

Deep Blue Sea

By **Meg Swecker** for Blue Ridge Public Television (WBRA, WMSY, WSBN)
Roanoke County Schools, Roanoke, VA

Grade Level: 3-5, 7

Time Allotment: 2 class periods

Overview: Oceans cover approximately 70% of the Earth's surface, yet many of their geological features remain a mystery to our students. While many important features exist near the continents, their underwater location makes it difficult for students to understand. Students will become familiar with the features of the ocean floor.

Subject Matter: Science

Learning Objectives:

Students will be able to:

- Identify the geological characteristics of the ocean floor
- Create a media-based project that highlights key features of the ocean floor.

Standards: Virginia Standards of Learning which can be found at:
<http://www.pen.k12.va.us>

SCI.5.6 The student will investigate and understand characteristics of the ocean environment. Key concepts include:

- geological characteristics (continental shelf, slope, rise);
- biological characteristics (ecosystems);

SCI.ES.11 The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include:

- importance of environmental, geologic, and economic implications;
- features of the sea floor (continental margins, trenches, mid-ocean ridges, and abyssal plains) reflect tectonic processes;

Media Components:

Streaming Video:

Oceans: Earth's Last Frontier "Continental Shelves, Continental Slopes, Abyssal Plains, and Trenches" (02:10) United Streaming-
<http://www.unitedstreaming.com>

Google Earth download: <http://www.earthgoogle.com>

Photo Story download:

<http://www.microsoft.com/windowsxp/using/digitalphotography/photostory/defaultmspx>

Photo Story Project example: <http://www.rcs.k12.va.us/tech/doe/Ocean%20Floor.wmv>

Images of ocean floor features: <http://www.rcs.k12.va.us/tech/oceanpix.htm>

Materials:

For entire class:

- One computer with internet access
- Google Earth software installed on the computer
- One LCD display unit
- One TARGET for each ocean feature discussed
- An assortment of colored markers

For cooperative groups of 2-5:

- One computer with internet access
- Photo Story software installed on the computer

Prep for Teachers:

- Prior to teaching this lesson, download and install Google Earth.
- Prior to assessment activity, install Photo Story on the computers that the cooperative groups will use.
- The United Streaming video clip, *Oceans: Earth's Last Frontier: "Continental Shelves, Continental Slopes, Abyssal Plains, and Trenches"* should be downloaded, cued, and ready to view...
- When using media, provide students with a **FOCUS FOR MEDIA INTERACTION**, a specific task to complete and/or information to identify during or after viewing of video segments, websites, or other multimedia events.

Introductory Activity:

Step 1:

Using Google Earth, identify areas of the world where the continental slope is visible.

1. **Say** to the class, "Today we are going to learn about the characteristics of the ocean floor."

2. Using the computer and LCD projector, open Google Earth. As the image of North America grows larger on the projection screen, **ask**, "Which continent are we looking at?"

(Answer: North America)

Step 2:

Place the cursor on the Atlantic Ocean, somewhat close to the eastern coast of the United States. **Ask**, "Which ocean are we looking at?" (Atlantic Ocean)

Step 3:

Double-click on the area of the ocean closest to the coast of Virginia and zoom in. When the deep blue line becomes visible on the projector screen, cease the zoom. **Say**, "Google Earth shows us satellite images of planet Earth. We've identified a continent and an ocean, but what is this dark blue line in the Atlantic Ocean?" Allow students to brainstorm ideas. **Say**, "This line is the part of the continent which extends under water. It is the place where the ocean floor changes from the continental shelf to the continental slope. It is called the Continental Shelf Break."

Step 4:

Examine the continental break around various land masses. **Ask**, "Is the Continental Shelf Break generally close to land?" (Yes). **Say**, "The Continent doesn't end where the ocean begins. It extends under the seawater and ends at the Continental Shelf Break."

Learning Activity

Ask, "Has anyone ever been to the beach?" (Allow students to respond and share briefly)

Say, "When you go to the beach and swim in the ocean, you are swimming above the ocean floor. Today we're going to learn about features of the ocean floor." Introduce the United Streaming video clip, *Earth's Last Frontier: Continental Shelves, Continental Slopes, Abyssal Plains, and Trenches*.

Focus on media interaction- **Say**, "Watch this clip for a description of the Continental Shelf." Start the video clip from the beginning and play it for approximately 14 seconds, until you see people in the surf holding a big net.

Ask, "Which part of the ocean floor are we most familiar with?" (Continental Shelf)

Ask, "Is the Continental Shelf part of the Continent?" (Yes)

Ask, "Is the Continental Shelf above water or under water?" (under water)

Focus on media interaction-Say, " Watch this next clip to find out how we can learn about sea life on the Continental shelf, and why there is so much life near the shore." **Resume** the clip and **play** it for approximately 22 seconds, until the narrator says, "...for here the water is shallow and gets a lot of light." **Ask,** "How can we learn about creatures that live on the Continental Shelf?" (wade out, use a net)

Ask, "Why do we find an abundance of sea life on the Continental Shelf?" (Light)
Ask, " How would the presence of light encourage sea life?" (Light creates the condition for phytoplankton to grow. Phytoplankton is a food source for many sea creatures)

Say, "Watch this next clip to find out what lives on the Continental Shelf." Play the clip for approximately 24 seconds, until the narrator says, "... the catch here includes baby Hermit Crabs and Flounder."

Say, "Name two examples of sea animals that were found in the net." (Baby Flounder, Hermit Crabs)

Ask, "Are these the only sea animals that would live on the Continental Shelf?" (No)

Ask, "If Baby Flounder and Hermit Crabs are found in these shallow waters, what other types of sea animals might also live there?" (accept a variety of answers that may draw from student's personal experiences. Fish, crustaceans, and eels are all commonly found on the continental shelf.)

Focus on media interaction- Say, "Watch this next clip to find out where the Continental Shelf ends and the name of the ocean floor that drops off sharply." Play the clip for 11 seconds, until the words "Continental Slope" appear on the clip.

Ask, "At the end of the Continental Shelf, what does the ocean floor do?" (drops off sharply)

Ask, "What do we call the part of the ocean floor that drops off sharply?" (Continental slope)

Say, "That's right. The Continental Slope is the edge of the Continent and the place where the ocean becomes very, very deep. Along this edge, you may also find the Continental Rise, places where sediment is deposited. The Continental rise is part of the Continental Slope and it creates contour to the slope."

Focus on media interaction- Say, "Watch this next clip to find out what is beyond the Continental Slope." Play the clip for 6 seconds, until the words "Abyssal Plain" appear on the clip.

Ask, "What do we call the flat part of the ocean floor that is beyond the continental slope?" (Abyssal Plain)

Say, "The Abyssal Plain is a flat, featureless region in very, very deep water. It is 2-4 miles deep in many places." **Ask,** "Do you think much light will get to the Abyssal Plain?" (No)

Ask, "What are the features of the ocean floor that we've talked about today?" (Continental Shelf, Continental Slope, Continental Rise, Abyssal Plain)

****End of Fifth Grade objectives. Fifth grade teachers move to the Culminating Activity. Seventh grade teachers continue with the learning activity.****

Focus on media interaction-Say, "The Continental Slope ends where the Abyssal Plain begins in some parts of the ocean. Watch this next clip to discover another feature of the ocean floor that is sometimes found at the end of the Continental Slope. Watch to see which ocean this feature is found in most often." Play the clip for 8 seconds until the words "Deep Trench" appear on the clip.

Ask, "What is the name of another feature found at the bottom of the Continental Slope?" (deep trenches)

Ask, "In which ocean are deep trenches commonly found?" (Pacific)

Focus on media interaction- Say, "Watch this next clip to find out what scientists think the Earth's surface is made of and how deep ocean trenches are formed." Play the clip for 12 seconds, until the narrator says "...trenches are formed when moving plates collide and one moves under the other."

Ask, "What do scientists believe the Earth's surface is made up of?" (large sections of rock; plates)

Ask, "Do these plates ever move?" (Yes; constantly)

Ask, "How do these plates create trenches?" (moving plates collide, and one moves under the other)

Say, "So the Continental Slope can end in either an Abyssal Plain or a deep ocean trench."

Ask, "What are the features of the ocean floor that we've talked about today?" (Continental Shelf, Continental Slope, Continental Rise, Abyssal Plain, Trenches.)

Culminating Activity: Target Game

- Create a large target on butcher paper and draw one "ring" per cooperative group.
- A separate target should be created for each geological feature.
- Targets are placed around the room and one cooperative group is seated at each target.
- Using a timer, students have 2 minutes to write down everything they know about the geological feature in the center of the bull's eye.
- When the time is up, the group moves on to the next target and completes the next available ring.
- When each group has visited each target, the targets are brought to the front of the room for class evaluation.

Assessment Activity: Photo Story Project

- Divide students into cooperative groups and assign the group project. Possible projects might include:
 - Describe the features of the Continental Shelf (Continental Slope, Continental Rise, Abyssal Plain)

- Compare and contrast the features of two different sections of the ocean floor.
- Explain how living in different areas of the Ocean floor might affect the food web.
- Show students the Photo Story example found at this website:
<http://www.rcs.k12.va.us/tech/doe/Ocean%20Floor.wmv>
- Instruct group to select images found on this website:
<http://www.rcs.k12.va.us/tech/oceanpix.htm>.
 - Once the images have been selected, download them by placing the cursor on the image, right-mouse clicking, and selecting “save picture” from the short-cut menu.
- Working in small groups, students should open Photo Story and choose “begin a new story”.
- Import the images that have been downloaded.
- Add text pertinent to each image.
- With instructor permission, add music to the Photo Story.
- Name and save the Photo Story project.

Cross-Curricular Extensions:

Math:

- Students can graph the approximate depths of each ocean feature and compare them to landforms on the earth’s surface that are of approximate height.
- Using chalk and an asphalt surface, help students draw scale models of the ocean’s geological features.

English:

Students can read the following:

- Ocean Babies by Deborah Lee Rose
- The Magic School Bus on the Ocean Floor by Joanna Cole

Science:

- Participate in the exploration of an island ecosystem
<http://www.racerocks.com/racerock/>

Technology:

- Ask a CyberScientist:
<http://www.onr.navy.mil/focus/ocean/resources/default.htm>
- Ocean Zones WebQuest:
<http://projects.edtech.sandi.net/sessions/oceans/>
- Ocean Adventure ThinkQuest:
<http://library.thinkquest.org/18828/>

- Links:

<http://www.onr.navy.mil/focus/ocean/regions/oceanfloor2.htm>

<http://www.oceansatlas.org/index.jsp>

<http://whalesong.net/>

<http://oceanworld.tamu.edu/index.html>

<http://www.geocities.com/sseagraves/underthesea.htm>

Community Connections:

- Invite a scuba diver to come in and discuss the ocean floor features that are visible to divers.

Assistive Technology:

- Supportive grouping
- Instead of creating slides with text, students could narrate their PhotoStory project.