Packet: El Niño

CLASS NOTES

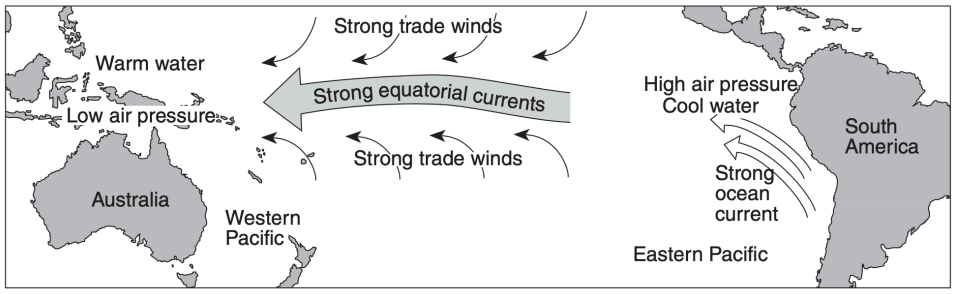
- In the 1600s, fishermen off the coast of _____ saw the appearance of unusually warm water in the _____
- They termed the event El Niño
    - Spanish for “Christ Child” or “The Little Boy” and was chosen based on the time of year [December] when these warm water events occur

- El Niño - _____

  _____
- La Niña - _____

  _____

- La Niña Conditions [Normal Conditions]:
    - Wind blows from _____ to _____ along the equator in the Pacific and actually piles up water in the western Pacific
    - In the eastern part, deep _____ water gets pulled up from below to replace the _____ water that is pushed away
        - Western water temperatures are warmer [30° C]
        - Eastern water temperatures are cooler [22° C]



La Niña Conditions [Normal Conditions]

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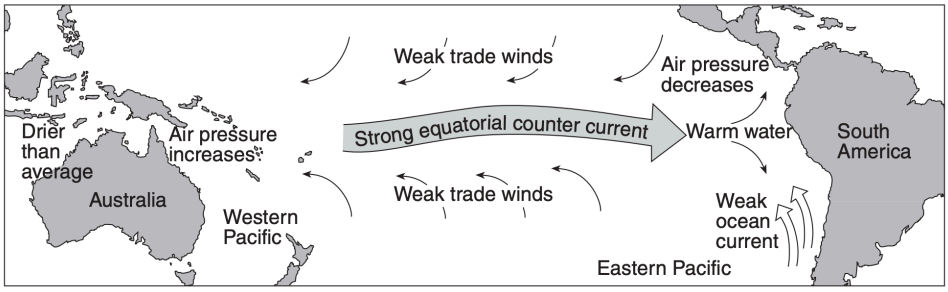
- El Niño Conditions:
    - The normal _____ that push the water get weaker
    - As a result, some warm water piled up in the _____ moves towards the _____ and stops the cold water _____
    - This makes the water in the eastern Pacific warmer and will change the associated weather
    - This cycle is called _____ and causes El Niño to get more powerful
    - El Niños occur approximately every two to seven years



El Niño Conditions

- Global Weather Related Effects of El Niño:
    - Peru has _____ and warm weather
    - Indonesia, Africa, and Australia have _____
    - California has droughts then torrential rain with _____
    - Northeast United States has mild winters and fewer _____
    - Southern Mexico suffers from increased _____

- Global Ecological Related Effects of El Niño:
    - Since El Niño reduces the upwelling of nutrient rich cold water which plankton are dependent on, fish have no food source and either die or are forced to migrate
        - This also causes sea birds to die or go elsewhere
    - California has seen fish populations reduced
        - As a result marine mammal deaths increase and pup survival rates decreases

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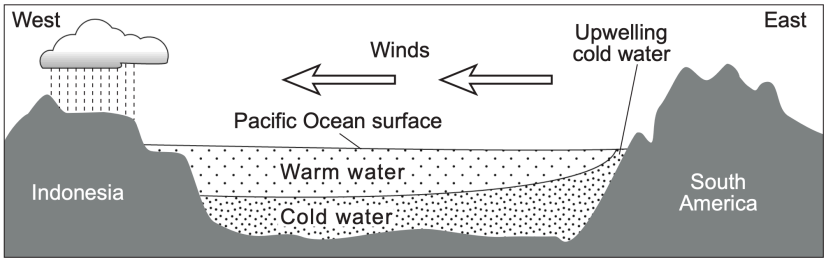
PART I QUESTIONS: MULTIPLE CHOICE

Base your answer to questions 1 and 2 on the passage and cross section below and on your knowledge of Earth science. The cross section represents a generalized region of the Pacific Ocean along the equator during normal [non-El Niño] conditions. The relative temperatures of the ocean water and the prevailing wind direction are indicated.

Under normal Pacific Ocean conditions, strong winds blow from east to west along the equator. Surface ocean water piles up on the western part of the Pacific due to these winds. This allows deeper, colder ocean water on the eastern rim of the Pacific to be pulled up (upwelling) to replace the warmer surface water that was pushed westward.

During an El Niño event, these westward-blowing winds get weaker. As a result, warmer water does not get pushed westward as much, and colder water in the east is not pulled toward the surface. This creates warmer surface ocean water temperatures in the east, allowing the thunderstorms that normally occur at the equator in the western Pacific to move eastward. A strong El Niño is often associated with wet winters along the northwestern coast of South America and in the southeastern United States, and drier weather patterns in Southeast Asia (Indonesia) and Australia. The northeastern United States usually has warmer and drier winters in an El Niño year.

Normal Pacific Ocean Conditions (non-El Niño years)



(Not drawn to scale)

1. During an El Niño year, winter climatic conditions in New York State will most likely be
   a. colder and wetter
   b. warmer and wetter
   c. colder and drier
   d. warmer and drier

2. Compared to non-El Niño years, which climatic conditions exist near the equator on the western and eastern sides of the Pacific Ocean during an El Niño event?
   a. The western Pacific is drier and the eastern Pacific is wetter.
   b. The western Pacific is wetter and the eastern Pacific is drier.
   c. The western and the eastern Pacific are both wetter.
   d. The western and the eastern Pacific are both drier

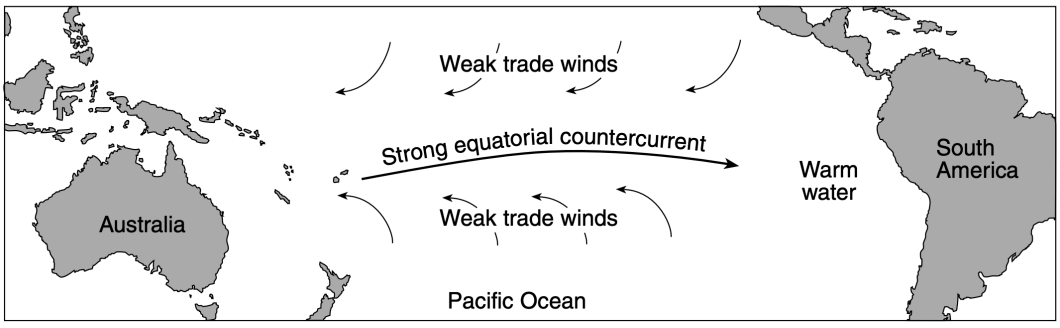
3. Which natural event periodically weakens western surface ocean currents in the equatorial Pacific Ocean, resulting in a change in air temperature and precipitation patterns in the United States?
    a. El Niño
    b. transpiration
    c. ocean tides
    d. volcanic eruptions

4. During an El Niño event, the South Equatorial Current reverses direction and flows over the top of northern portions of the Peru Current, causing
    a. warmer surface ocean waters along the northeast coast of South America
    b. warmer surface ocean waters along the northwest coast of South America
    c. cooler surface ocean waters along the northeast coast of South America
    d. cooler surface ocean waters along the northwest coast of South America

5. During an El Niño event, surface water temperatures increase along the west coast of South America. Which weather changes are likely to occur in this region?
    a. decreased air temperature and decreased precipitation
    b. decreased air temperature and increased precipitation
    c. increased air temperature and increased precipitation
    d. increased air temperature and decreased precipitation

The map below shows the weak trade winds and strong equatorial countercurrent in the Pacific Ocean during El Niño conditions. This causes warm surface ocean water to migrate eastward, lowering the atmospheric pressure above this warm water.

El Niño Conditions



6. What are the most likely changes to atmospheric temperature and precipitation along the west coast of South America during El Niño conditions?
    a. lower temperatures and lower amounts of precipitation
    b. lower temperatures and higher amounts of precipitation
    c. higher temperatures and lower amounts of precipitation
    d. higher temperatures and higher amounts of precipitation