

Lesson Plan: Exploring Satellite Images

Identifying Changes in the Gulf of Maine from Space

Goals: At the end of this activity, students will understand:

- How to read and interpret a satellite image
- How to recognize the land masses in and around the Gulf of Maine

Objectives: Students will:

- Organize satellite images in chronological order
- Interpret satellite images
- Compare areas of high and low concentration of chlorophyll
- Discuss and answer questions within a small group

Background information that would be helpful to review and explain to students throughout this lesson:

- What chlorophyll is and that it can be measured from space
- That the bathymetric features of the Gulf of Maine influence mixing
- Chlorophyll is the pigment in plankton
- The quantity of phytoplankton varies throughout the year in the Gulf of Maine

Materials:

- Satellite Activity 6 cards
- Follow up Questions
- Paper and pencil

Prep- Work:

Download the satellite images and print them out on a color printer. One printed out the sets of two months out so that there are 6 sets of 2 satellite images. Print out as many sets as needed for students to work in groups of 2, 3, or 4. Along with each set of satellite images, students should also have a set of questions to during and after the activity. See questions below. Change or alter the questions how ever you see fit. If possible laminate the satellite images so they will last longer.

Procedure:

Split the class up into groups (2, 3 or 4 – depending on the materials available).

(Option- this can be done before or after the activity is finished. It may work nicely to answer and review these questions after the activity but it is up to you.) Before handing the packet of satellite images out to the students, discuss one satellite image as a class, show them the following:

1. The scale bar and units of measure
2. Explain what the scale bar means in relation to the colors in the ocean
3. Where Nova Scotia, Bay of Fundy, Cape Cod, Portland, Penobscot Bay, Georges Bank Region, Long Island, Cape Ann/Gloucester
4. Information in Legend (school, SeaWiFS Chlorophyll Concentration...)
5. Latitude and longitude marks around the edges of the image

Hand out a packet of cut satellite images out to the groups of students with the directions.

Directions for students:

1. Arrange the images in chronological order beginning from January to December.
2. Answer the following three questions as a group writing your answers on one sheet of paper
 - a. Which time of year is there the least amount of chlorophyll in the water? What evidence do you have to support your answer?
 - b. Which time of year is the most amount of chlorophyll in the water? What evidence do you have to support your answer?
 - c. What are three questions you have about these satellite images?

Class Discussions:

When students are finished, discuss each question as a class tallying answers on the board. For question one, students should see that January is the month with the fewest areas of red, which is the highest reading of chlorophyll. Even there is still some yellow and orange in the region at this time, there is still the lowest amount of red due to heavy winter mixing throughout the water column at this time. For question two, students should notice that April is the most “productive” time based on chlorophyll content (phytoplankton) in the water column. There is a large amount of red and orange along the edges of the shoreline and dark up in the Bay of Fundy, Nantucket Shoals (area below Nantucket), over Georges Bank, and other places.

Further Exploration:

Have students go to the following website to explore the MODIS satellite images http://www.cooa.unh.edu/modis_images.jsp for either chlorophyll or sea surface temperature. Here students can see when the phytoplankton bloom may occur in the Gulf of Maine as well as study chlorophyll levels and water temperature south of the Gulf of Maine down the eastern seaboard.

Evaluation:

This can happen in a few different ways. The review of these concepts can be reviewed throughout the unit or immediately after. An example of processing what was learned in the activity students could:

- Write a summary of one of the satellite images by describing how to read the image to someone who has never seen it before.
- Make a list of all the ideas that were discussed in the small groups and with the class.
- other

Print and Cut out these questions for each student group packet or make up your own questions for this activity!

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