

MY NASA DATA Lesson: See notes at the end of the lesson for data updates with the new Earth System Data Explorer

El Nino Lesson

Purpose:

To explore an historical El Nino event using real satellite data and to correlate El Nino to local weather

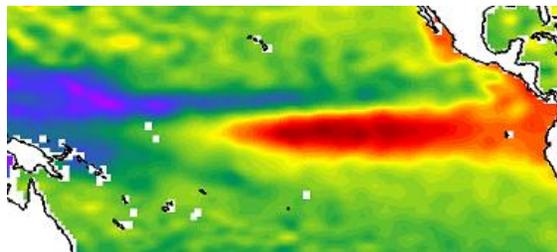
**Grade Level:** 6 – 12

Image courtesy TOPEX Poseidon Project

Estimated Time for Completing Activity:

50 minutes

Learning Outcomes:

- Students will practice using authentic satellite data to explore historical weather events.
- Students will gain a better understanding of El Nino and be able to relate it to local observations.

Prerequisite

- Full introduction to ENSO, El Nino and La Nina
- Familiarity with finding locations using latitude and longitude coordinates

Tools

- Computer with Printer
- Red and blue colored pencils

AP Environmental Science Topics

- Atmosphere-ocean interactions
- El Nino – Southern Oscillation (ENSO)
- Latitude and longitude
- Upwelling

- [Water cycle](#)

Vocabulary:

- [El Nino](#)
- [ENSO](#)
- [La Nina](#)
- [precipitation](#)
- [sea surface temperature](#)
- [upwelling](#)

Lesson Links:

- [NOAA El Nino Education Page](#)
- [Live Access Server](#)
- [CERES Radiative Anomalies \(extension\)](#)

Background:

One of the strongest observed ENSO events of the century began to unfold in 1997. Fortunately, an extensive network of satellite and ocean buoy instruments was prepared to monitor and record the historical event. In this lesson, students will collect data from the MY NASA DATA Live Access Server to understand how scientists detect the onset of El Nino conditions and the reversal to La Nina conditions using authentic satellite data. The students will further discover how this event affected their local weather by exploring regional data for the same time period.

Procedure:

Part I: Examine LAS Equatorial Pacific sea level height and sea surface temperature data to explore the ENSO event of 1997 – 1999.

1. Click on the Lesson Link for the Live Access Server.
2. Select Oceans, 5-Day Sea Level height (TOPEX-POSEIDON) After choosing 5-Day Sea Level height you will be taken to the LAS.
3. Directly under the title of the Parameter you will be able to see a world map with a compass rose directly underneath it. Click on the double down-facing arrow above the map and select Equatorial Pacific from the drop down menu.
4. In the upper left of the screen make sure to click on the update plot radio button to update the color plot you are requesting.

5. Select time Nov 1997 (El Nino) since you clicked on the radio button your plot will automatically update once the date has been selected. (Note: you can click on 'Animate' at the top of the page to see an animation for a selected time period. I.E the month of Nov 1997)
6. At the top of the screen click on 'Compare' in order compare multiple plots at one time.
7. At the bottom of each map you will be able to change the date you will be looking at.
8. Change the upper right plot to Feb 1999.
9. You can use the bottom two plots for other years you might want to study and compare should there be time.
10. Once you have chosen your times for each plot go to the top of the page and click on 'Update Plots' to see the updated plots you requested.
11. Once you are able to see the new plots you can click on each to see a larger image of the plot to save as an image to complete this activity. (PC – right click and 'save image as' MAC – control click and 'save image as')

Part II: Explore LAS precipitation data to correlate this El Nino – La Nina cycle to wetter or drier conditions for students' local area.

1. Return to the Datasets page of the Live Access Server.
2. Select Atmosphere, Precipitation, Monthly Precipitation (TRMM). You will then be automatically taken to a plot of Monthly Precipitation in which you can make changes to the plot.
2. on the left side of the plot under 'Line Plots' click the radio button for 'Time Series'.
3. Enter your latitude and longitude position under the world map in the upper left corner of the screen.
4. Select time from Jan 1997 – Dec 2000.
5. Click 'Update Plot' to view your plot.
6. Be sure to save your plot to complete this activity (PC – right click and 'save image as' MAC – control click and 'save image as')

Using your colored pencils, mark on your line graph where you may be seeing effects of El Nino (red) and La Nina (blue), if any.

Questions:

1. How are ocean water temperature and sea level height correlated?
2. What happens to the fishing industry in the eastern Pacific during El Nino? Why?
3. Based on your line plot, is there evidence that ENSO affects your local precipitation?

Extensions:

1. Students may research and discover other time periods of El Nino and La Nina cycles to see if the results are consistent.
2. Students may also explore cloud cover and net radiation data during ENSO events. See the Lesson Link on CERES Radiative Anomalies for further explanation.

Lesson plan contributed by the MY NASA DATA team

[Click here for Teachers Notes](#)

[View lesson without Standards](#)



Data Notes from Dr. Brad (12/2018):

Up-to-date data is available for this lesson on the Earth System Data Explorer:

Daily SST: Hydrosphere->All Data->Sea Surface Properties->Daily Sea Surface Temperature

Sea Surface Height: Hydrosphere->All Data->Sea Surface Properties->Sea Level (Sea Surface Height) Anomaly

Precipitation: Hydrosphere->All Data->Precipitation->Monthly Precipitation

