Lab 10 for GEOL 1147 (Introduction to Meteorology Lab)

The Southern Oscillation Index (SOI) is a standardized index based on the observed sea level pressure differences between Tahiti and Darwin, Australia. The SOI is one measure of the large-scale fluctuations in air pressure occurring between the western and eastern tropical Pacific (i.e., the state of the Southern Oscillation) during El Niño and La Niña episodes. When the SOI is negative (positive), it corresponds to El Niño (La Niña) event.

1.Use the SOI index listed in Lab10_soi.xls to calculate the averaged SOI index in Jan and Feb.

2. Plot time series of SOI (Jan & Feb) and Precipitation at San Diego (Jan & Feb). Plot the scatter plot of SOI (Jan & Feb) and Precipitation at San Diego (Jan & Feb). Copy Jan & Feb precipitation at San Diego from Lab9_SAN.xls to Lab10_soi.xls. Calculate averaged precipitation in Jan & Feb. Then plot averaged SOI (Jan & Feb) versus Precipitation at San Diego (Jan & Feb).

3.Does negative SOI (El Nino event) correspond to wet winter at San Diego?

4. The National Atmospheric and Oceanic Administration's Earth Systems Research Laboratory (ESRL), in Boulder, Colorado, provides Web access to many years of atmospheric observations analyzed for use originally by computer forecasting models. Among other things, the Web site allows you to construct "composites" (by which ESRL means averages of spatial patterns over time) of a variety of atmospheric quantities, including wind speed at various levels in the atmosphere.

4a. Access ESRL's Monthly/Seasonal Climate Composites Web site at http://www.esrl.noaa.gov/psd/cgi-bin/data/composites/printpage.pl.

4b. Specify the quantity that you want to analyze and plot:
Pull down the "Which variable?" menu and select "Scalar Wind Speed".

4c. Specify the level in the atmosphere where you want to analyze the wind speed:
Pull down the "Level?" menu and select "300 mb".

4d. Specify the period of particular months of the year (the "season") during which you want to analyze the wind speed at 300 mb:
Pull down the "Beginning month of the season" menu and select "Jan". Pull down the "Ending month" menu and select "Feb".

4e. Specify the range of years for which you want to compute a composite average of 300 mb wind speed during January and February (JF):
In the "Enter range of years" text box, enter "1950" to "2012".

4f. You are going to create a "color-filled" contour plot, which is a contour plot (of lines of constant wind speed, or isotachs) in which the area between each pair of adjacent contour lines is filled in with a different color. Specify a plot color:
Pull down the "Color" menu and select "Black and White".

4g. Under "Override default contour interval?", in the "Interval" text box, enter "2.5" (which means 2.5 meters per second). In the "Range: low" text box, enter "30" (that is, 30 meters/second).
In the "Range: high" text box, enter "50" (that is, 50 meters/second).

4h. Rather than viewing a plot for the entire world, create one for North America (which focuses more closely on the area of interest to us, the West Coast of the U.S.):
Pull down the "Map projection" menu and select "North America".

4i. Click on the "Create plot" button. This should create the specified plot and display it in your Web

browser.

4j. Plot Scalar Wind Speed for El Niño years (1983, 1992, 1998) and La Niña years (1974, 2008, 2011). Describe the differences of jet stream during the El Nino and La Nina years.

5. Plot 1000 mb air temperature for Jan and Feb in El Niño years (1983, 1992, 1998) and La Niña years (1974, 2008, 2011). Also plot the anomaly figure for 1000 mb air temperature for El Niño years (1983, 1992, 1998) and La Niña years (1974, 2008, 2011). Plot the figure for the whole globe. Describe differences in the 1000 mb air temperature between El Nino and La Nina years.

6. Plot the 300 mb vertical velocity (omega) for Jan and Feb in El Niño years (1983, 1992, 1998) and La Niña years (1974, 2008, 2011) over the North America. Negative (positive) omega refers to rising (sinking) air. Describe differences of vertical velocity between El Niño and La Niña years and their relationships to the precipitation at San Diego.