

# We're Not in Kansas Anymore... Where in the World is Site 806?

## Summary

In this introductory lesson, students plot latitude and longitude coordinates, using maps and Google Earth, to find their homes, schools, and Site 806 from the Ocean Drilling Program (ODP) Leg 130.

*Note that this lesson may be used separately, or as an introductory lesson for Activity 2: Wanted... "Mohawk guy" and his Band of Neogene Planktic Foraminifer Friends for Crimes against Calcareous Nannofossils and other Phytoplankton.*

## Learning Objectives

Students will be able to:

- Plot locations using latitude and longitude coordinates.
- Utilize *Google Earth* to find coordinates.
- Find regions and locations on a world map.

## National Science Education Content Standards

- Standard A: Science as Inquiry
- Standard D: Earth and Space Science

**Target Age:** Grades 5-12

**Time:** One class period

## Materials

- On-line access to *Google Earth* (can be downloaded at: <http://earth.google.com/>)
- World map
- Some yellow highlighter pens
- Student Page 1: Directions and map of the world
- Student Page 2: Coordinates chart for latitude, longitude, and elevation

## Background

Today's students live in a global community, so it is imperative that they become familiar with other regions of the world. By utilizing *Google Earth* students begin to see that the world and its oceans are connected. This use of *Google Earth* will help students visualize that coordinates on a map are real places. Students begin by finding the coordinates of their own school and home before moving beyond their backyard to the Ontong Java Plateau in the western equatorial Pacific. This location represents an important scientific site in a remote region of the ocean marked by coordinates of latitude and longitude. When *Google Earth* zooms in on this location, students will find open ocean instead of land. To become oriented, students will need to zoom back out to find nearby landmasses.

The ODP drilling vessel, *JOIDES Resolution*, traveled via Guam to Site 806. Modern navigation is based on satellites so each Leg, or expedition, is guided by plotting coordinates to find the exact location for this drill hole in the deep ocean. Before students begin to look at deep sea cores at Site 806 B, it will be important to find Site 806 on a map, and where it is in relation to the rest of the world. This activity will help students develop spatial relationships as they zoom into specific locations. They will also learn how latitude and longitude help plot locations on a map.

The world, like a circle, is divided into 360 degrees. Latitude and longitude are also divided into degrees. When reading coordinates, latitude is listed first. Latitude runs parallel (east-west) and shows degrees north (0° to 90° N) or south (0° to 90° S) of the equator. While many students might know that the equator is

located at zero degrees latitude, they might not be aware of the geography—which bodies of water or landmasses the equator crosses, such as central Africa, northern South America, the Galapagos Islands, Southeast Asia (Borneo, Sumatra).

Longitude runs up and down on a map (north-south) and shows the degrees east and west of the Prime Meridian, which runs through Greenwich, England. The Prime Meridian is 0° longitude. Longitude to the east is marked in positive degrees (up to + 180° E), while longitude to the west of the meridian is measured in negative degrees (to - 180° W). Maps normally show degrees as whole numbers, with precise measurements marked in minutes or seconds after the whole number. Each degree is subdivided into 60 minutes, as shown with an apostrophe symbol ('), and each minute may be divided into 60 seconds (shown ").

### What to do

1. Have students use *Google Earth* to find the coordinates for latitude, longitude, and elevation for their school, home, and Site 806 B.
  - a. Ask students to follow the directions on Student Page #1 and mark locations on the world map on this page, as well as “fly” to specific regions of the world using *Google Earth*.
  - b. Have students record the latitude, longitude, and elevation on Student Page #2 for their school, home, Site 806 B, Guam, Papua New Guinea, and the Solomon Islands (note: elevation below sea level) to help familiarize themselves with finding locations and locating landmasses around Site 806 B.
2. As indicated on the student page, have students zoom into Guam to view photos and to find out information about Guam. (Leg 130 to Site 806 B began and ended in Guam.)

### Useful Links

National Atlas: Latitude and Longitude. This article reviews latitude, longitude, and precision (includes approximate miles of degree, minute, and seconds).

[http://nationalatlas.gov/articles/mapping/a\\_latlong.html](http://nationalatlas.gov/articles/mapping/a_latlong.html)

### Related Activities on Deep Earth Academy Website

<http://www.oceanleadership.org/learning>

- Plot Sea Surface Temperatures
- Wanted...”Mohawk guy” and his Band of Neogene Planktic Foraminifer Friends for Crimes against Calcareous Nannofossils and other Phytoplankton.

### Acknowledgements

This activity is based on the *Scientific Results* volume from William P. Chaisson and R. Mark Leckie (1993) from the Ocean Drilling Program (ODP) Leg 130, available at: [http://www-odp.tamu.edu/publications/130\\_SR/VOLUME/CHAPTERS/sr130\\_10.pdf](http://www-odp.tamu.edu/publications/130_SR/VOLUME/CHAPTERS/sr130_10.pdf).

Kroenke, L.W., Berger, W. H., Janecek, T.R., et al., 1991 *Proceedings of the Ocean Drilling Program, Initial Reports*, Vol. 130.

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# Student Page #1

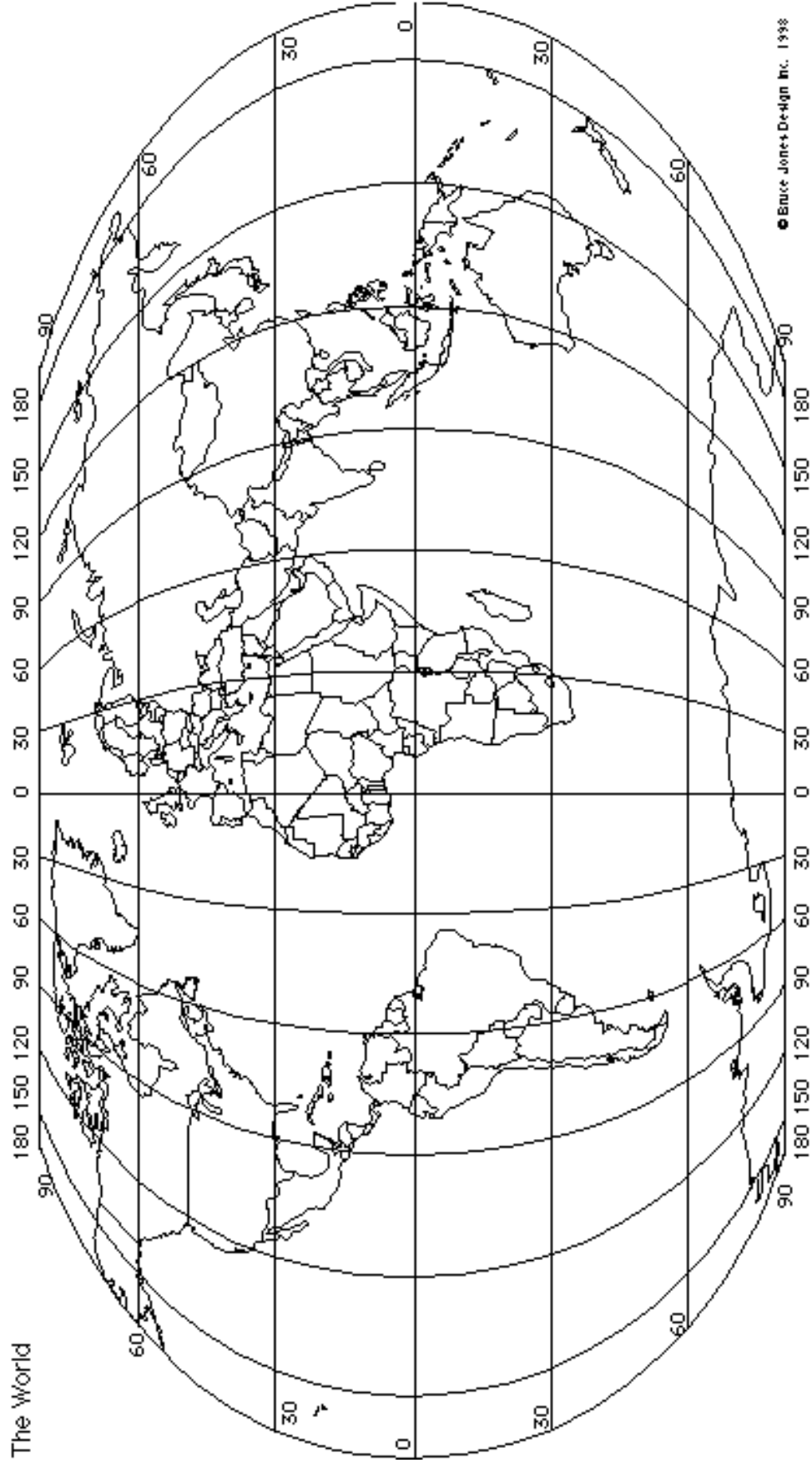
## Locating Places

### Directions

Use the attached map in conjunction with *Google Earth* to find locations in different regions of the world. Numbers across the top of the map show degrees of longitude to the east and west of the Prime Meridian ( $0^{\circ}$ ). Numbers along the sides of the map show degrees of latitude north and south of the equator ( $0^{\circ}$ ).

1. If you do not already have it, download *Google Earth*, (<http://earth.google.com>) then type your school address in the Input Box (upper left-hand corner) and then push "Go." This will fly you to the exact location of your school.
  - a. Record the coordinates for latitude, longitude, and elevation on the chart on Student Page #2.
  - b. Put an "X" on the map above to mark this region of the world.
  - c. Use a yellow highlighter to highlight the line representing the equator.
2. Type your home address in the Input Box, then GO.
  - a. Record the coordinates on your chart.
  - b. Zoom in (+) for better clarity. (Use joystick below the picture.)
  - c. Find landmarks, such as driveway, lake, rooftops.
3. Type the coordinates for Site 806 B's latitude and longitude in the Input Box: 0 19.11' N, 159 21.69' E. Note that *Google Earth* will not take the degree mark, but it will take the minute mark. Type a space after the degree. Mark this location on your map.
  - a. Since this site is in the middle of the ocean, find nearby landmasses to get oriented.
  - b. Instead of zooming in, it will help to zoom out (-) with the joystick until you locate the equator, Guam, Marshall Islands, Solomon Islands, and Papua New Guinea. The names will appear on the map. Use the left arrow to scroll left to find the Philippines.
4. Find and record the latitude and longitude coordinates for Guam, Papua New Guinea, and the Solomon Islands on your chart.
5. The Ocean Drilling Program Leg 130 expedition began and ended at Guam. Zoom into Guam and find the airstrips. Click on the colored dots to view photos and information about Guam (click on Guam). Next, find the Marianas Trench and Challenger Deep (near  $N11^{\circ} 30'$ ,  $E 142^{\circ}$ ).

## Student Page #1: Locating Places



Map: [http://cse.ssi.berkeley.edu/SEGwayEd/lessons/search\\_ice\\_snow/worldmapL.gif](http://cse.ssi.berkeley.edu/SEGwayEd/lessons/search_ice_snow/worldmapL.gif)

## Student Page #2

We're Not in Kansas Anymore... Where in the World is Site 806?

Location	Latitude	Longitude	Elevation (ft)
School			
Home			
Site 806B	0° 19.11' N	159° 21.69' E	
Guam			
Papua New Guinea			
Solomon Islands			