Name _____ Date _____

Data From Space

Activity 1. Exploring Florida's Role in Space Exploration

Dr. Mike is lucky—he had to drive only a couple hours up I-95 to get to Kennedy Space Center and see the shuttle launch. Why did NASA build the space center on the northeast coast of Florida? Use the questions below to guide you to an answer.

1. Is an object on the surface of Earth sitting still relative to outer space? Why or why not?

_____

_____

_____

2. Where is an object that is "stationary" relative to Earth's surface moving fastest relative to space?

_____

3. Which way does the Earth rotate—toward the east or toward the west?

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4. If an object left Earth, which direction would it travel due to inertia and Earth's rotation?

_____

5. Would it be ideal if temperatures are often below freezing where you launch rockets? Explain your answer.

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6. Would it be better if rockets were launched over water or land? Explain your answer.

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7. What would be ideal: a rocket-launching center located in the middle of nowhere, in the middle of a city, or somewhere in between? Why?

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8. Use your answers to the questions above to write a paragraph to explain why NASA launches rockets and space shuttles from its location on the Florida coast.

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Activity 2. Comparing Data Collected By Satellites

Before we work with some satellite images, let's learn more about them. Use Internet resources to answer the questions below.

For each of the following satellites, describe the type of information it gathers and how big it is relative to the size of a car.

1. Aura (Atmosphere)

_____

_____

2. Quickscat (Atmosphere)

_____

_____

3. OSTM (Ocean)

_____

_____

4. Grace (Land)

_____

_____

5. Landsat 7 (Land)

_____

_____

Activity 3. Examining Satellite Data to Identify Plankton Blooms

Phytoplankton are single-celled organisms that can photosynthesize. They form the base of the food chain in many marine environments. Areas where there are a large number of phytoplankton usually have lots of fish and other things for big marine predators to eat.

Satellites can help us learn about where these blooms occur through photographs and the analysis of ocean color. If there is a lot of green in the ocean (the color of chlorophyll that is used in photosynthesis), it means there is a lot of phytoplankton. Satellites can also measure the temperature of the oceans.

Use the images below to answer the following questions.

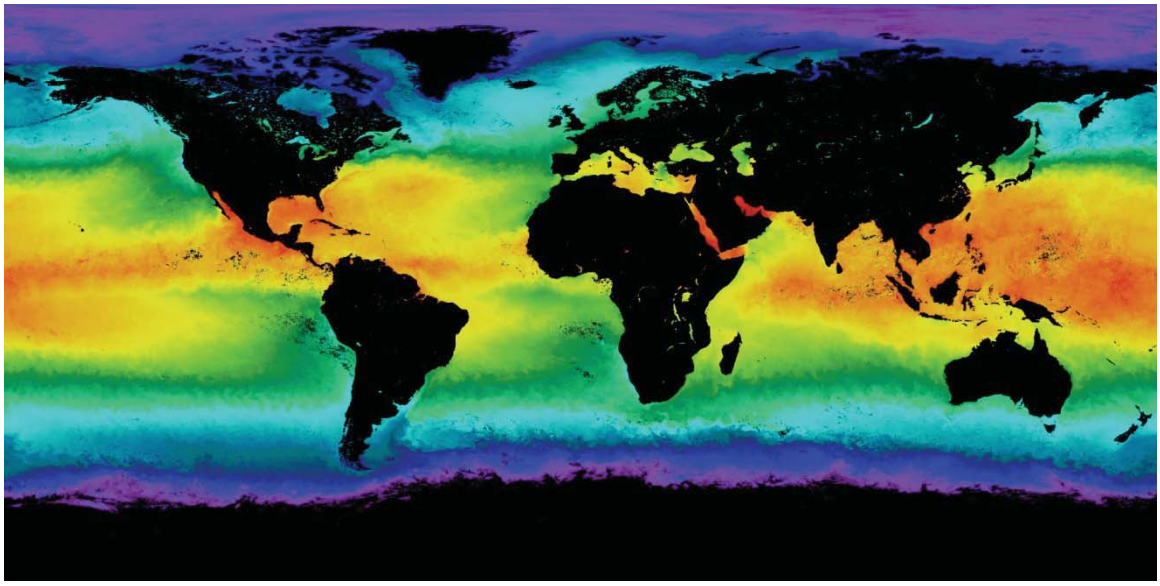

Figure 1. Sea Surface Temperatures in July. (Purple/blue is cool water; red is warmer water.) Source: NASA.

Name _____ Date _____

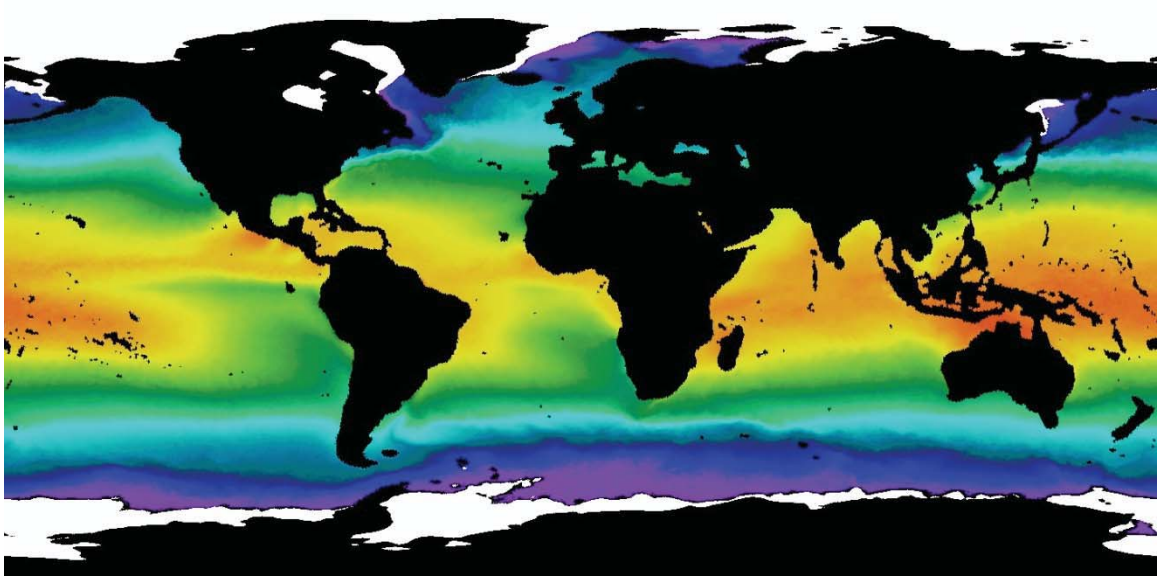

Figure 2. Sea Surface Temperatures in December. (Purple/blue is cool water; red is warmer water; white is ice.) Source: NASA.

1. In summer months, humpback whales can be found in the ocean near Alaska. But they need to find warm waters (indicated by the yellow color in the satellite photographs) for their calves to survive when they are born in the winter. If you were a humpback whale, would you stay near Alaska to give birth? Why or why not? If not, where would you go?

_____

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2. Most sharks have body temperatures that are the same as those of the water around them. Tiger sharks need a water temperature indicated by the color yellow in the satellite images. Can you predict what their distribution might be like in summer and winter months along the east coast of the United States? Do you think that there are a lot of tiger sharks off the coast of California, Oregon, and Washington? Explain your answers.

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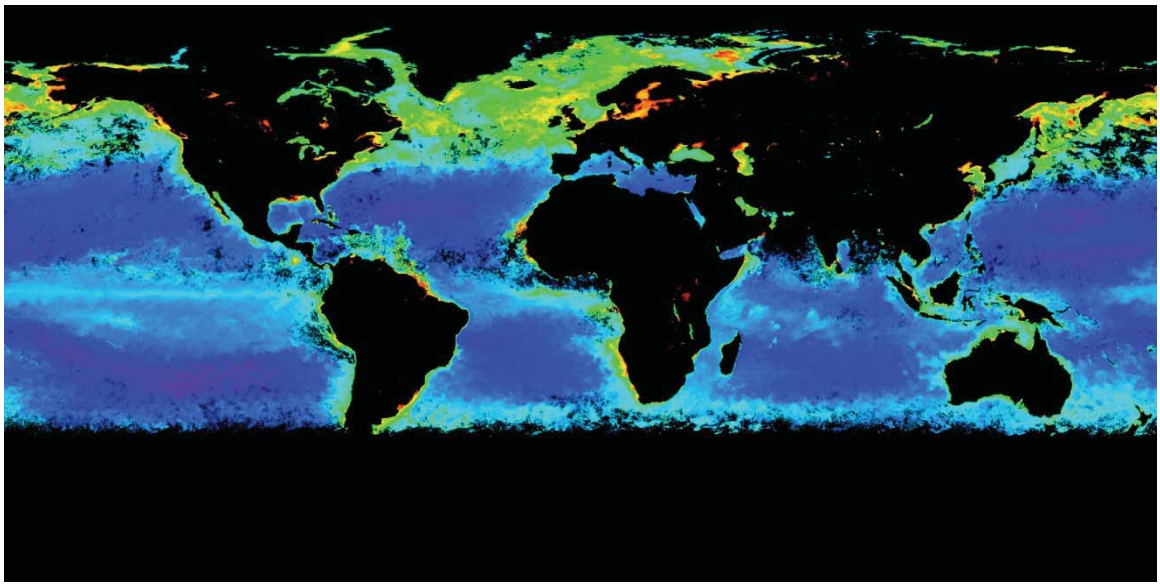

Figure 3. Chlorophyll amounts in the oceans in July. (Blue indicates less chlorophyll; green/red indicates more chlorophyll; black indicates land or ice.) Source: NASA.

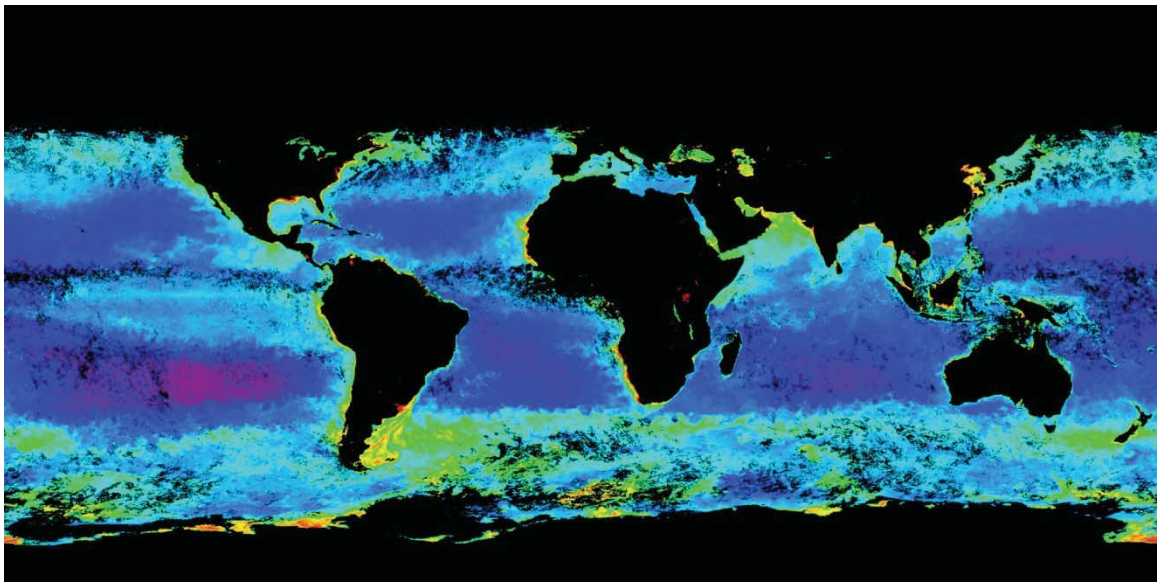

Figure 4. Chlorophyll amounts in the oceans in December. (Blue indicates less chlorophyll; green/red indicates more chlorophyll; black indicates land or ice.) Source: NASA.

3. Do you think that humpback whales would be able to eat very much if they moved into the warmer waters of Hawaii or Mexico in the winter? Explain your answer.

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4. If you were a humpback whale living in Hawaii in the winter, would you stay there all year? Why or why not? If you left, where would you go? When?

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Activity 4. Locating A Position Using GPS Coordinates

Global Positioning System (GPS) data can be used in many different ways. People use GPS navigation tools to figure out where they are in the wilderness and in cities. Biologist can use GPS data to learn where animals are moving.

Input the following GPS coordinates into mapping software to determine each location and then answer the following questions.

Table 1. GPS Coordinates of Seasonal Humpback Whale Movements.

Season	Longitude	Latitude	Nearest landmark
Winter	20°37'53.00"N	156°31'36.00"W	
Spring	35°30'24.00"N	146°34'7.00"W	
Summer	57°52'55.00"N	134°56'7.50"W	
Fall	43°23'48.00"N	141° 6'55.00"W	

1. Where did the humpback whale go throughout the year? Describe its movements.

_____

_____

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2. Using what you learned in activity 3, why do you think the whale might be doing this? (One important thing to know—humpback whales are so big they can live for months without eating!)

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3. Based on what you have learned about satellite data, write a short essay about something you would like to know about that you could investigate using satellite data.

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