



# Activity of the Month – December, 2009

## A Reader's Guide to Climate Change

### Summary:

Students divide into groups to read and discuss one of nine short but jam-packed articles about research done by the Ocean Drilling Program that has improved our understanding about past climate change events. These articles briefly describe the research conducted and the findings that resulted. Students use the information from the article to complete a write-up that they can be shared with other students.

### Learning Objectives:

Students will be able to:

- Understand how core data is used to make inferences about past climate events
- Interpret science research summaries
- Interpret a variety of multi-dimensional graphs and charts
- Compare, contrast and discuss hypotheses and evidence of past climate change to recent weather patterns and concerns over global climate change

### National Science Education Standards:

Content Standard D: Earth and Space Science and

Content Standard F: Science in Personal and Social Perspectives

Ocean Literacy Principle 3: The ocean is a major influence on weather and climate.

**Target Grade:** 9-13. For readers with advanced science knowledge.

**Time:** 1-2 class periods

### Materials:

- Copies of the nine *Ocean Drilling Program Highlights* climate change articles – enough copies so each team has a different article, and each student within a team has one copy.
- Readable copies of the geological time scale – 1 per team
- Blank copies of Analysis and Interpretation – 1 per student plus 1 per team
- Highlighters – 1 per student
- Geological dictionaries and chemistry references – 1 per team

### Background:

*Ocean Drilling Program Highlights* describe the incredible history, science and research that have taken place aboard the *JOIDES Resolution* and in oceanographic laboratories around the world since 1983. ODP, the Ocean Drilling Program, sailed groups of about 25 scientists (plus technicians and crew) to hundreds of global locations to drill for samples of rocks and sediment from below the seafloor in hopes of answering important questions about Earth's history and structure, life in the deep biosphere, past climate change and natural resources. In 2005, the Ocean Drilling Program was replaced by the Integrated Ocean Drilling Program (IODP), which has continued to expand our understanding of what was learned by the earlier expeditions.

**What to do:**

Very simply, any or all of these articles can be read and analyzed independently during class or as homework. Time allowing, however, the following method can yield a lively and provocative class discussion!

**Introduction Ideas:**

Have students visit the *JOIDES Resolution* website at <http://www.joidesresolution.org/> to learn more about the ship and to view an introductory video about scientific ocean drilling.

**The Lesson:**

1. Divide the class into groups of three to four students. Distribute one article per group; making sure each student has his/her own copy.
2. Students use the "Analysis and Interpretation" (A&I) page as a guide for understanding, and to answer questions as best they can.
3. When each group member has finished reading and completed an A&I, they join together to compare and contrast their findings. They should discuss their answers until the group agrees on a response to each question.
4. Students then record their final group answers on a clean A&I that can then be used to prepare a five-minute presentation and a short hand out or visual (poster, transparency, Power Point, or "black board") for the rest of the class.

**Extension Idea:**

- Watch the videos about coring for evidence of climate change in extreme environments: <http://recordings.wun.ac.uk/conf/nwo/oceandrilling2006>
- Use Google Earth to explore some of the drill sites and data that were recovered.

**If you plan to use Google Earth**, load the IODP data into Google Earth before you start:

1. Download and Install Google Earth onto your computer at <http://earth.google.com>
2. Add the IODP web-based program:
  - a. Use Google Earth's top menu to select Add – Network Link.
  - b. Customize the "Name" of the link to be called "Drill Sites."
  - c. Copy and paste the following link:  
<http://campanian.iodp-mi-sapporo.org/google/data/iodp.kml> into the "Link" field.
  - d. Hit OK.
  - e. Under "Places," check the named link, Drill Sites, you added to become active.
  - f. Wait 10 to 15 seconds for Google Earth to start loading data.
  - g. When the process is complete, the locations of boreholes drilled during IODP, ODP, DSDP will be shown on the map.

# A Reader's Guide to Climate Change

## *Readings in Climate Change from Ocean Drilling Program Highlights*

### Analysis and Interpretation (*Not for the scientifically wimpy!*)

*Ocean Drilling Program Highlights* describe the incredible history, science and research that have taken place aboard the *JOIDES Resolution* and in oceanographic laboratories around the world since 1983. ODP, the Ocean Drilling Program, sailed groups of about 25 scientists (plus technicians and crew) to hundreds of global locations to drill for samples of rocks and sediment from below the seafloor in hopes of answering important questions about Earth's history and structure, life in the deep biosphere, past climate change and natural resources. In 2005, the Ocean Drilling Program was replaced by the Integrated Ocean Drilling Program (IODP), which has continued to expand our understanding of what was learned by the earlier expeditions. In this activity you will read about an ocean drilling expedition related to climate change, then share what you learn with your classmates.

1. Complete the following for the highlight you are reading:

Title: \_\_\_\_\_

Author(s): \_\_\_\_\_

Location of the cores or samples discussed in the article: \_\_\_\_\_

Geological time period referenced: \_\_\_\_\_

2. Read the article through from beginning to end. Highlight and/or underline new words and ideas or statements that are unclear to you.
3. List and define all new terms through the use of context clues. Do your best, but do not use a dictionary!
4. Write formulas and/or draw the structures of any chemicals or minerals listed in the article.

5. List, summarize or paraphrase the research investigation question(s), hypotheses, and methods, described by the author(s). Reread until you can distill or explain at least some portion of the work.
  
6. Summarize the research conclusions **IN YOUR OWN WORDS**. You may need to refer to the graphs, charts and illustrations, which are full of useful information that can help you better understand the conclusions.
  
7. Use geology and chemistry texts, dictionaries and other references to look up all the new terminology you listed above. Compare your original definitions with those in the texts and make corrections if needed.
  
8. After learning about other ODP Highlights from your classmates, explain how the ODP research can help us better understand the effects of global climate change. How is this information helpful for understanding our future?