

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Ocean Satellite Images

### TEACHER VERSION: Suggested student responses included

**Goal:** To learn how to interpret and understand satellite images of ocean temperature and chlorophyll.

#### **Data sets:**

- 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 (NASA).
- 12 temperature profiles measured at a fixed location off the U.S. east coast near New Hampshire.

#### **Instructions:**

The SST and Chl images come in pairs (each pair has a matching ocean animal icon above the legend). There are 12 pairs – one for each month of the year. Arrange the pairs in chronological order starting in January and ending in December. The image month is not labeled, however you can use the temperature profiles, which have monthly labels, as a clue. To do this, match the surface temperature of the profile (at depth zero- marked ‘surface’ on the graph) with the temperature at the measurement site (labeled with a red star) in the SST image.

#### **Questions:**

After arranging the images by month, answer the following questions.

- 1) Describe the color scale and range in values in the SST and Chl images.

*Chlorophyll concentration is measured in  $\text{mg}/\text{m}^3$  and ranges from  $0.05 \text{ mg}/\text{m}^3$  (purple) to greater than  $10 \text{ mg}/\text{m}^3$  (red). SST is measured in  $^{\circ}\text{C}$ , and ranges from less than  $4^{\circ}\text{C}$  (purple) to greater than  $32^{\circ}\text{C}$  (red).*

- 2) Use a map or online tool to locate the following landmarks: Cape Cod, Cape Hatteras, Cape Fear, Nova Scotia, Long Island.
- 3) Use a map or online tool to locate the following ‘ocean’ marks: Chesapeake Bay, Georges Bank, the Gulf Stream, the Gulf of Maine.
- 4) What is the general pattern of SST and Chl for a given month of your choice?

*Answer will depend on student-selected month.*



5) Which month has the highest average Chl over the whole image? The lowest?

*The highest average Chl concentration is in April (dolphin icon); the lowest is in September (seahorse icon).*

6) Which month has the lowest temperature in the Gulf of Maine? The highest?

*The highest average SST is in August (shark icon); the lowest is in February (orca icon) or March (shrimp icon).*

7) Do you see any relationship between SST and Chl?

*Chlorophyll concentrations are highest in the spring, as the sea temperature begins to warm. However, by the time the sea surface temperature has hit its peak, the chlorophyll concentration have started to drop. Maybe this is because the phytoplankton grows best in the spring when sunlight conditions are optimal, but they haven't become overcrowded.*