El Nino Southern Oscillation (ENSO) Data

Part 1: Below are the yearly averages of ESNO data from the Pacific Ocean Basin. Your job is to plot this data on the provided ENSO Graph Worksheet to measure the pattern of the ENSO anomalies that have occurred over a 30-year period.

You will need this data to complete your task; the second part of this lab will involve comparing your graph to that of hurricane frequency to determine if any patterns exist. You will then assume the role of the Governor of Florida and be sent an email from the State's Chief Meteorologist with the future breaking anomaly data. You will need to act and respond to the email to address any concerns that are raised.

Year	Anomaly (°C)	Year	Anomaly (°C)
1983	0.4	1998	0
1984	-0.5	1999	-1.2
1985	-0.6	2000	-0.9
1986	0.3	2001	-0.3
1987	1.3	2002	0.6
1988	-0.8	2003	0.3
1989	-0.6	2004	0.4
1990	0.3	2005	0.1
1991	0.7	2006	0.1
1992	0.6	2007	-0.5
1993	0.3	2008	-0.7
1994	0.5	2009	0.4
1995	-0.1	2010	-0.3
1996	-0.4	2011	-0.7
1997	1.1	2012	-0.1

ENSO Anomaly Data Table*

*positive values indicate warmer the average temperatures; negative values represent lower than average temperatures

<u>Step 1</u>—This the temperature anomalies and the year in which they occurred. Take this data and graph it on your ENSO Graph Worksheet. There are two Y-axes on this graph. One is for ENSO Anomaly data and the other axis will be used to plot the frequency of hurricane data.

<u>Step 2</u>—After plotting connect your data points. Use Blue Colored Pencil/Pen to connect the data points.



<u>Step 3</u>—Now, write a brief analysis of your data before moving on to the second part of the activity. Be sure to address the following questions in your data summary:

- I. Describe any patterns observed in the data set after you graphed it.
- II. What years had the longest period of average El Nino conditions before changing to average period of La Nina conditions?
- III. What years had the longest period average La Nina conditions before changing to average period of El Nino conditions?
- IV. Were there any multiple years of successive positive or negative values?

Hurricane Data Hunt

<u>Part 2:</u> Now it is time for you to collect some data. For the second part of this activity, you will be researching the frequency of hurricanes and tropical storms in the Atlantic Basin (the number of named storms for each year that graphed in the previous exercise).

After completing your data hunt, you will graph the hurricane frequency on the ENSO Graph Worksheet (using the second Y-axis scale). You will need this information as you assume the role of the Governor in the writing challenge at the end of the activity.



<u>Step 1</u>—The National Hurricane Center (NHC) has a tremendous amount of data regarding tropical storms that occur almost every year.

Log onto a computer and visit the following URL: <u>http://www.nhc.noaa.gov/data/</u>. Look through the website to see the vast amount of data that the NHC collects. After exploring, find the section titled, **Past Track Seasonal Maps**. This section will have two menus: Atlantic Basin and Pacific Basin. Click on the most recent data for the Atlantic Basin. When you click on a year on this drop down menu, a map of all of the named storms will appear for that year.

<u>Step 2</u>—Open each map for the years of ENSO Data that you plotted in the last activity (years 1983-2012). After viewing a map for a particular year, use your internet browser's back button to select another year. Count the number of named storms for each of the years and included them on a data table.

Year	# of Storms	Year	# of Storms	Year	# of Storms
1983		1993		2003	
1984		1994		2004	
1985		1995		2005	
1986		1996		2006	
1987		1997		2007	
1988		1998		2008	
1989		1999		2009	
1990		2000		2010	
1991		2001		2011	
1992		2002		2012	

Step 3—Plot the data that you have collected on the ENSO Graph. You will plot hurricane frequency on the same graph as the ENSO Anomaly Data. BE SURE TO USE THE PROPER SCALE (double Y-Axis).

Step 4—Connect the hurricane frequency data points with RED PEN and answer the following questions.

Compare your two sets of data: ENSO Anomaly Data and the Hurricane Frequency Data to answer the following questions. Time periods of El Nino Periods are categorized by positive values and La Nina Periods are categorized by negative values on your graph.

a. When comparing the two graphs, do you see any patterns between the frequency of storms and EL Nino or La Nina Conditions? (i.e. when ENSO Anomaly data goes up, what happens to hurricane and tropical storm frequency?)

b. Look at your data for 1990 to 1995; what relationship do you see in these data?

c. Are there any areas on the graph that do not follow the pattern of El Nino Conditions with fewer hurricanes?

d. What are some of the limitations of making generalizations/predictions based on this data set?