

Shipboard Connections

Grade: 4th – 12th

Group Size: class

Time: 45 minute pre-lesson, 30 – 45 minute ship link, 1 – 2 hours prep

BACKGROUND The Integrated Ocean Drilling Program (IODP) is an international marine research program that explores the Earth's history and structure as recorded in seafloor sediments and rocks and monitors sub-seafloor environments. Scientific ocean drilling revolutionized our view of Earth history and global processes through ocean basin exploration. Science outcomes from 40 years of expeditions have advanced our understanding of sea level and climate history, gas hydrates, deep biosphere and the structure of land underneath the ocean. Scientific ocean drilling expeditions have validated the theory of plate tectonics, given researchers insights into Earth's ancient climate and provided evidence of an asteroid impact that caused mass extinctions 65 million years ago.

OVERVIEW The students will be transported aboard ship via Skype. They will gain an understanding of the interdependence of different disciplines when conducting a scientific study. They will interact with the crew and scientists aboard a research vessel, learning about the methods of sampling as well as tools and technology used to obtain those samples. They will have an opportunity to ask questions, find out about current research and to learn about the day in life aboard ship.

National Core Content Ideas - CONTENT STANDARDS

PS4.C: Information Technologies and Instrumentation – knowledge of the essential components of modern imaging, communication, and information technologies.

LS2: Ecosystems: Interactions, Energy, and Dynamics - How and why do organisms interact with their environment, and what are the effects of these interactions?

ESS1.C: The History of Planet Earth - How do people reconstruct and date events in Earth's planetary history?

ESS2.C: The Roles of Water in Earth's Surface Processes - How do the properties and movements of water shape Earth's surface and affect its systems?

ESS2.E: Biogeology How do living organisms alter Earth's processes and structures?

ETS2.A: Interdependence of Science, Engineering, and Technology

What are the relationships among science, engineering, and technology?

Ocean Literacy: 1b,c, 6b, 7b-d, f

Common Core Language Arts: Listening and Speaking 1 – 3, 5

PERFORMANCE OBJECTIVE

1. Students will engage in discussion (listening and speaking) with crew and scientists of the USS Joides Resolution to learn about the science conducted aboard ship and ship operations.

2. Students will be able to identify at least one challenge related to investigations below the seafloor at depth and how the crew and scientists overcome that challenge.

MATERIALS

Computer with internet capability and Skype loaded on to the computer
Projector connected to the computer to allow students to see the presentation
Webcamera for the crew to see the students
Expedition summary
Ocean map showing Bathymetry

ADVANCE PREPARATION

Contact **Sharon Katz Cooper**, Assistant Director of Education
scooper@oceanleadership.org
to see if it is possible to schedule a skype with the ship – dates are really dependent upon ship availability.

Download the video/slides to give an overview of the ship and life aboard the ship.
<http://www.oceanleadership.org/education/deep-earth-academy/>

Visit the ship website to find out about the current expedition. Share a map with the students of where the study site(s) are located. <http://joidesresolution.org/>
More indepth information on the integrated ocean drilling program is found at <http://iodp.tamu.edu/publicinfo/drillship.html>

Contact the ship in advance to arrange to Skype. Download Skype onto your system in advance.

Test the system with the ship a few days before the student link to be certain everything works correctly.

Prepare student questions in advance of the live link.

TEACHING TIPS AND TRICKS FOR SUCCESS

Realize that real time may mean challenges in maintaining a connection. Call back if you need to and have a back up plan if the connection just doesn't work on that day.
Previewing the students is really valuable to make the most of the interaction and know that the time frame may extend beyond what you planned.

PROCEDURE

A. Investigation Question:

What challenges are faced when collecting samples from the ocean floor at depth?
What careers are available in ocean sciences aboard a research vessel?

B. Engage:

Ask students to diagram the ocean floor. Share a bathymetric map and help them understand the depths that are found in the ocean as well as where they tectonic plates meet (NOAA Ocean Explorer Mapping the Ocean Floor Bathymetry lesson go into ocean floor mapping in depth -

oceanexplorer.noaa.gov/edu/curriculum/section2.pdf)

Ask the students to brainstorm about how samples might be collected from the ocean floor, brought to the surface without contamination and what they might look for in those samples.

C. Procedure:

1. Introduce the students to deep ocean exploration and the USS Joides Resolution through lessons provided.
2. Share the current expedition overview (*sample from Expedition 339 that was the Expedition at our workshop is attached*). Introduce vocabulary and breakdown expedition goals to understandable chunks.
3. Identify the conditions you will be observing (is it a different time of day where the ship will be located? Check the ship Blog to see what has been happening to make sure that students know what has been happening aboard ship.
4. Have students develop the questions that they would like to ask the scientists and ship crew. Review questions in small groups and edit questions, research further ideas together to modify questions for the online link.
5. Share content interests with contact aboard the ship.
6. Participate in live link through Skype.
7. Discuss observations with students. Follow up the experience with students having them summarize what they learned, found most interesting, were appreciative to find out about to share back with the ship liaison.

D. Data connections: look at the Blog and the previous expeditions to see what data has been collected and how this connects to the visits.

E. Assessment: student summaries provide insight to how students have connected to the presentation/interaction with the ship.

ADAPTATIONS/EXTENSIONS

Divide responsibilities of who will take notes for answers to student questions.

Video the experience to help students reflect back upon questions and answers if students will have trouble taking notes or remembering content.

Have students follow the blogs related to the expedition
Relate questions to the ship for students and check for understanding during the presentation to ensure students have time and comfort to process information.

RESOURCES

This section lists books, journal articles, and/or web sites that can be used for more information.

<http://www.oceanleadership.org/education/deep-earth-academy/> - Deep Earth Academy facilitates and develops programs and materials based on scientific ocean drilling expeditions and Earth Systems Science to strengthen students' science, mathematics, and analytical skills. Our approach includes use of authentic data, inquiry-centered activities and interdisciplinary explorations drawing from the adventures of the JOIDES Resolution ship and the earlier ocean drilling ship; the Glomar Challenger.

<http://joidesresolution.org/> - The JOIDES Resolution is a seagoing research vessel that drills core samples and collects measurements from under the ocean floor, giving scientists a glimpse into Earth's development. Data from **The JR's** ocean drilling offers a scientific means of understanding climate and environmental change throughout a significant part of our planet's history—a research subject often termed Earth's paleoclimate. **The JR's** core samples are the “smoking gun” in evaluating many historical events related to paleoclimate changes in the solid earth and more -- like the extinction of the dinosaurs, for example.

<http://www.darkenergybiosphere.org/> - Our mission is to explore life beneath the seafloor and make transformative discoveries that advance science, benefit society, and inspire people of all ages and origins. We are a multi-institutional distributed center establishing the intellectual, educational, technological, cyber-infrastructure and collaborative framework needed for transformative experimental and exploratory research on the subseafloor biosphere.