

Chlorophyll-a from Space!

A Classroom Activity for Ocean Gazing Episode #25: A green ocean

Grade Level: 7-12

Lesson Time: 45 min.

Materials Required

computers with internet access, copies of the student worksheet

Summary

Use chlorophyll-a satellite data to determine ocean productivity.

Objectives

- ✓ Interpret “chlorophyll a” concentration maps and sea surface temperature data.
- ✓ Use the data to determine concentrations of phytoplankton in the ocean.

Vocabulary

Chlorophyll-a, Photosynthesis, Respiration, SeaWiFS, Primary productivity

Introduction

The Living Sea; Predators and Prey
(Background Information)

<http://www.mos.org/oceans/life/webs.html>

SeaWifs Teachers Guide Studying Ocean Color from Space.

[\(http://oceancolor.gsfc.nasa.gov/SeaWiFS/TEACHERS/\)](http://oceancolor.gsfc.nasa.gov/SeaWiFS/TEACHERS/)

When investigating the productivity of the ocean, it is necessary to look at the first link in the ocean food chain. These are often single-celled plants called phytoplankton. (Click here to see pictures of phytoplankton http://oceancolor.gsfc.nasa.gov/SeaWiFS/TEACHERS/sanctuary_4.html).

These primary producers, which contain the pigment chlorophyll, require sunlight, nutrients, carbon dioxide and water to continue the process of photosynthesis and respiration. This is called plankton primary productivity. The rate at which this process of primary production occurs can be limited by nutrient supply and the amount of available sunlight. Therefore, areas of the ocean where abundances of phytoplankton pigment concentrations are found should, theoretically, be abundant in nutrients supply and receive adequate amounts of sunlight.

In order to determine ocean productivity, we can use “chlorophyll a” as an indicator.

(Photosynthesis)

6	6	solar energy	1	6
molecules + molecules -----> molecule + molecules				
carbon dioxide	water	chlorophyll	sugar	oxygen

(Respiration)

1	6	6	6	life
molecule + molecules -----> molecules + molecules + support				
sugar	oxygen	carbon dioxide	water	energy



Data Activity

In this activity students will use data from the SeaWiFS program to deduce areas of ocean productivity.

1. Explore the SeaWiFS Browser.
(<http://oceancolor.gsfc.nasa.gov/cgi/browse.pl?sen=sw&typ=GAC>)
2. Click on the link for the current month from the selection of months below the global picture. This will give averaged results for an entire month's data. Note: If it is the beginning of a month, select the previous month's data for a better image.
3. Click on the color bar next to the SeaWiFS User Login button near the top of the web page and answer the questions on the Student Worksheet.
4. Click the back button to return to this month's global data.
5. Compare the recent chlorophyll a concentration maps with current sea surface temperature data.
(<http://weather.unisys.com/surface/sst.html>)
6. To see changes in ocean productivity throughout the year, use the archived images on the SeaWiFS browser.
(<http://oceancolor.gsfc.nasa.gov/cgi/browse.pl?sen=sw&typ=GAC>)
7. Access the Previous Year's Data by choosing the link for the year in the table below the global map.
8. Start with the January composite (all data collected in January) map.
9. Click on February to continue to viewing the data throughout one year. Concentrate looking at the polar regions and the North Atlantic basin and answer the questions on the Student Worksheet.

National Science Standards

Science as Inquiry

Abilities necessary to do scientific inquiry
(K-4, 5-8, 9-12)

Life Sciences

The cell (9-12)

Structure and function in living systems (5-8)

Science in Personal and Social Perspectives

Natural resources (9-12)

Ocean Gazing Podcast

The related podcast episode for this activity can be found by going to the podcast section of www.oceangazing.org