

Ocean Color: True or False Images?

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Introduction:

Ocean color is a term describing satellite imagery used to determine productivity in oceanic regions. It is a remotely sensed process that assesses phytoplankton activity by measuring chlorophyll concentrations. Although microscopic, phytoplankton in huge quantities can be seen from space using light refraction and reflection and are tracked by ocean color monitoring programs, such as SeaWiFS.

In this activity students will create and interpret ocean color imagery using SeaWIF data taken from NASA's Ocean Color and Giovanni websites, as well as Landsat 7 and TOPP.

Objectives:

Students will be able to:

- Explain the difference between satellite photography and satellite imagery
- Describe a "false color image"
- Interpret ocean color and sea surface temperature (SST) images
- Use real time and near real time data websites

Ocean Literacy Principles

This activity support:

- Essential Principle # 5: The ocean supports a great diversity of life and ecosystems
- Essential Principle # 7: The ocean is largely unexplored

Materials:

Writing Materials
Notebook
Computers with Internet Access

Handouts/Transparencies:

Student Instructions

Procedure

1. Introduce the idea of ocean color monitoring and false imagery to the students. Divide students into pairs and provide them with Student Instructions. Assign each pair to a computer.
2. Give students time to work through the instructions. Stop the class at different

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intervals to discuss their answers to the posed questions. If available, have students print off some of the color imagery they are creating to aid discussion.

3. Review answers and summarize key points:
 - Chlorophyll production is generally higher in summer months when more light and more favorable climate conditions are present
 - Cloud cover can substantially affect satellite imagery
 - The differences between true color and false color satellite imagery
 - Applications of ocean color data and imagery

Teacher Notes

- Before class, work through the Student Instructions yourself so you become familiar with the different websites and imagery the students will be producing. These instructions provide some questions for the students to discuss as they explore each section. Questions are designed to be open ended so as to aid discussion and allow students to feel comfortable with the data sets they are exploring.

Extensions

1. Ocean color has many applications in the marine sciences. Some examples include use within whale monitoring programs to track ecosystem health, within climate change research, as well as in ocean circulation tracking. Have students create a research poster on one such application of ocean color, also focusing on activities that are more terrestrially based.
2. Ocean color technologies are also useful in monitoring toxic and harmful algal blooms. Have students take a look at [NOAA's Phytoplankton Monitoring Network](#) and [Bigelow Laboratory's Algal Blooms](#). What are the causes and effects of harmful algal blooms? How can ocean color technology help us control these effects?

Vocabulary:

Chlorophyll-a

The photosynthetic pigment present in plant organisms responsible for photosynthesis reactions

Productivity

The rate of production of new biomass by an individual, population or community. Essentially it is the fertility or capacity of a given habitat or area

Satellite

An artificial body placed into earth's orbit in order to collect information or provide communication

SeaWiFS

Sea-viewing Wide Field-of-view Sensor. An satellite instrument specifically designed to monitor ocean characteristics such as chlorophyll-a concentration, water clarity and sea surface temperature.