to complete the necessary discourse for this lesson. The original flow experiment has the Flubber marked with contour lines across two directions that allows for the flow dynamics to be clearly observed.

Objectives

- Students, based on knowledge gained from observing Flubber in a previous activity, will predict the flow of Flubber around obstacles.
- Students will compare the actual flow of Flubber with their predictive flow ideas.
- Students will time lapse photograph their predictive drawings and the real flow.
- Students will compare predictions with reality.

Materials

- Drawing paper
- Stream table or other enclosed contraption that can hold Flubber and be tilted
- White glue
- borax
- water
- iPad with time lapse photography app
- obstacles of choice
- markers for contour lines drawing on Flubber

Preparation

1. Preliminary information was gained via glacier flow research and simple Flubber flow experiment without any obstacles or barriers placed in stream table.
2. Students will design a Flubber flow experiment by deciding what obstacles they want to place in front of a flowing Flubber mass.
3. Students will draw their predictions and time lapse photograph these predictive drawings showing contour line change in two directions. Two direction contour lines must be drawn and shown to change over flow time.

Procedure

1. Design "obstacle course" for Flubber.
2. Create series of flow hypothesis drawings with two directional contour lines and time lapse photograph that series to show flow hypothesis.
3. Create obstacles in stream table.
4. Add Flubber.
5. Draw two directional contour lines on Flubber quickly.
6. Tilt table and time lapse photograph the actual Flubber flow.
7. Compare hypothesis flow drawings with real flow.

Assessment

1. Students will present in a discourse medium of choice their hypothesis time lapse and the time lapse of the Flubber flow with obstacles.
2. Students will write a conclusion as follows.
3. Paragraph one summarizes purpose and procedure.
4. Paragraph two summarizes the hypothesis and the actual results.
5. Paragraph three compares the accuracy of the hypothesis with the results.

Extension

Ideas can be generated for the application of time lapse photography in the lab.

Resources

Climate research and glaciologist Seth Campbell, PhD
• Research Geophysicist Cold Regions Research and Engineering Lab, Hanover, NH
• Research Assistant Professor, University of Maine School of Earth and Climate Sciences

Contact Seth Campbell at seth.campbell@umit.maine.edu

Assessment

The assessment pieces are the time lapse photography documentation and then the written conclusion which has students comparing predictions with actual flow.

Authors

Seth Campbell, Phd <seth.campbell@umit.maine.edu>

Ken Williams
   Middle School Educator
   Nobleboro Central School, Nobleboro, Maine
   kwilliams@aos93.org

Standards

Next Generation Science Standards (NGSS):

The science standards are tough to match point by point with this activity as this activity specifically asks students to deal with glacial movement. The benefit of the experiment regarding new standards is that students are expected to offer a prediction based on initial observations of an uninterrupted fluid flow dynamic over time and then compare that prediction with something of their own invention that gets observed and recorded.

- MS-ETS1-1
- MS-ETS1-4
- MS-PS1-4