Ocean Satellite Images Teacher Guide

Guiding Question
- What is the relationship between sea surface temperature and chlorophyll concentration?

Purpose
- To learn how to interpret and understand satellite images of ocean temperature and chlorophyll.

Estimated Time
- 1 hour

Materials and Tools
- Student Handouts
- Satellite Images Dataset* (one set per team)
- Temperature Profiles Dataset* (one set per team.
- Image Month Key (one copy to display for class).

Preparation
- Make copies of student handouts and datasets (Satellite Images should be color copied)

** Datasets are:*

- *Data 12 images of monthly average sea surface temperature (SST) and chlorophyll a concentration (Chl) for the U.S. East Coast from the MODIS Aqua satellite).*
- *12 temperature profiles measured at a fixed location off the U.S. east coast near New Hampshire.*

Definitions

- **Sea Surface Temperature** = Temperature of the water closest to the oceans surface.
- **Chlorophyll a** = A specific form of chlorophyll used in photosynthesis. This gives phytoplankton their greenish color. Chlorophyll a concentration is used by scientists as a measure of phytoplankton productivity (or growth).
- **MODIS** = The MODerate resolution Imaging Spectroradiometer is a scientific instrument launched by NASA that captures data in 36 spectral bands. It images the entire Earth every 1 to 2 days. For more information see: http://modis.gsfc.nasa.gov.

What to do and how to do it

Tell students that they will be looking at datasets of monthly average sea surface temperature (SST) and Chlorophyll a (Chl) for the East Coast of the United States. The images come from the MODIS Aqua satellite. Remind students that chlorophyll is used as a measure of the phytoplankton population.

Break students into teams of 3-4. They will work with their team to match the SST image to the Chl image, and then arrange the pairs in chronological order (January to December). They should use their understanding of temperature and phytoplankton to match the images, but each pair does have a matching animal icon above the legend.

The image month is not labeled, however they can use the temperature profiles, which have monthly labels, as a clue. In order to do this, they should match the surface temperature (at depth zero- marked 'surface' on the graph) of the profile with the temperature at the measurement site (labeled with a red star) in the SST image.

Once students have organized the pairs, they should answer the questions on their student handout. Once all teams are done, display the Image Month Key, students can assess their own work. Discuss with them their answer to question 7 on their handout: "Do you see any relationship between SST and Chl?"

Assessment

Use responses on the student handout to assess understanding of concepts. The Teacher Version with example responses can be used to assess completeness of student work.