Notes for Suitcase Oceanography Earth Materials Lesson

Lesson 1

What is in the bottom of the ocean and how did it get there?

1. In advance

A. Have the teachers prepare name tags for the kids.

B. Students will need to have a sharp pencil and a ruler.

C. Teacher have kids write their best answer to:

<u>What is in the bottom of the ocean? How did it get there?</u>

2. Introduction

A. Hang wall charts in advance, queue films, and distribute handouts.

B. Set up materials for demonstration on sedimentation: beakers, rocks, colored sand slurries, clay.

C. Give name(s) and say you are from COAS-OSU. Also,

1. Tell kids that you are an oceanographer.
2. Ask for a definition of "oceanographer".
3. Tell kids you are here to talk about ocean science.
4. Tell kids to raise their hands to be called on for answering questions.

D. Ask "Who has ever been to the ocean?"

E. Ask "What does the seafloor look like?"

F. Distribute hand-outs and tell them we will explain where the rocks and sediments in the bottom of the ocean came from.

3. Undersea volcanoes

(2 charts: Processes that contribute to seafloor deposits and a map of the ocean floor.)

A. Talk about different types of rock they have been studying, which ones originated in the ocean (for example, limestone, basalt, and sandstone)? Calcite (is it a mineral or rock?) is also formed in the ocean by organisms such as plankton, coral, clams, and other bivalves.

B. Explain the world map, pointing to the oceans and land. Note the proportion of water to land (70–30%); why it's called the "blue planet."

C. Seafloor eruptions: Note undersea mountain chains. Explain that there are submarine volcanoes, which put out lava that forms oceanic crust (basalt). This is the longest continuous chain of volcanoes in the planet. If all the new rock formed every year along mid-ocean ridges were poured into the Grand Canyon, the entire Grand Canyon would be filled in 8 to 10 years. (~20 cubic kilometers of new oceanic crust are formed every year). The Hawaiian islands are made mostly of basalt.

1. Show segments from the NOAA vents program: Camsfly, lamphere, lava eruption, rescue, octopus.

D. Hydrothermal vents

The areas around spreading centers have cracks. As seawater descends into the region of partly molten rock beneath the mid-ocean ridge, it heats up to 300-400°C and becomes extremely corrosive. This hot fluid is capable of dissolving the surrounding basaltic rock and leaching out metals and other elements. The most spectacular of these vents are called black smokers, the "smoke" that comes out of chimneys consist of metallic sulfide particles that precipitate out of the vent fluids as it mixes with seawater.

1. Show short segment on hydrothermal vents.

3. Sedimentation and aquarium demonstration

A. Ask the students to name other ways materials can be put into the oceans (cover the ways they don't bring up – give local examples where possible).
    1. Refer to the chart with illustrations.
    2. Reiterate that lava forms rocks (basalt) at the seafloor and put the basalt samples in the bottom of the aquarium. Add some black sand to illustrate volcanic-hydrothermal deposits.
    3. Add more colored sand to the aquarium to illustrate deposition. Explain that we are using colored sand to demonstrate these processes. In the ocean, there is sand, clay, and silt. Clay and silt have much smaller particles and settle more slowly. Put some mud in another beaker and show that this takes too long.
    4. Use a straw to "core" sediments from the aquarium, and show students how to do it. Make three "cores." Seal them with playdough and pass them around.
    5. Show them a real core and explain that these get cut lengthwise for curation (saving and preserving) and study.
    6. Note that, after the sediments get buried, they change with time. Explain that students will explore the changes that occur to materials after they get buried, from shells to marble, in the next lesson.
    7. Ask the students to look at the "core" pictured in their booklet. Help them answer the questions in the sheet.

4. Recap

A. Ask students to answer the questions in the last page of their booklets

B. Collect the booklets and pre-lesson sheets for assessment.