CLASSROOM ACTIVITY*

Sea-Surface Temperature

Objective: To observe changes in SST over time and space off the west coast of Florida.

Duration of activity: One period of 45 minutes

Seating Arrangement: Computer lab or normal classroom style (if using laminated printouts)

Grades: 6-12

Subject areas: Marine Science, Mathematics, Environmental education.

SSS: SC.E., SC.H., MA.B., MA.E.

National Science Education Standards:

6.1 Science as Inquiry Content Standards

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

6.4 Earth and Space Science Content Standards

- Structure of the Earth's system

6.5 Science and Technology Content Standards

- Abilities of technological design
- Understanding about science and technology

6.6 Science in Personal and Social Perspective

- Natural resources
- Environmental quality
- Science and technology in local, national, and global challenge

Materials:

- IMaRS website (http://imars.usf.edu)
- Selected images from the web page (n15, January 25, 2005; n17 March 13, 2005; n17 June 17, 2005; n12 September 12, 2005)
- sst_lab_worksheet.xls spreadsheet (http://education.imars.usf.edu/images/stories/docs/sst_lab_worksheet.xls; Answer sheet: http://education.imars.usf.edu/images/stories/docs/sst__lab_worksheet_filled.xls
- Access to Microsoft Excel

**Lesson plan also available in the Remote Sensing Teacher Resources section of the ORBITaL website under Extensions (Sea Surface Temperature (modified); http://education.imars.usf.edu/images/stories/docs/sea_surface_temperature_mod.doc)*

Background:
The Remote Sensing Tour on the ORBITaL website (http://education.imars.usf.edu) is a great introduction to all the types of satellite data used to study the ocean, including sea surface temperature (SST).

If internet connections are not readily available in the classroom or at home, then the background materials to introduce students to remote sensing and SST can be found in the Remote Sensing Teacher Resources section of the ORBITaL website (http://imars.usf.edu/~rluerssen/web_docs/eo_rs.ppt). There you will find Power Point presentations with all the graphics, information and presentation notes for you to present the information to your class.

In addition to the background information on what SST is and how satellites work, a discussion of how the temperature of the ocean changes with time (daily, seasonally and over longer time periods, like El Nino) is strongly suggested. This activity will have students interpreting SST satellite data and making observations of these changes in SST.

The ME Connection:
It is important that students understand what SST data can be used for. For example, these data are used for things as ordinary as checking the water temperature before going out to the beach or scuba diving. Data is also used on scientific studies such as the study of ocean circulation. Have students make a list of how they could use SST data in their daily lives and also have them research how SST data is used in ocean research.

Learning Procedure:

1) Open sst_lab_worksheet.xls in Microsoft Excel
2) Access the IMaRS web page http://imars.usf.edu
3) On Left, click on SST page, on right, click on Florida west shelf area, scroll down to month/day images and scroll to Satellite/day select the first image listed in the materials section OR click here:
    1) http://imars.usf.edu/cgi-bin/db?site=wfl&mode=daily&type=st&date=2005.01
       then scroll down to the N15 category and click on the January 25 image
    2) http://imars.usf.edu/cgi-bin/db?site=wfl&mode=daily&type=st&date=2005.03
       then scroll down to the N17 category and click on the March 13 image from 0328 hrs GMT
    3) http://imars.usf.edu/cgi-bin/db?site=wfl&mode=daily&type=st&date=2005.06
       then scroll down to the N17 category and click on the June 17 image from 0335 hrs GMT
    4) http://imars.usf.edu/cgi-bin/db?site=wfl&mode=daily&type=st&date=2005.09
       then scroll down to the N17 category and click on the Sept 12 image from 1052 hrs GMT
4) Enter in the first latitude/longitude position from the Excel worksheet in the appropriate boxes and press *Submit Coords*. The temperature at that location will appear above the boxes. What are the units of temperature? What does the gray represent?
5) Record that temperature in the appropriate box on the Excel spreadsheet. As you enter the data into the spreadsheet the bar chart will automatically fill in.
6) Repeat steps 4 and 5 for the other 5 latitude/longitude positions.
7) Repeat steps 3 through 6 for the March, June and September images
8) Record observations related to the questions at the bottom of the spreadsheet.

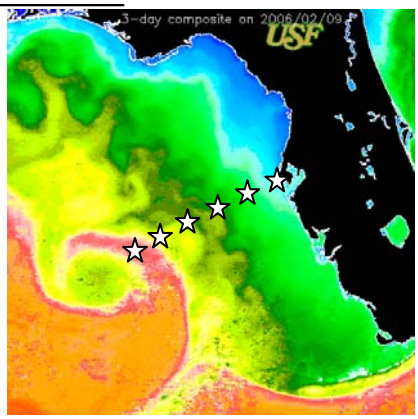
Extra credit: Convert all temperatures recorded into Fahrenheit.

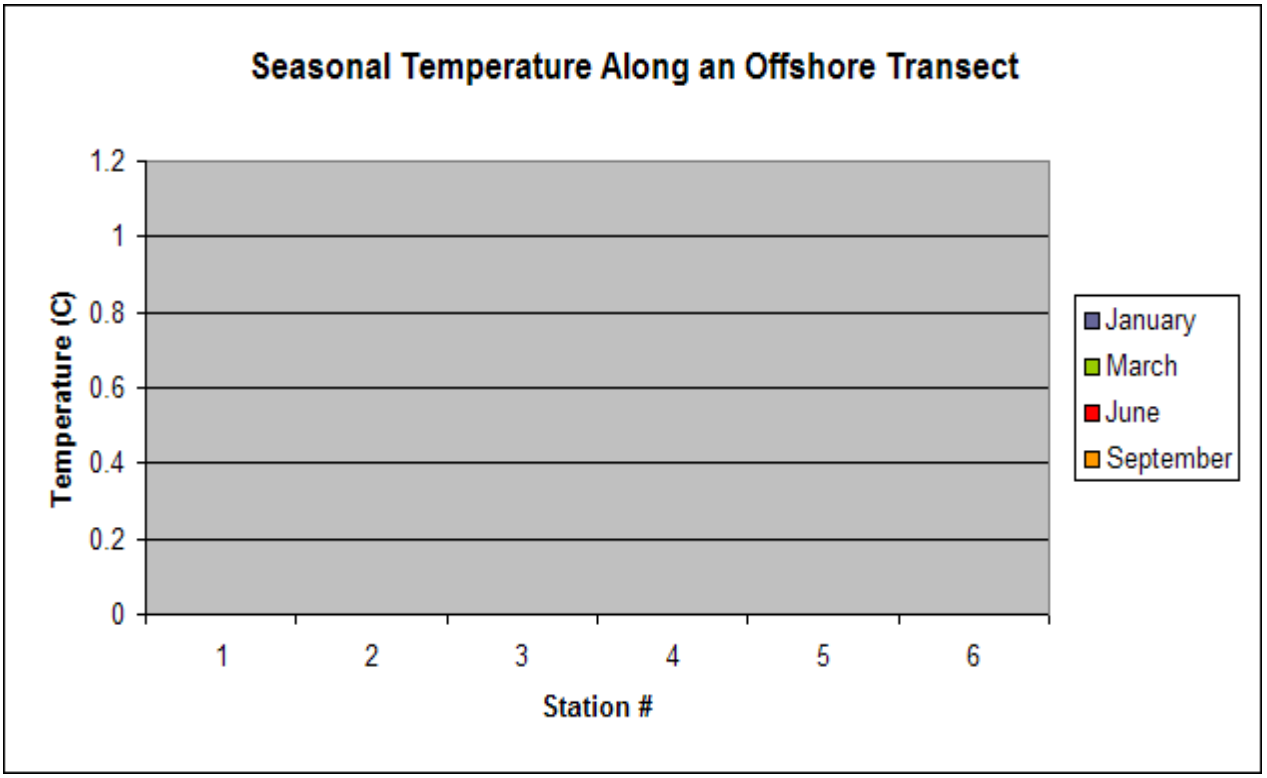
Assessment: Use the rubric in Table 1 to assess individuals on how students performed

Authors: Laura Lorenzoni and David Palandro;
Modified by Remy Luerssen (January 31, 2007)

Student Worksheet **NAME** _____ **CLASS**_____

			Temperature			
Station #	**Lat**	**Lon**	**January**	**March**	**June**	**September**
1	27.77	-82.86				
2	27.54	-83.12				
3	27.45	-83.60				
4	27.19	-84.18				
5	26.99	-84.60				
6	26.58	-85.23				
			N15 Jan25	N17Mar13	N17Jun17	n12 Sept 12





Observations:

1) How does the temperature change as you move offshore?

2) Why do you think the temperature is not the same onshore and offshore?

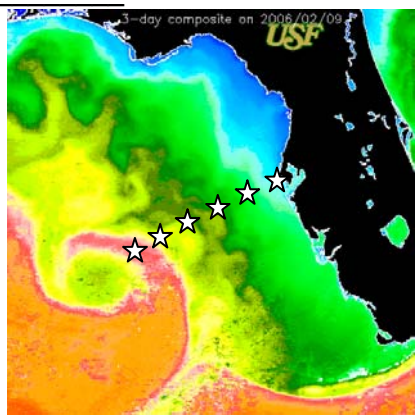
3) How does temperature change with season?

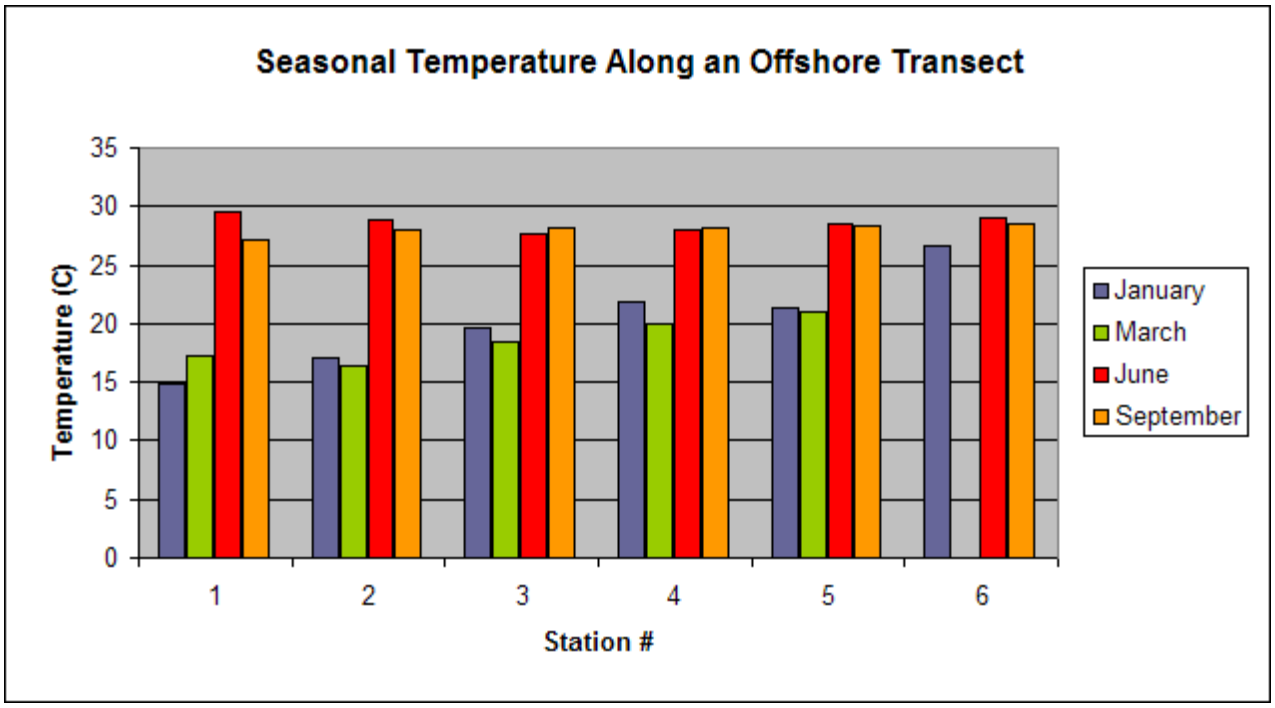
4) Which season has the highest temperatures?

5) Which season has the largest range of temperatures?

Student Worksheet **NAME** _____ **CLASS**_____

			Temperature			
Station #	**Lat**	**Lon**	**January**	**March**	**June**	**September**
1	27.77	-82.86	14.83	17.22	29.57	27.18
2	27.54	-83.12	17.02	16.43	28.78	27.98
3	27.45	-83.60	19.61	18.42	27.58	28.18
4	27.19	-84.18	21.80	20.01	27.98	28.18
5	26.99	-84.60	21.41	21.01	28.58	28.38
6	26.58	-85.23	26.58		28.98	28.58
			N15 Jan25	N17Mar13	N17Jun17	n12 Sept 12





Observations:

1) How does the temperature change as you move offshore?

2) Why do you think the temperature is not the same onshore and offshore?

3) How does temperature change with season?

4) Which season has the highest temperatures?

5) Which season has the largest range of temperatures?