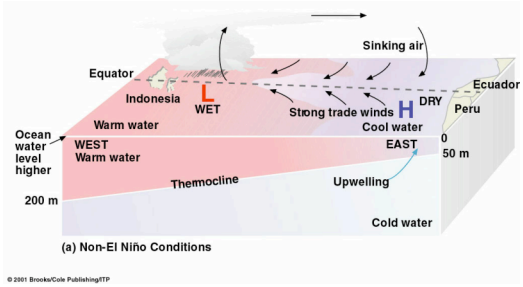
El Niño, La Niña, and the Southern Oscillation

Normal ocean and atmospheric conditions are shown in the diagram to the right.



El Niño develops in the equatorial Pacific when sea surface temperatures are warmer than normal.
La Niña develops in the same region when sea surface temperatures are colder than normal.

Sometimes the pressure patterns in the equatorial Pacific weaken or reverse – this is called the "*Southern Oscillation*".
Pressure patterns are monitored and indexed by the "Southern Oscillation Index" (SOI). Pressure values in the eastern Pacific (Tahiti) and western Pacific (Darwin) are monitored and departure from normal values are used in the SOI.

SOI = pressure departure at Tahiti – pressure departure at Darwin

ENSO (El Niño/Southern Oscillation) develops when the following occur:

- sea surface temperatures (SST) in tropical eastern Pacific Ocean are warmer than normal
- pressure patterns weaken (and may reverse)
- trade winds weaken (and may reverse)

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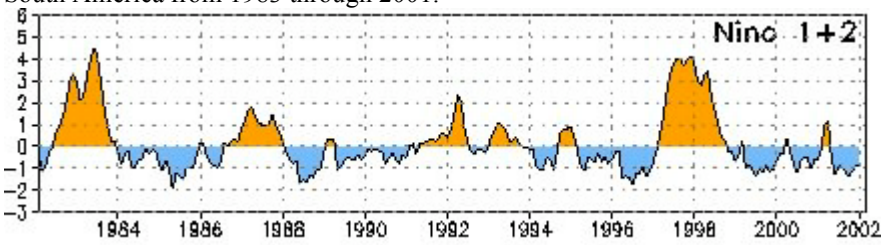
1. A positive SST anomaly is a signal of:

   El Niño La Niña neither

2. A negative SST anomaly is a signal of:

   El Niño La Niña neither

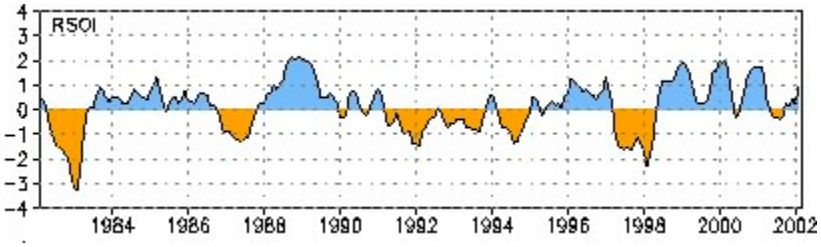
The chart below shows the SST anomaly for the equatorial Pacific just off the coast of South America from 1983 through 2001.



3. Identify two years with the strongest El Niño signal from the SST anomalies.

4. Identify two years that had a strong La Niña signal from the SST anomalies.

The chart below shows the SOI from 1983 through 2001.



5. What is the value of the SOI for each of the years you identified in #3?

6. What is the value of the SOI for each of the years you identified in #4?

7. A negative SOI could then be a signal of:

ENSO La Niña neither

8. If the SOI is negative then surface pressure systems are:

stronger than normal normal weaker than normal

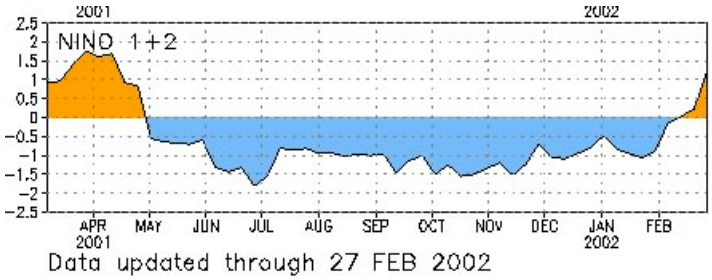
9. A positive SOI could then be a signal of:

ENSO La Niña neither

10. If the SOI is positive then surface pressure systems are:

stronger than normal normal weaker than normal

The chart below shows the SST anomalies for the past year. The data was collected just off the coast of South America in the equatorial Pacific.



11. In making a forecast for El Niño or La Niña you would want to examine many data sources including SOI, SST, and SST anomaly. Using only the SST anomaly data for the past 12 months (in the chart above) what is your prediction for the coming months?

El Niño Na Niña neither