

Name: _____

Graph the Pacific Pulse & Analyze Your Graph

1. What does an ONI value greater than zero tell you about sea surface temperatures in the Niño 3.4 region?
2. What does a negative ONI value indicate?
3. Find three periods when ONI remained at or above $+0.5^{\circ}\text{C}$ for several consecutive seasons. Record them below.

El Niño Event	Beginning	Ending	Highest ONI

4. Find three periods when ONI remained at or below -0.5°C for several consecutive seasons.

La Niña Event	Beginning	Ending	Lowest ONI

5. Which El Niño event in the dataset reached the highest ONI value?
6. Which La Niña event reached the lowest ONI value?
7. Does the strongest event appear to be the longest? Explain using evidence from your graph.
8. Approximately how many years separate the El Niño events you identified?

9. Is the amount of time between events always the same?

10. Based on your data, would you describe ENSO as:

- perfectly periodic,
- recurring but irregular, or
- completely random?

Explain your choice using evidence from the graph.

Measuring an ENSO Event

Choose **one El Niño event** and **one La Niña event** from your graph.

For each event:

1. Count the number of consecutive three-month periods that meet or exceed the appropriate $+0.5^{\circ}\text{C}$ or -0.5°C threshold.
2. Identify the highest or lowest ONI value during the event.
3. Calculate the mean ONI during the event.

	El Niño	La Niña
Event dates		
Number of three-month periods		
Maximum/minimum ONI		
Mean ONI		

Compare the Events

4. Which event lasted longer?
5. Which had the greater peak anomaly?
6. Are **duration** and **intensity** the same thing? Explain.
7. Suppose two El Niño events both lasted 12 months, but one reached an ONI of $+0.8^{\circ}\text{C}$ and the other reached $+2.0^{\circ}\text{C}$. Would you expect their effects to be identical? Why or why not?

Ocean Conditions & Marine Life

During normal Pacific conditions, upwelling brings cold, nutrient-rich waters from the ocean depths to the surface off the west coast of South America. Use what you have learned about ENSO to complete the following table.

Condition	Trade Winds	Eastern Pacific SST	Upwelling	Expected Nutrient Supply
El Niño				
Neutral				
La Niña				

Then answer the following questions.

4. During which ENSO phase would you expect the weakest coastal upwelling?
5. During which phase might nutrient concentrations near the surface be greatest?
6. Phytoplankton need nutrients and sunlight to grow. Predict what could happen to phytoplankton abundance in the eastern tropical Pacific during a strong El Niño.
7. How could a change in phytoplankton abundance affect:
 - zooplankton?
 - small plankton-eating fish?
 - larger predatory fish?
 - seabirds and marine mammals?
8. Commercial fisheries for species such as anchoveta are extremely important along the west coast of South America. Explain how a change in ocean circulation could eventually affect people and economies on land.