

“El Nino - Southern Oscillation”

Monash University 2002




Outline


- What is El Niño?
- What is the Southern Oscillation (ENSO)?
- How does El Niño work?
- How does El Niño affect Australia?
- How long has El Niño existed?
- Is El Niño changing?



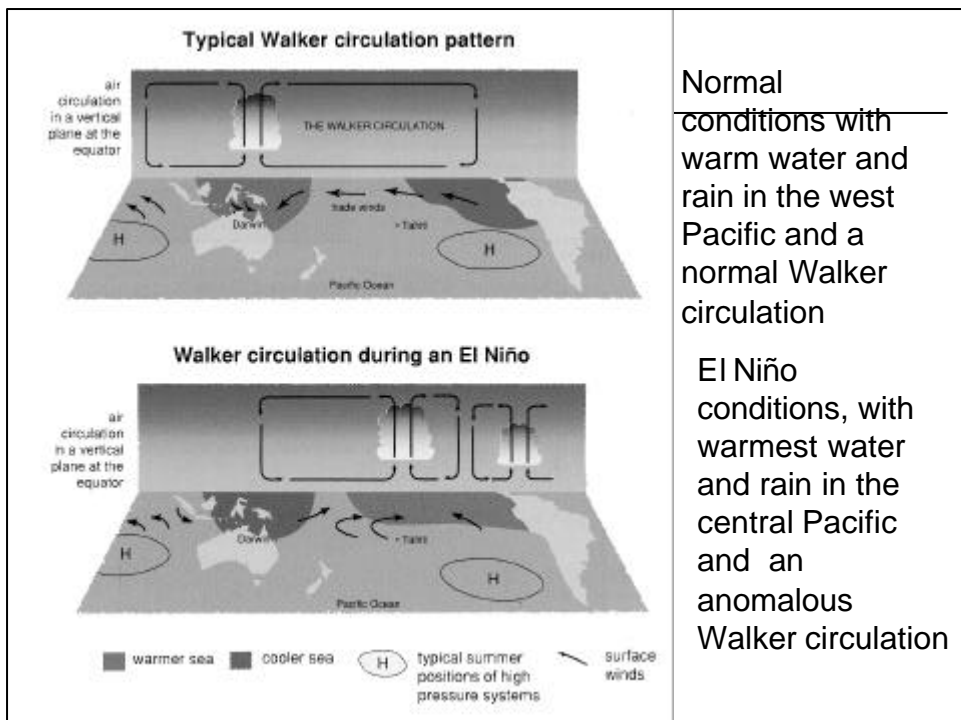
References

- Sturman and Tapper, The weather and climate of Australia and New Zealand
 - www.bom.gov.au/lam.climate/levelthree/analcli/m/el_nino.htm
 - www.dar.csiro.au/information/el_ninolanina.html
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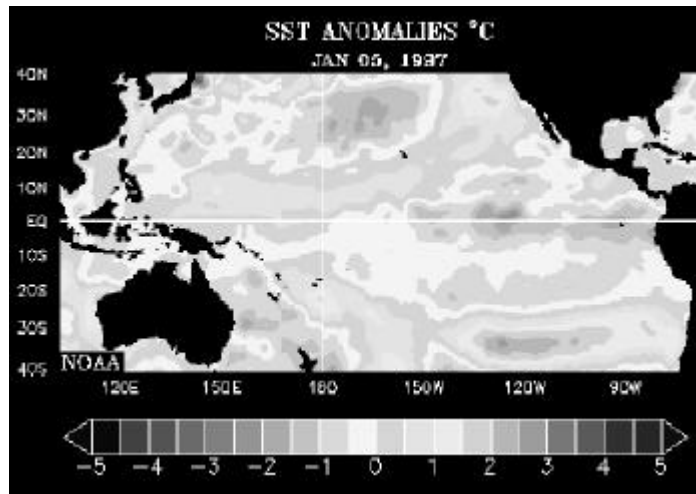
What is El Niño?

- El Niño is a warming of the equatorial eastern Pacific Ocean
 - It occurs about once every 2 to 7 years
 - The name is Spanish, meaning 'the boy' because it affects the coast of South America at Christmas
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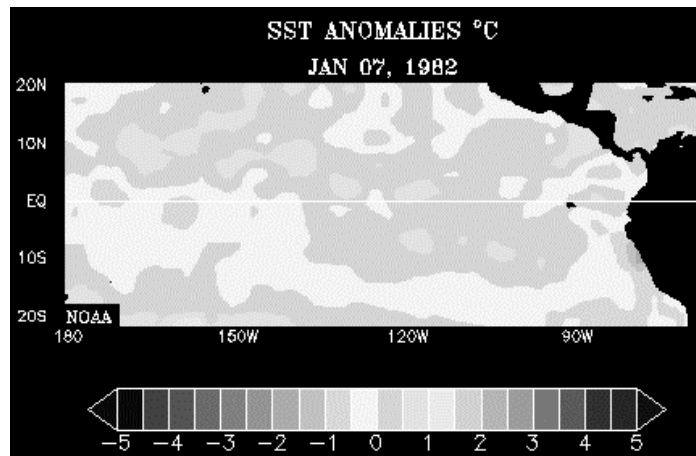
- Normally, the warmest water in the equatorial Pacific Ocean is in the west, north of Australia
- There is much colder water near the South American coast
- When an El Niño occurs, the warmest water is in the central and east Pacific



Sea surface temperature anomalies
Jan 97-April 98

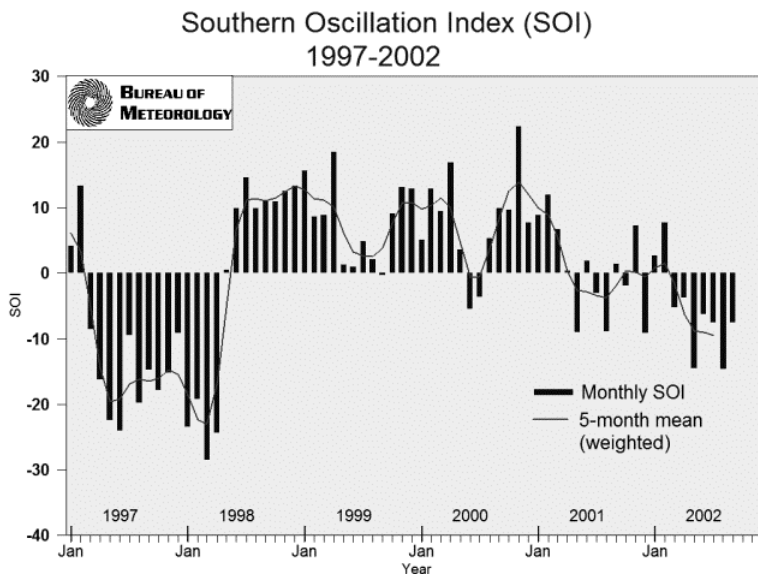


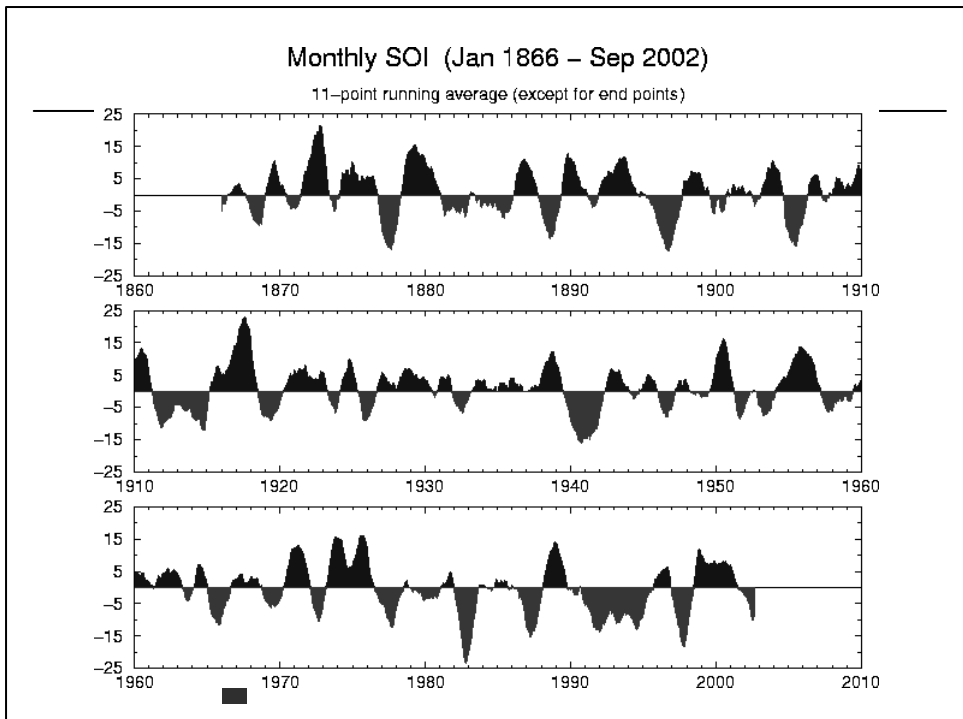
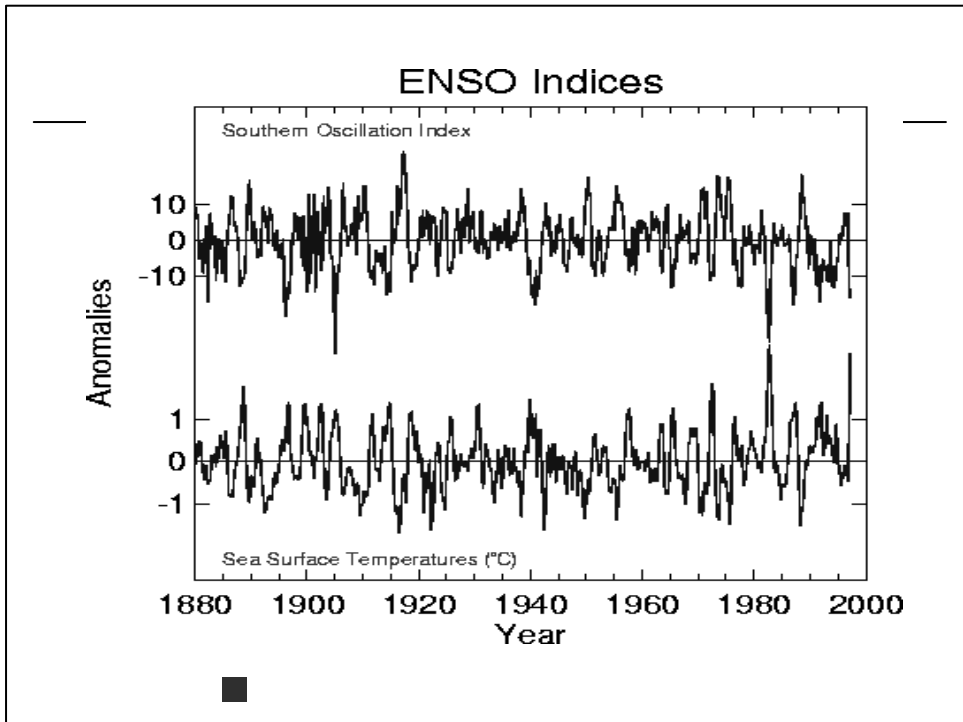
Sea surface temperature anomalies
Jan 82-July 83



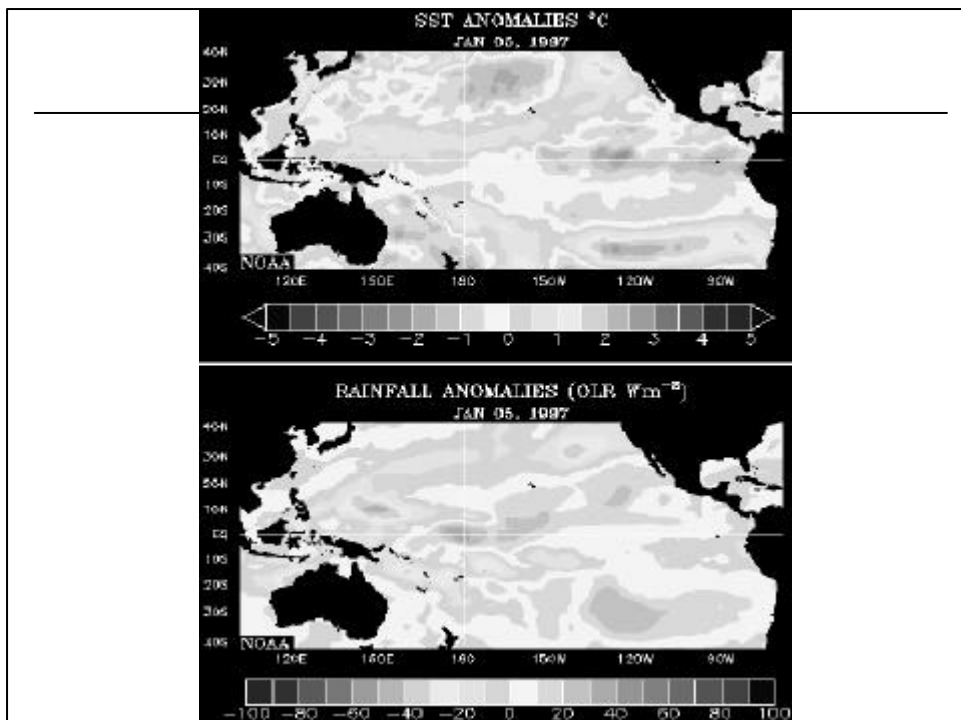
What is the Southern Oscillation?

- It is the atmospheric part of El Niño
 - It is a see-saw in atmospheric pressure across the Pacific Ocean
 - During El Niño, the pressure is higher in the west and lower in the east
 - The Southern Oscillation Index, the pressure difference between Tahiti and Darwin, is negative during El Niño
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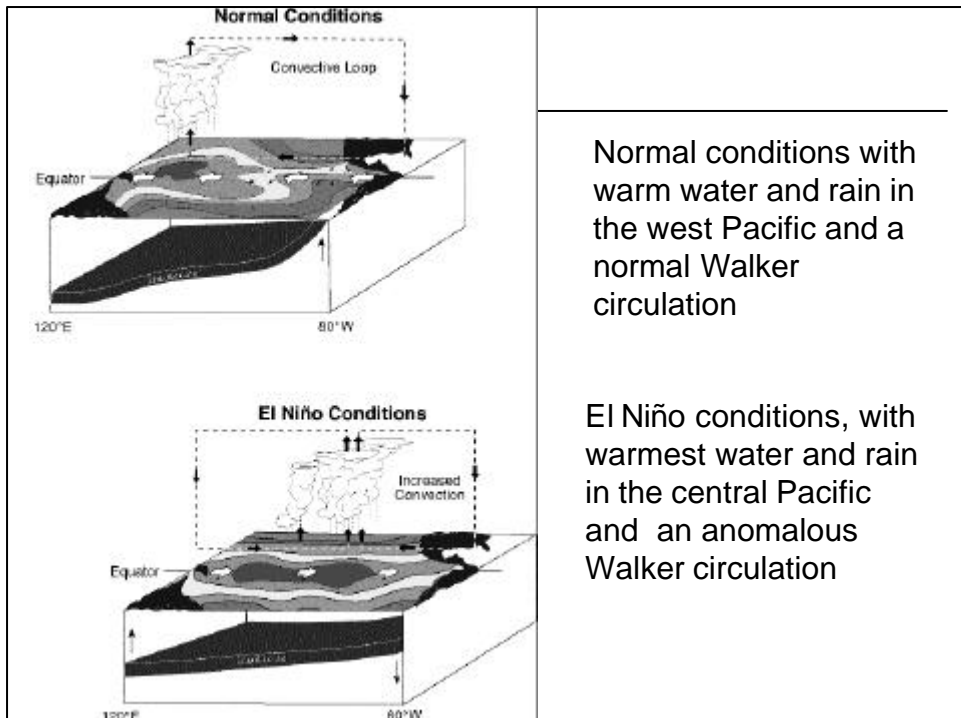


- Normally, there is heavy rain to the north of Australia, over the warmest ocean region
- When El Niño occurs, the region of heavy rain moves east with the warmest sea temperatures, leaving dry conditions in the west Pacific

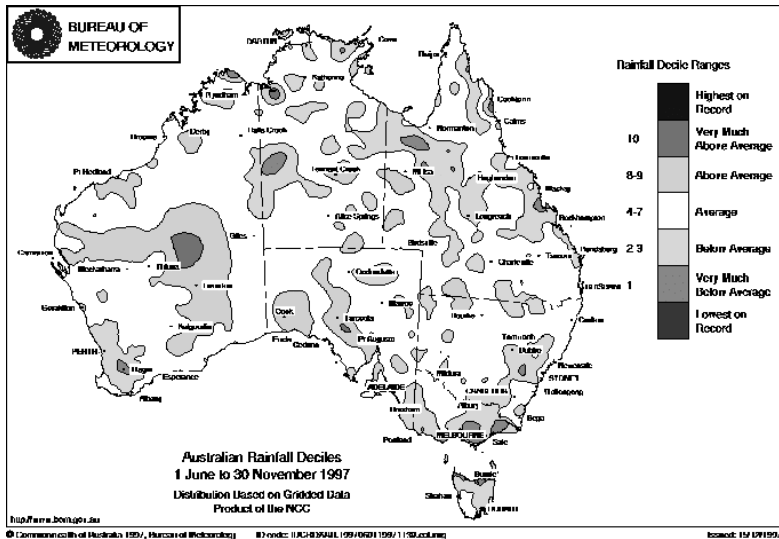


How does El Niño work?

- El Niño is a coupled ocean-atmosphere process
- It involves:
 - weakening of the trade winds
 - warming of the eastern equatorial Pacific
 - eastward movement of the heavy rain region
 - increased pressure in the west and reduced pressure in the east



Rainfall anomalies June-Nov 1997

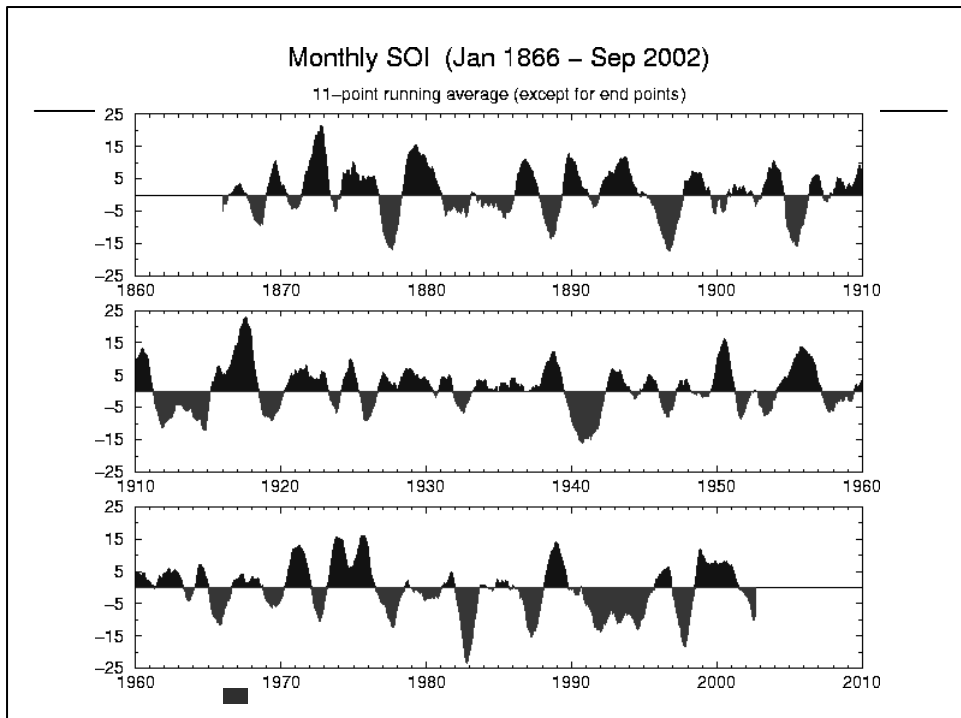


How long has El Niño existed?

- Evidence for El Niño is found in drought and flood records, ocean sediments, tree rings and corals
- There is good evidence that El Niño has affected Australia and South America for at least the last 6,000 years

Is El Niño changing?

- El Niño has varied in strength and frequency over the last 120 years
- Recently, there have been strong El Niños in 1982/3, 1986/7, 1991-5 and 1997/8
- It has been suggested that El Niño is changing due to greenhouse warming but there is no convincing evidence yet



Summary

- El Niño causes Australia to be “a land of drought and flooding rains”
- It has influenced Australia for a long time and will continue to do so
- We should take El Niño into account in planning agriculture and other activities

