DragonflyTV: GPS Activity 1

N'ice Moves!

Mendenhall Glacier Visitor Center

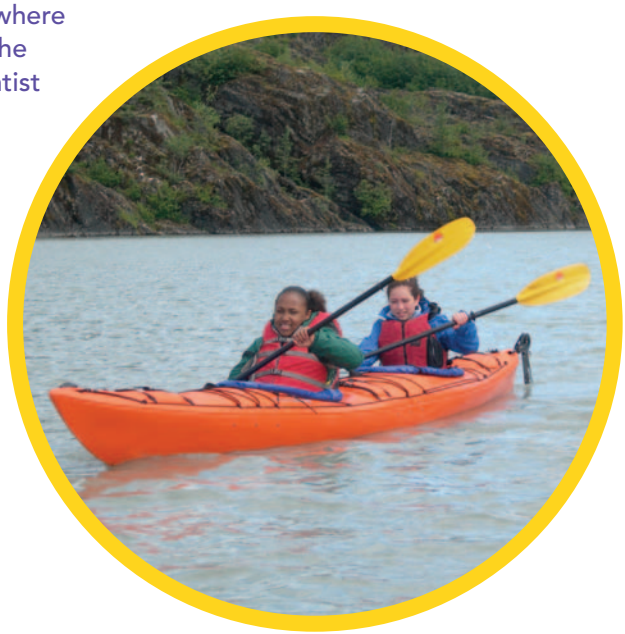
Juneau, AK

www.fs.fed.us/r10/tongass/districts/mendenhall/

Glaciers

We're Deborah and Brittani, and we live in Juneau, Alaska, which is home to 38 glaciers! We love being outside, especially during our short Alaskan summers, so we decided to check out a glacier up close at the Mendenhall Glacier Visitor Center. The center has cool exhibits that explain the science behind glaciers. We also saw some evidence, such as old photos, that the front edge of the glacier has retreated in the last 30 years. That got us thinking about global warming, and we wonder: How fast are the glaciers melting?

We decided to take a look at the terminus—the place where the glacier meets the open water of Mendenhall Lake. We kayaked to reach it. By studying landmarks, we could see that the terminus has indeed retreated over the years. We continued our research at the North Star camp, where researchers from the University of Alaska study the Mendenhall Glacier. Eran, an environmental scientist from the university, taught us how to make measurements on the glacier and compare them to past measurements.



Icebreaker

Watch a glacier model on the move!

30 minutes

DragonflyTV Skill: Observing

Guide your kids as they

1) Measure 2 cups of white glue into a bowl. Very slowly, add liquid starch until the consistency is like that of putty. (Too much starch results in a stringy substance.) This mixture is gak! It can be placed in a zipper storage bag in the refrigerator between uses.
2) Add a fist-sized gob of gak to the landscape in various places. Each gob represents a year's worth of snowfall. Continue to add more "snow" until gone.
3) Observe the gak as it begins to flow downhill (like a river). Record the time it takes the gak to travel 1 cm, 2 cm, 3 cm, 5 cm, etc., down the model.
4) Continue to observe for about 20 minutes. Write down any other glacier behaviors, such as what happens if two separate flows meet, or when the flow meets an obstacle.
5) Develop other investigation ideas, such as: Does the amount of gak used in the flow affect how quickly it moves downhill?

You'll need:

- a plastic glacier landform model
- gak (white glue, and liquid laundry starch)
- a stopwatch
- a notebook

DFTV Science Helper

Plastic glacier models can be ordered from Ward's Scientific Supply (www.wardsci.com, item# 80 V 5820). Alternatively, students can create their own landform using papier-mâché, or rocks, etc.

For more simple activities like this one, surf to pbskidsgo.org/dragonflytv/superdoit/index.html

Investigation
Glaciers

1-2 hours, plus prep time a day in advance

No matter where you live, explore factors that affect how glaciers melt with this activity.

Preparations step

1) Prep "glaciers" at least 24 hours in advance by measuring 750 mL of water and pouring that into the plastic containers. Repeat for a total of 9 containers, 3 per energy station. (See the Science Helper below for a description of the stations.) Freeze the containers. For best results, the water needs to freeze completely. (If possible, students can do the measuring the previous day.)

Guide your kids as they

1) Make a group decision about how to design the experiment, considering the distance from the energy source (fan or lamp) to the "glacier," the position of the brick (under the glacier, alongside it, etc.) and so on. Predict which glacier will melt the most under the agreed-upon conditions.
2) Remove the "glaciers" from the plastic containers and place into plastic trays, each glacier on its own tray. Add the bricks according to the agreed-upon plan (placement should be consistent for all groups). The three glaciers at each station will be melting at once.
3) On a class signal, turn on the fans and lamps while setting a timer for 45 minutes.
4) While "glaciers" are melting, each group presents its experiment design conditions and explains why the conditions were chosen.
5) When time is up, remove the "glaciers" (and bricks) from the trays. One tray at a time, slowly pour the melt water from the tray into a beaker. Then carefully pour it into a graduated cylinder. Record the results. Repeat for each "glacier." Each station will record three water amounts, one for each of its glaciers.
6) Discuss the results as a class. Which glaciers melted the most? How did the predictions compare with the tested results?

You'll need:

- 3 lamps, each with a 75-watt bulb
- 3 fans
- 9 quart-sized plastic containers (like those from cottage cheese)
- 6 equal sized bricks (3 dark colored and 3 light colored)
- a beaker (1 liter capacity)
- a timer
- 9 plastic trays (at least 20 cm square and 5 cm deep)
- a graduated cylinder, 200 mL capacity

DFTV Science Helper

Divide the class into three small groups. Each group will be responsible for testing at one of three energy stations: Sun (lamp), Wind (fan), Control (no fan or lamp). Each station will test three conditions: use of a light-colored brick, a dark-colored brick, and no brick.

DFTV Kids Synthesize
Data and Analysis

Record the volume of melt water in mL in a table such as this (your class results will vary from these reported results):

Amount of Melt Water after 45 Minutes

Brick type	Energy stations		
	Control	Wind	Sun
None	35 mL	100 mL	80 mL
Light color	38 mL	140 mL	100 mL
Dark color	40 mL	180 mL	120 mL

DFTV Adult Tip

Many people believe that sunlight causes glaciers to melt more quickly than wind. However, wind is actually the more significant factor. Assuming your class arrives at the same result, discuss how it turns out that more heat energy can be transferred to the glacier models from warm air than from light energy.

Keep Exploring!

Does a small glacier melt more quickly than a large one? Do a similar test as before, this time starting with different sizes of glaciers (say, 2L, 1L, 0.75L). Expose each to the same energy source (wind, say), and measure the melt off after 45 minutes. With your findings, can you say whether a big glacier has more protection against global warming than a small one, or is there no difference?