

Seamounts and Currents
Winter Teachers' Workshop
February 3-4, 2006

Seamounts and Currents

Background:

Seamounts are underwater mountains that alter water flow and can be productive areas for sea life. Club members will create a flume and experiment with underwater objects to investigate how seamounts and other underwater obstacles alter current patterns. Here's a link to images of seamounts in the Pacific. <http://www.ldeo.columbia.edu/~small/PacificSmts/> These images were composed by a combination of data from satellite altimeters and shipboard SONAR data. The 'Shoobox Satellite' activity from the fall demonstrated how satellite altimeters work.

Materials:

Modeling clay
Large plastic containers
Plastic tubing
Binder clamps
Flow control clamps
Clear flume tray
Sink or bucket to catch flume outflow
Colored sugar solution
Pipettes

Procedure:

1. Set up the flume with a catch bucket and a water reservoir located above the flume and set up the experiment:
 - a. Fill one of the big plastic containers with water
 - b. Connect a siphon between the plastic container and the flume. Attach the siphon to the side of the plastic container with a binder clamp
 - c. Attach a flow-control clamp to the siphon tube and position it so that the outflow is securely positioned at the top of the flume
 - d. Loosen the clamp on the siphon tubing. Allow water to fill the flume until it starts flowing out the outflow hose then tighten the clamp.
 - e. Create seamounts and other underwater obstacles and place them in the flume. Make sure that the obstacles are fully submerged.
2. Start the water flowing and adjust the water flow so that the outflow is about 100 mL per minute.
3. Once the water is flowing inject a pipette-full of colored sugar water near the upstream side of one of the objects. You may need to adjust the flow rate and/or the amount of colored sugar water until you see a pattern.
4. Observe what happens when you change the flow.

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5. Try different objects. After experimenting with the underwater seamounts, have club members try some obstacles that are only partially submerged – like a dam or an island.
6. Compare results between groups and discuss the results people found.

Discussion:

Underwater seamounts change the current flow and cause gyres (swirls) and eddies (reverse currents) downstream of the obstacle. These disturbances cause upwelling in some areas and calm water in other places. These changes make microenvironments that are good for life like the orange roughy from the “Boom and Bust” activity.