



The aim of this activity is to develop a better understanding of local and regional weather events in relation to the global climate system. You will investigate and display the global El Niño and La Niña cycles and the associated trends and predictions of temperature, rainfall and extreme weather events in your local region.

Time

Two hours

Tools

- Internet access
- Pens
- Paper



Extreme weather events can devastate local populations, landslide in Taiwan 2009.

Background

The term “El Niño”, which means little boy and refers to the Christ child, was originally applied to a weak warm ocean current that ran southwards along the coast of Peru, usually occurring near Christmas. It has only recently become associated with much more extensive ocean temperature increases that extend over the Pacific basin, causing changes to global climate patterns. The atmospheric component tied to “El Niño” is termed the “Southern Oscillation”. Scientists often call this phenomenon, where the atmosphere and ocean collaborate together, ENSO (El Niño-Southern Oscillation).

ENSO is a natural phenomenon and there is good evidence from cores of coral and glacial caption ice in the Andes that it has been going on for millennia. The ocean and atmospheric conditions in the tropical Pacific are seldom average, but instead fluctuate somewhat irregularly between El Niño events and the opposite “La Niña” phase, consisting of a basin-wide cooling of the tropical Pacific, with a period of about 3-6 years. The most intense phase of each event usually lasts about a year.

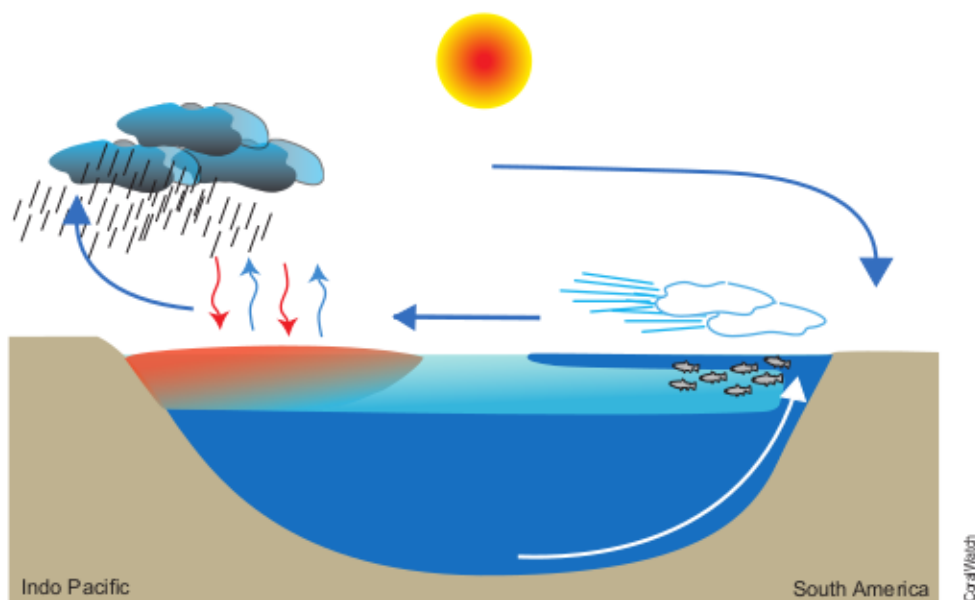
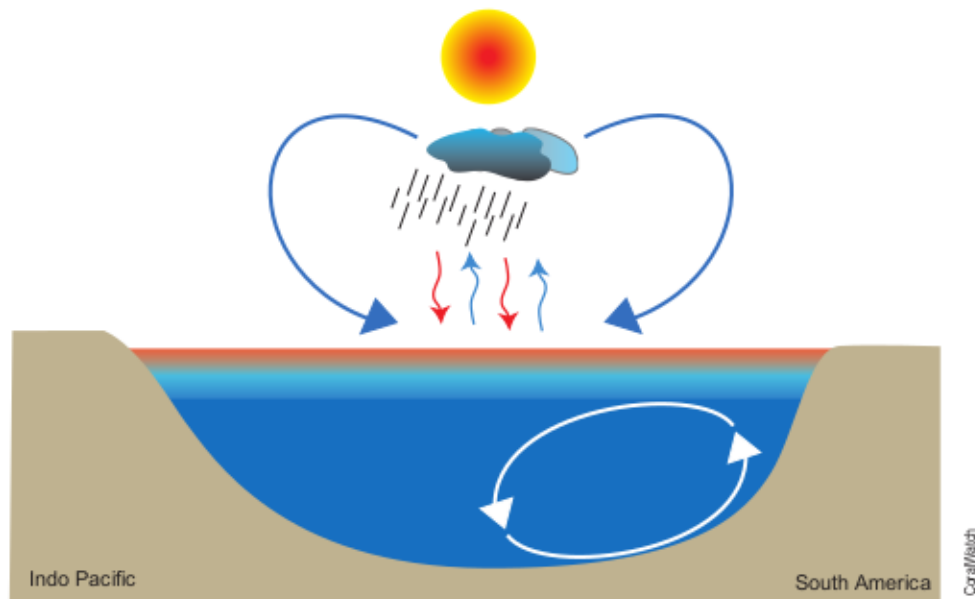
On a global scale, ENSO has a profound impact on humanity and society and is associated with droughts and increased fire risk in Australia, floods and severe coastal storms in California, heat waves on the European continent and other changes that have severely disrupted agriculture, fisheries, health, and the environment. One of the potential consequences of climate change, if temperatures move above 3°C, will be the establishment of a permanent El Niño pattern.





Classroom activity

1. Label the models given and explain, in your own words, the processes involved.



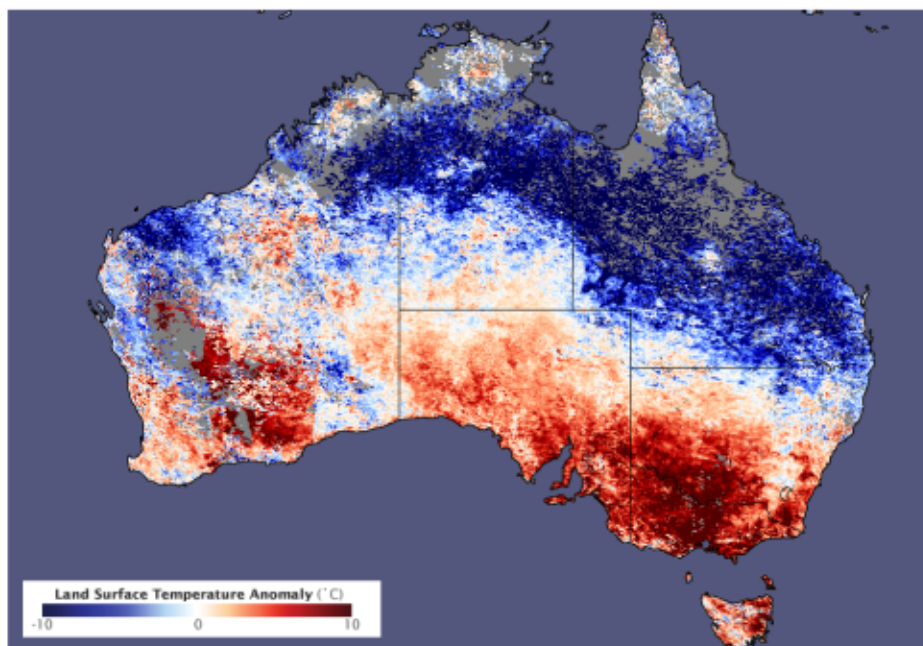


Classroom activities

1. Use the web and other references to search for:
 - a. the yearly or seasonal averages of rainfall and temperature in your region for this year and last year
 - b. frequency of extreme weather events such as storms or droughts which may have caused flooding or fires for the same period
 - c. any long term averages in rainfall or temperature available (e.g. a 10 year average)
 - d. the phase of ENSO cycle existing now and last year
2. Create a webpage or poster (max 400 words) using the information you have found including:
 - a. explanation of ENSO
 - b. predictions for your region (include some relevant data to support these predictions)
 - c. actions which could prepare for expected changes
 - d. summarise an extreme weather event from your region
 - e. what people should do in the case of extreme weather events



The two sides of El Niño. During 2008, south east Queensland experienced one of its longest dry spells ever recorded. The following summer, 66% of Queensland was flooded.



Wet in the north and dry in the south. Climate changes will not impact all areas evenly.

Source: NASA map, based on MODIS land surface temperature data.





Questions

1. What is the difference between weather and climate?
2. What are El Niño and La Niña?
3. Discuss the weather patterns associated with these two weather events on a global scale.
4. What are the associated changes in weather patterns that occur in your region during an El Niño event?
5. What are some of the extreme weather events that have occurred in the past 10 years?
6. How will climate change impact upon rainfall in your region?
7. How will it affect the temperature?
8. What are the costs and benefits of these changes?

Research projects

1. Discuss, using data, whether a possible link exists between El Niño and the increased frequency of coral bleaching events.
2. What are the possible consequences for your region if permanent El Niño weather were to develop?
3. Discuss what strategies you would put in place to cope with these changes.
4. Can we confidently link the increased frequency and intensity of these events to climate change?
Note: you must argue the science in this question and not accept opinion.
5. Investigate how the Indian Ocean Dipole influences the climate of the southern hemisphere.
6. What is the meridional overturning and how does it influence the climate of the northern hemisphere?

References

Reid et al. (2009) Coral Reefs and Climate Change: The guide for education and awareness. CoraWatch, The University of Queensland, Brisbane. (See El Nino page 62 and Tracking Change page 166)

Bureau of Meteorology; www.bom.gov.au/climate/enso/

NOAA's El Niño Page; www.elnino.noaa.gov

The University of Queensland; www.uq.edu.au

Climate Shifts; www.climateshifts.org

