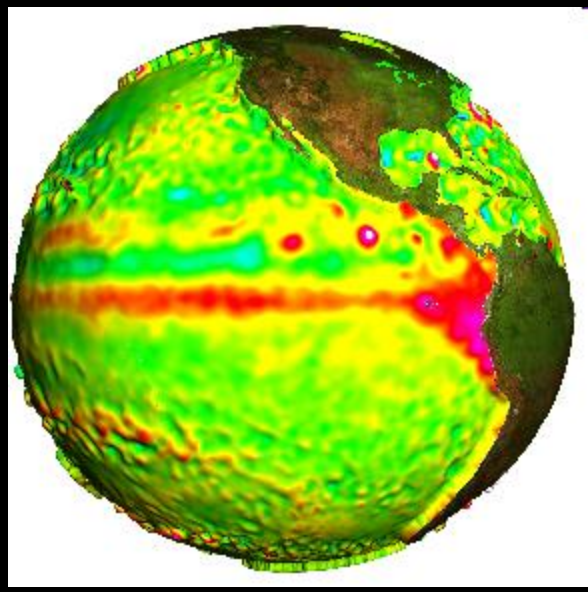
EL NIŇO - SOUTHERN OSCILLATION (ENSO)

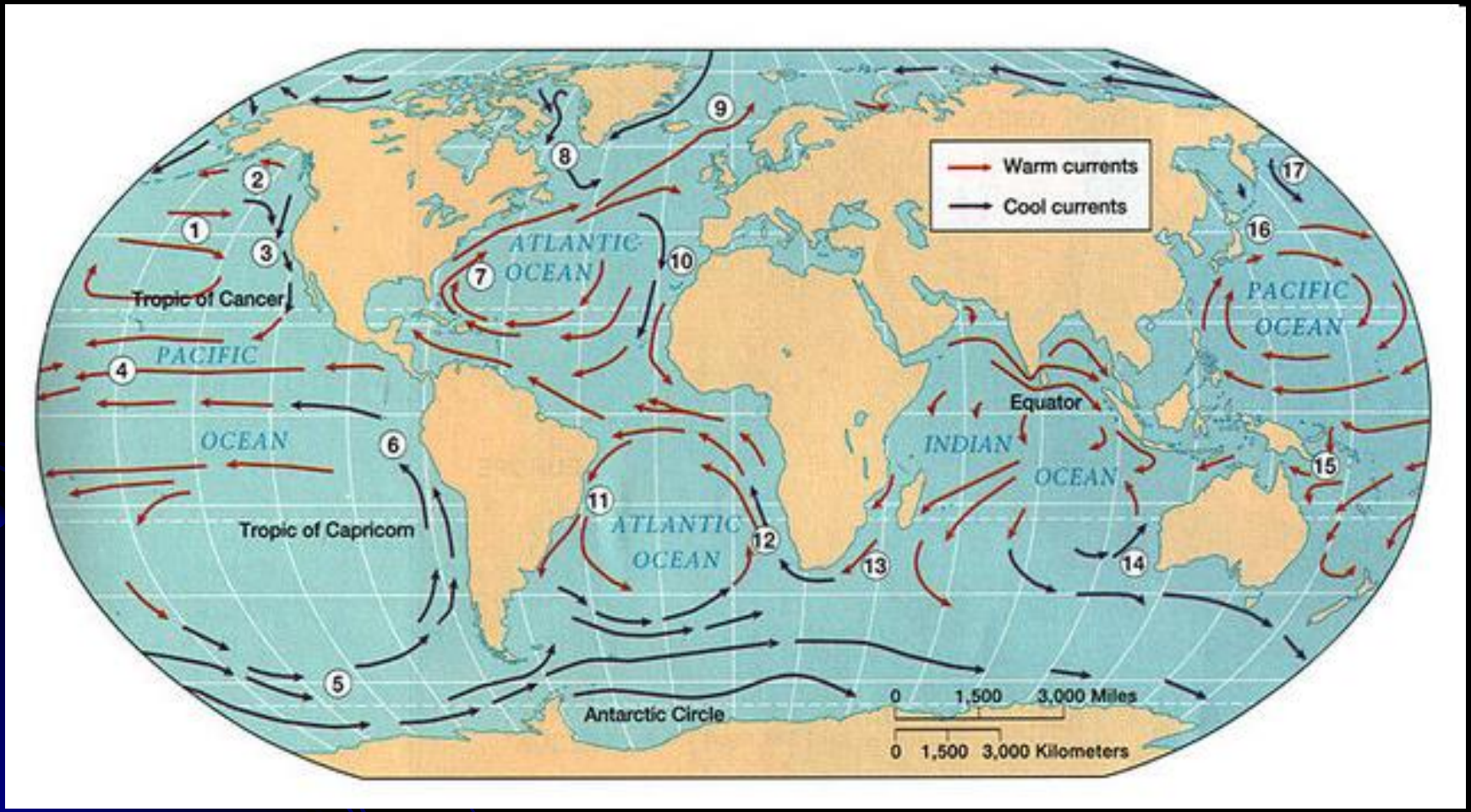


Kamila Klemešová
Geography
12.12.2009

ENSO = El Niño (EN) + Southern Oscillation (SO)

- **ENSO** - a global event arising from large-scale interaction between the ocean and the atmoshere
- **El Niño** – an extensive ocean warming that begins along the coast of Peru and Ecuador.
- **Southern Oscillation** – the reversal of surface air pressure at opposite ends of the tropical Pacific Ocean that occur during major El Niño events.
- **La Niña** – A condition where the central and eastern tropical Pacific Ocean turns cooler than normal.

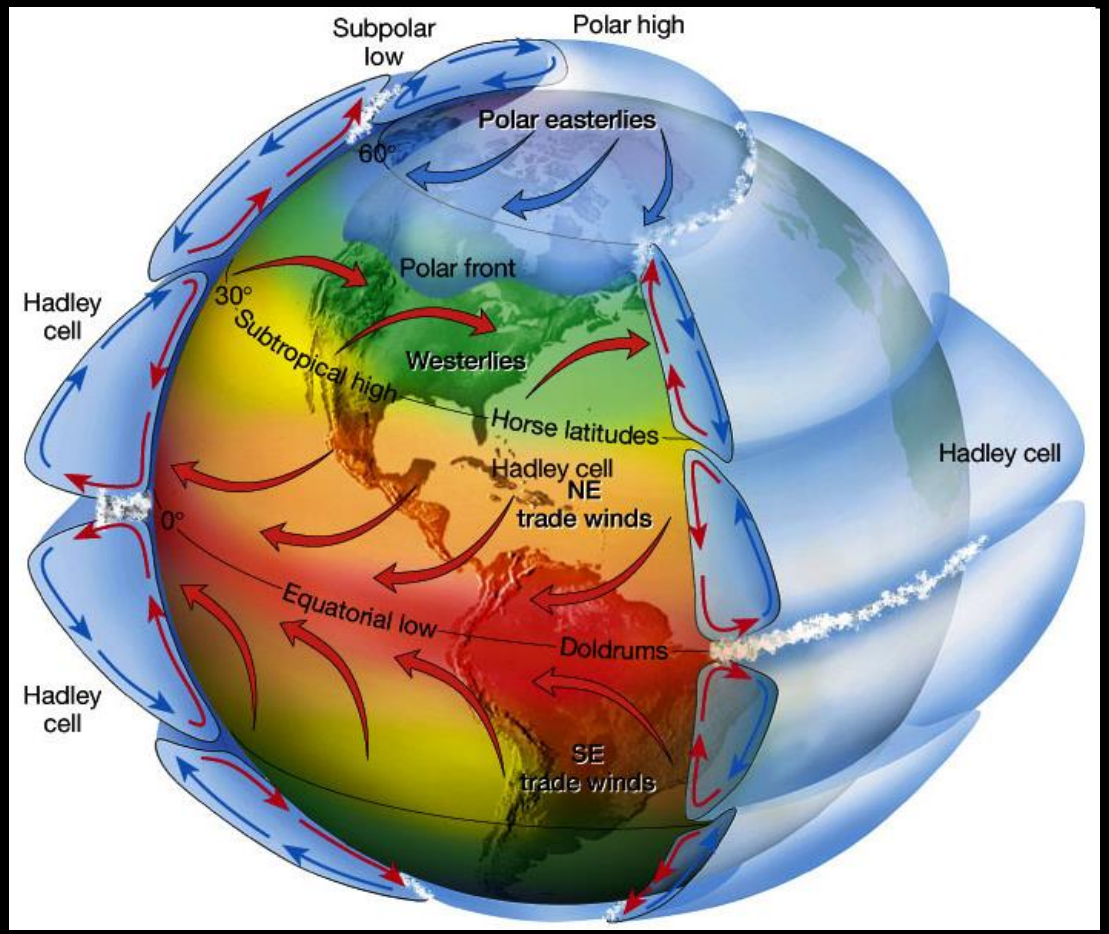
Ocean currents



www.freewebs.com/svobelisk/Route_Map/ocean_currents2_resized.jpg

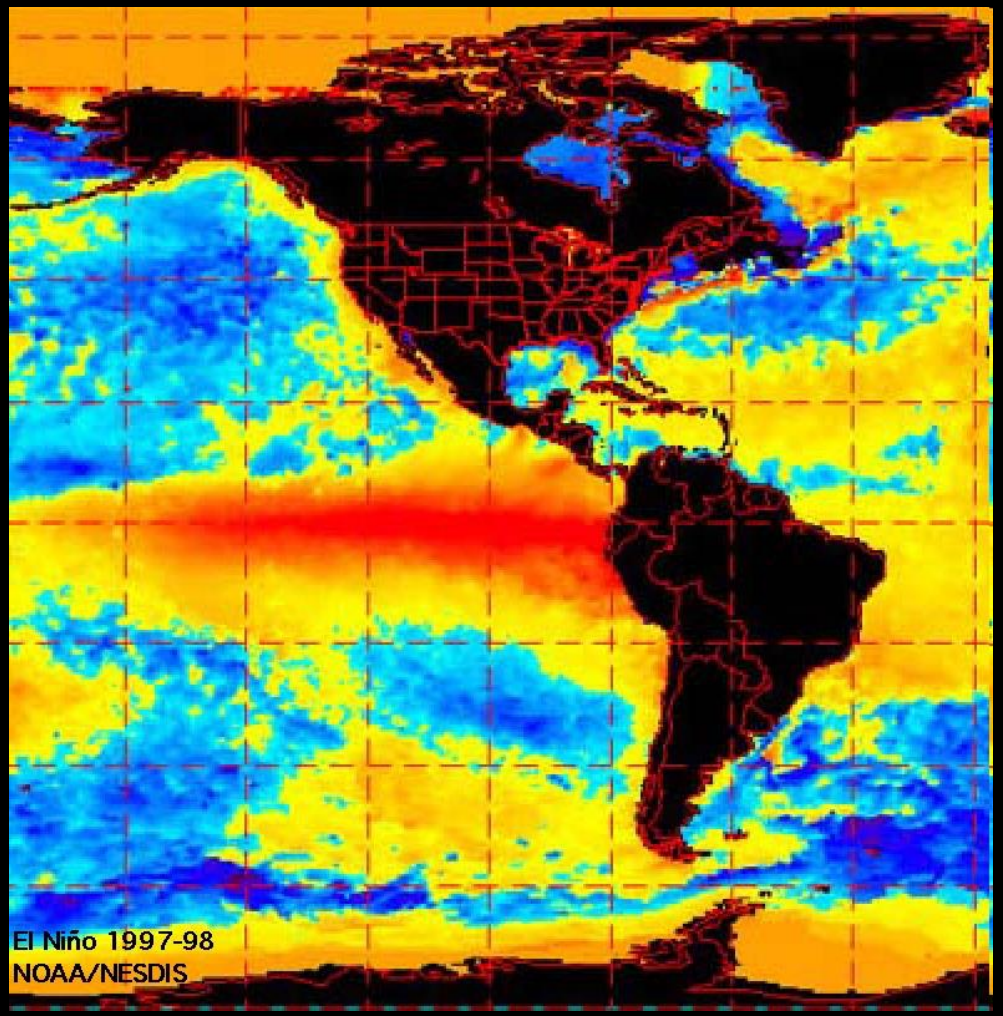
Global circulation

- Trade winds occupy most of the tropics and blow from the subtropical hights to the equatorial low.



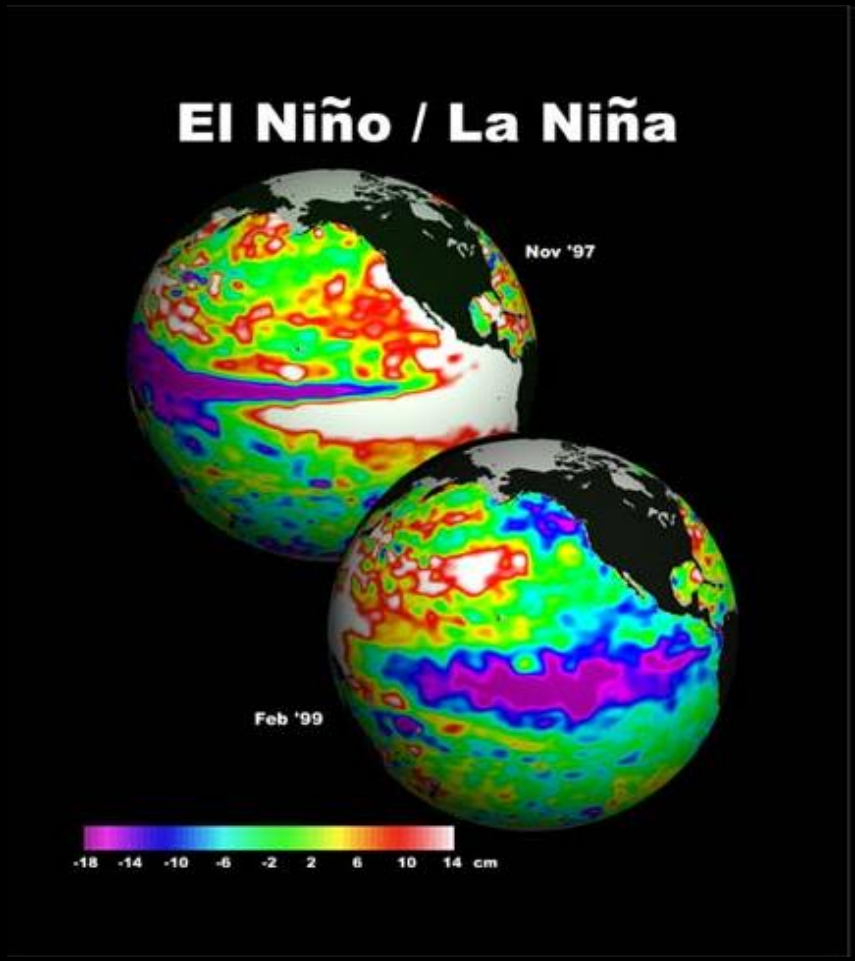
Characteristic of El Niño

- Weakening of the trade winds and warming of the surface layers in the eastern and central equatorial Pacific Ocean
- Events occur irregularly at intervals of 2-7 years.
- Water temperature near Peru rises => death of marine plants, fishs etc…



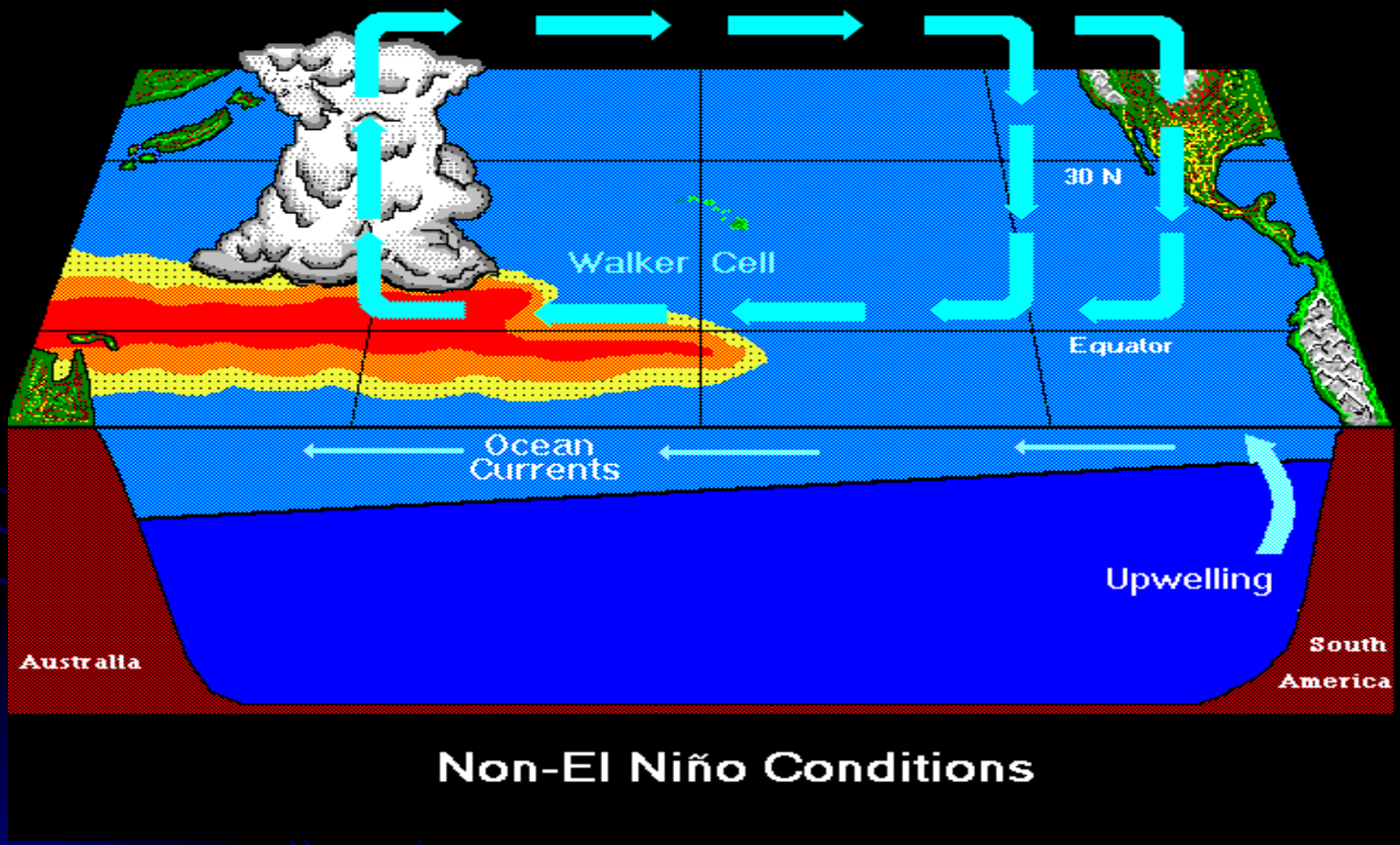
Sea surface height

- is a measure of heat stored in the upper ocean.
- Red and white colour - higher and warmer water
- Purple colour – lower and cooler water

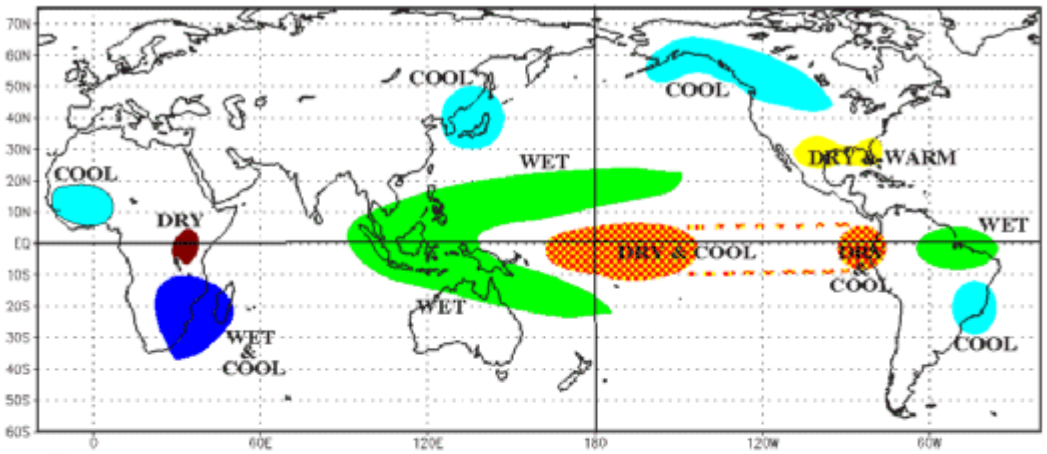


http://science.nasa.gov

Atmospheric and ocean circulation

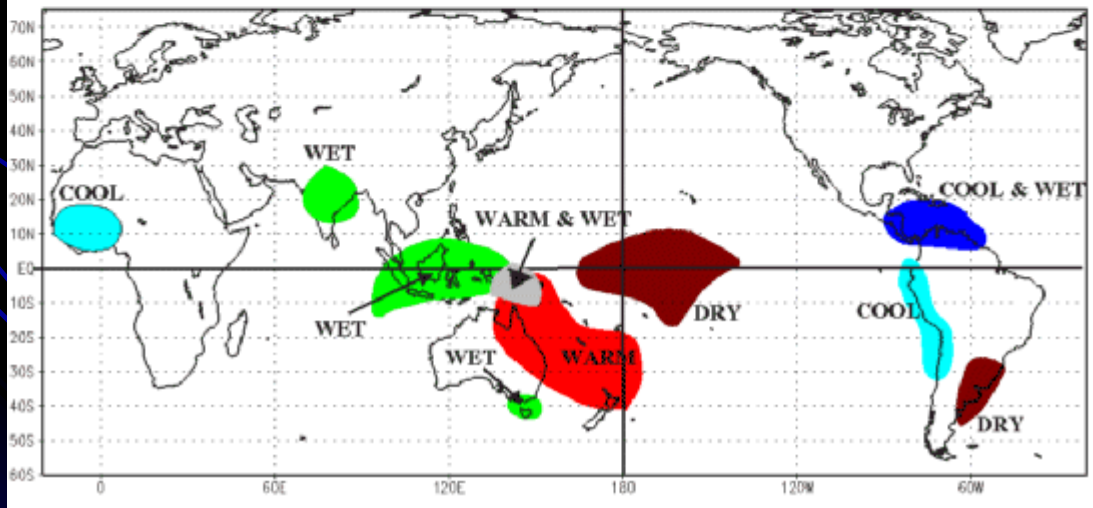


COLD EPISODE RELATIONSHIPS DECEMBER - FEBRUARY

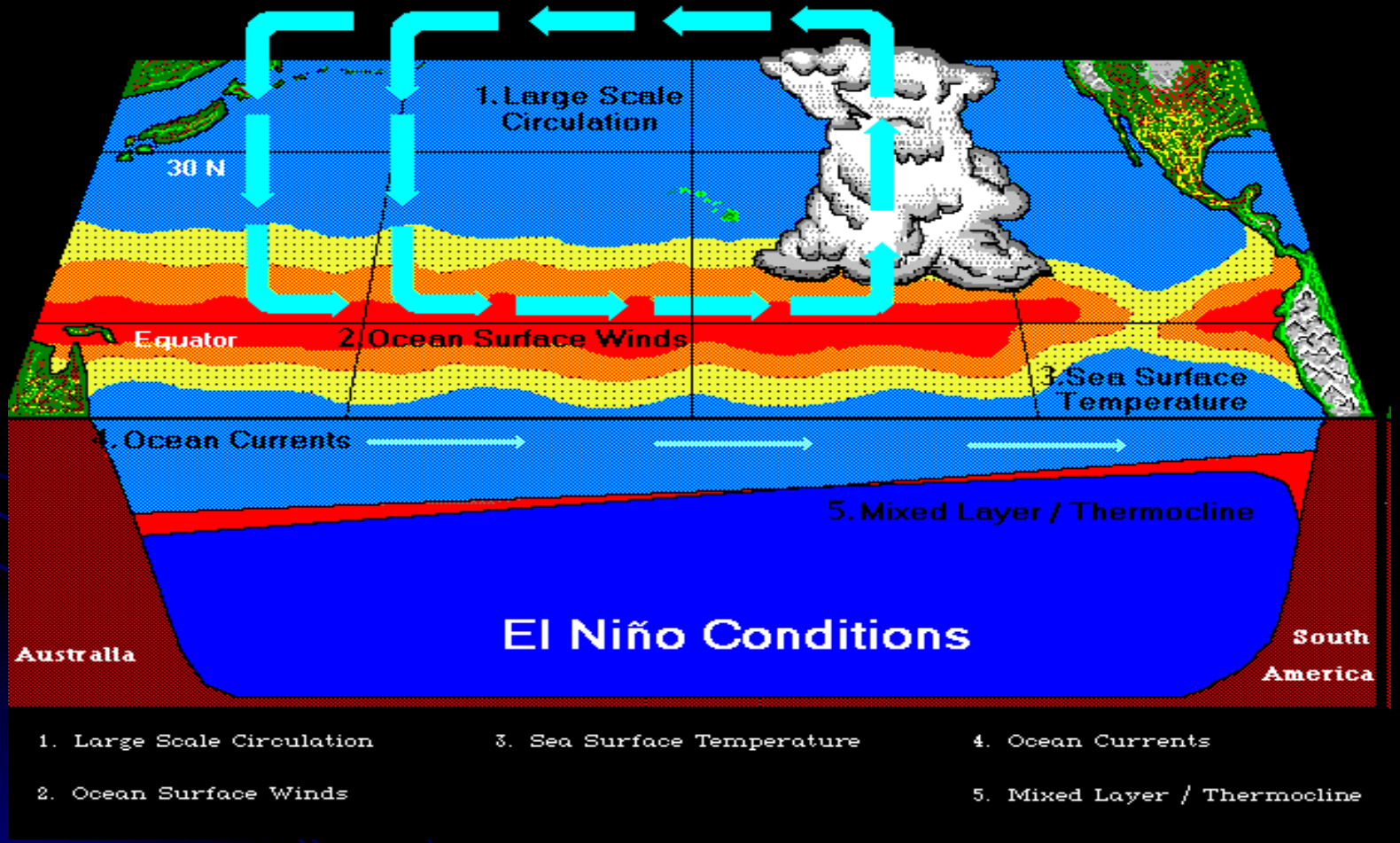


NOAA
Climate Prediction Center, NOAA

COLD EPISODE RELATIONSHIPS JUNE - AUGUST

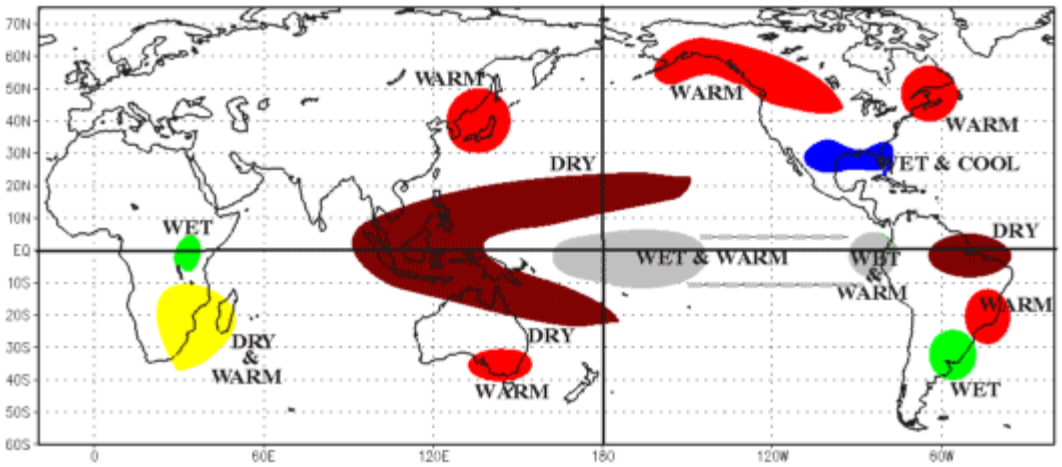


Atmospheric and ocean circulation during El Niño



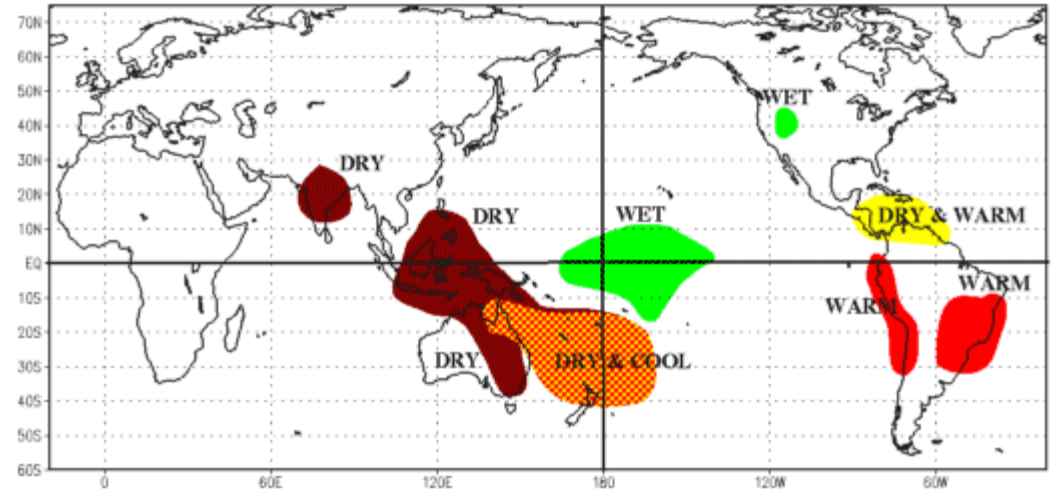
www.chmi.cz

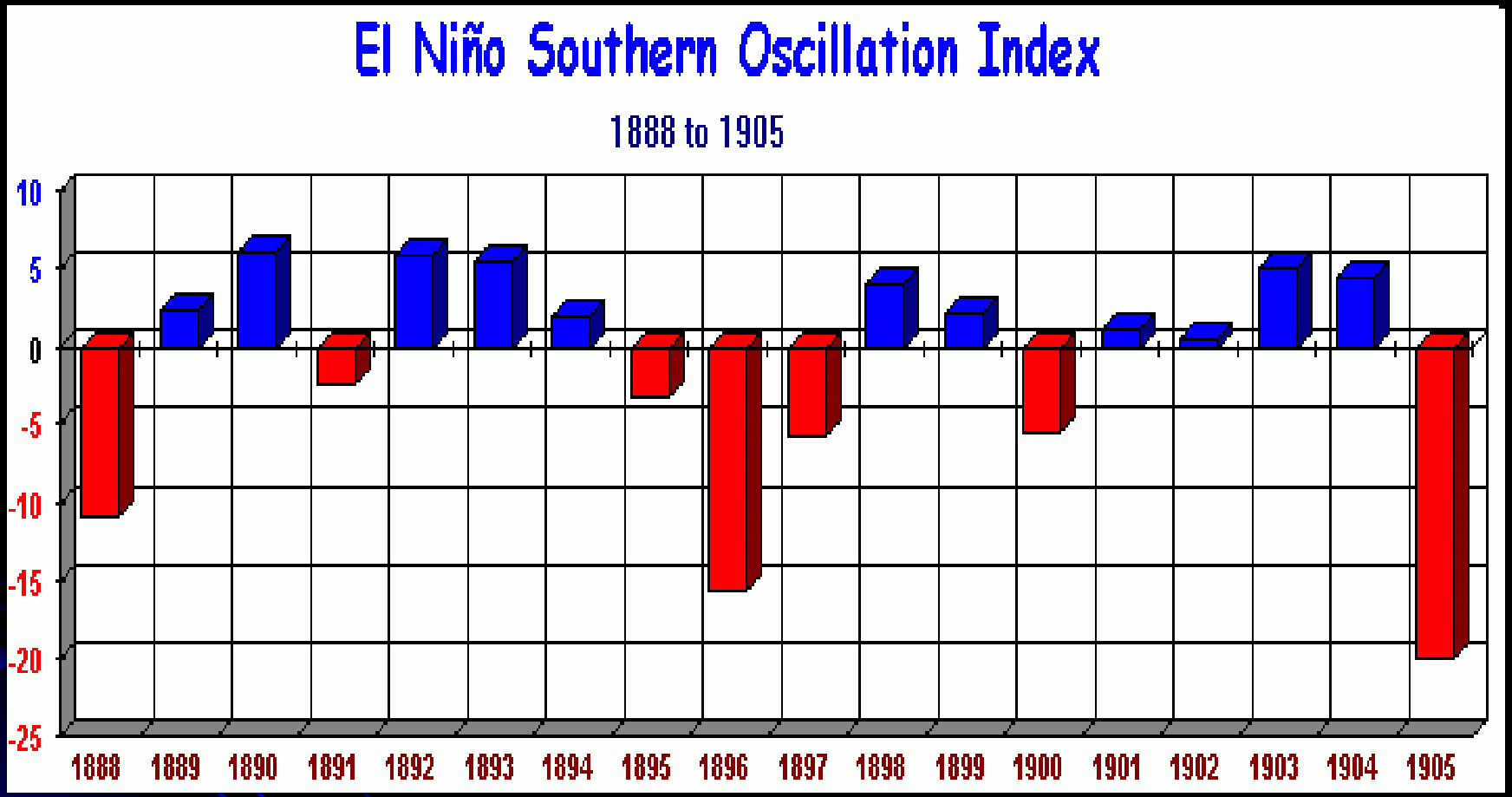
WARM EPISODE RELATIONSHIPS DECEMBER - FEBRUARY



Climate Prediction Center, NOAA

WARM EPISODE RELATIONSHIPS JUNE - AUGUST





El Niño – red, La Niña - blue

www.john-daly.com

SOI

- normalized difference in surface pressure between Tahiti, French Polynesia and Darwin, Australia.
- We measure the strength of the trade winds, which have a component of flow from regions of high to low pressure
- **High SOI** – big pressure difference
  La Niňa conditions – trade winds are stronger than normal
- **Low SOI** – small pressure difference => El Niňo conditions – trade winds are weaken than normal

Interests of El Niño

- El Niño typically lasts 9-12 months.
- La Niña typically lasts 1-3 years.
- El Niño events occur once every 2 to 7 years.
- El Niño means The Little Boy or Christ child in Spanish. This name was used for the tendency of the phenomenon to arrive around Christmas.
- La Niña means The Little Girl.

Impacts of El Niño

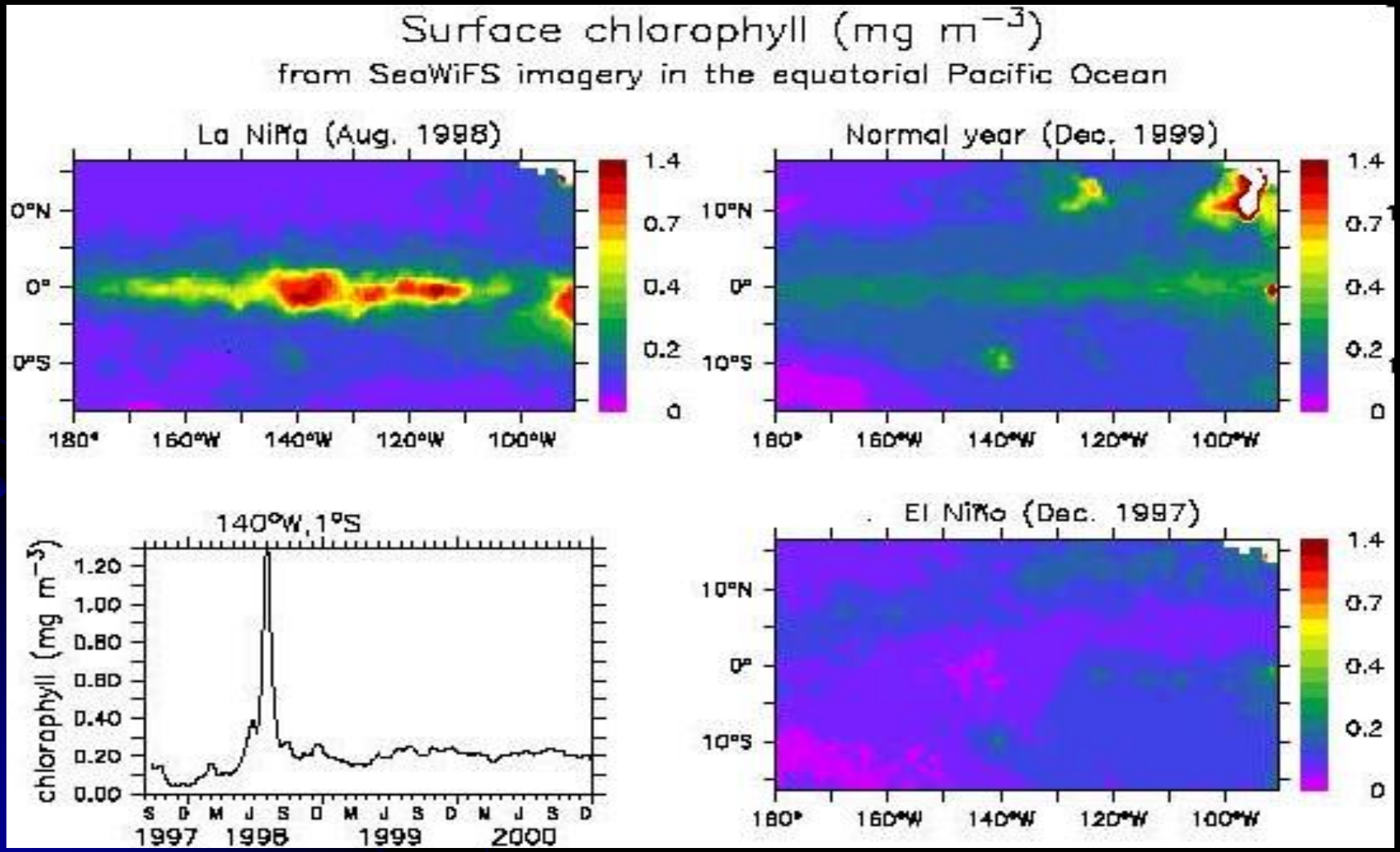
Changes in the Pacific ocean

- Warmer ocean near Peru cause the decrease of chlorophyll => fishs, marine plants die => less oxygen in the ocean…

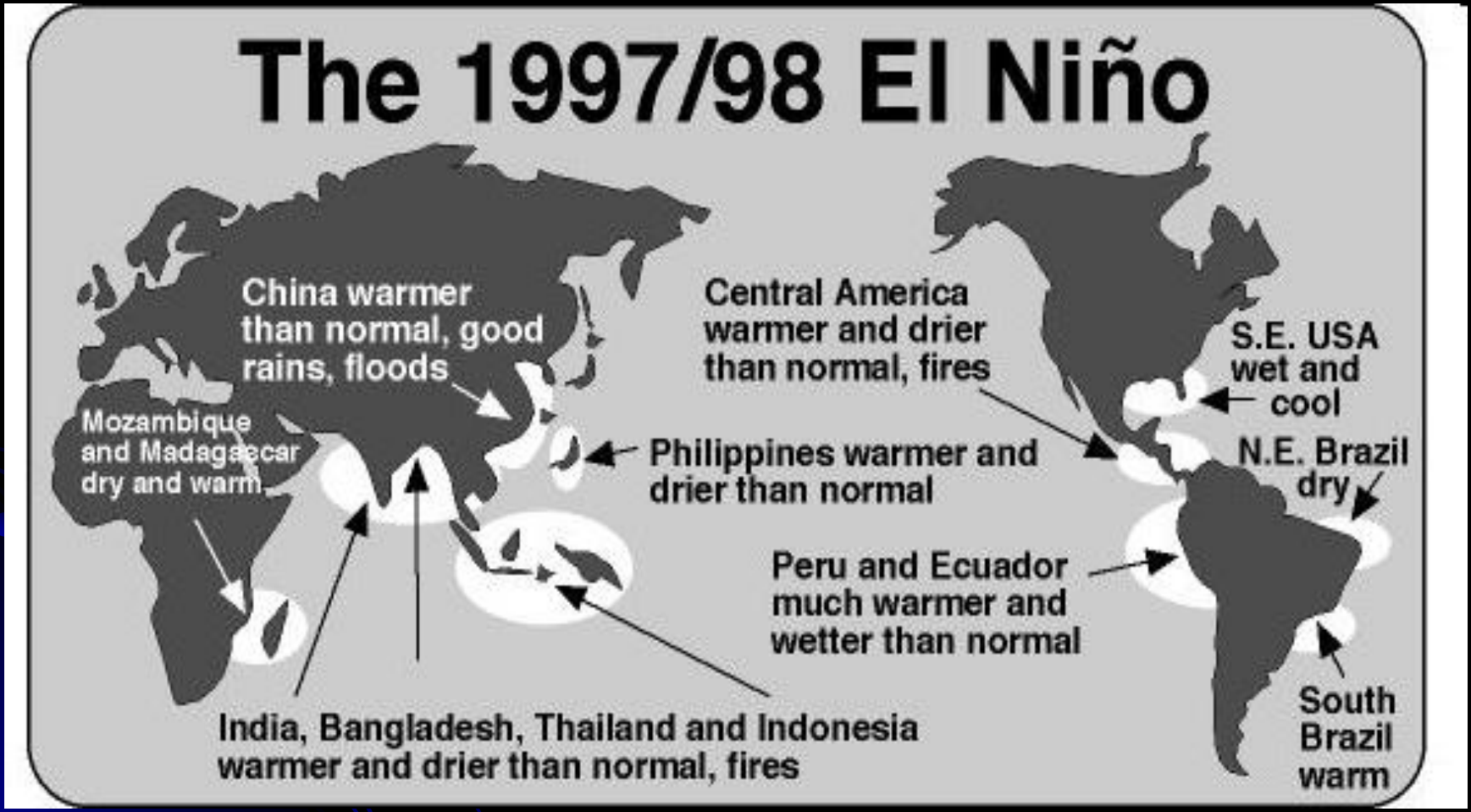
  e.g. produce of Peruvian anchovy :

  - 1971 – 10,3 million metric ton
  - 1972 – 4,6 million metric ton (El Niňo)

Changes in the produce of chlorophyll in the Pacific ocean

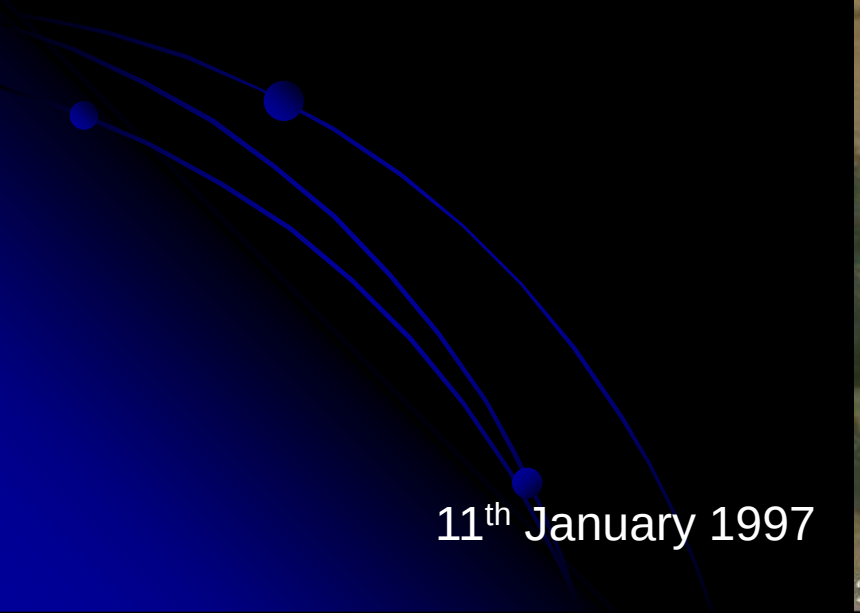


Global impact of El Niño

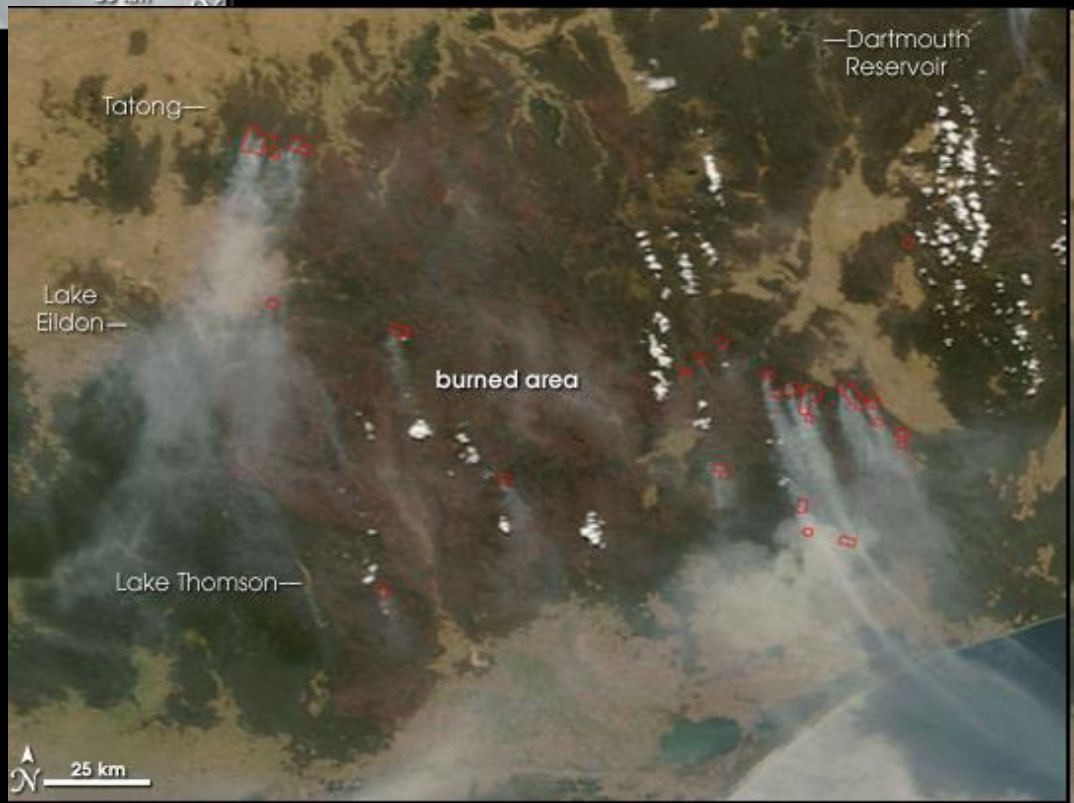


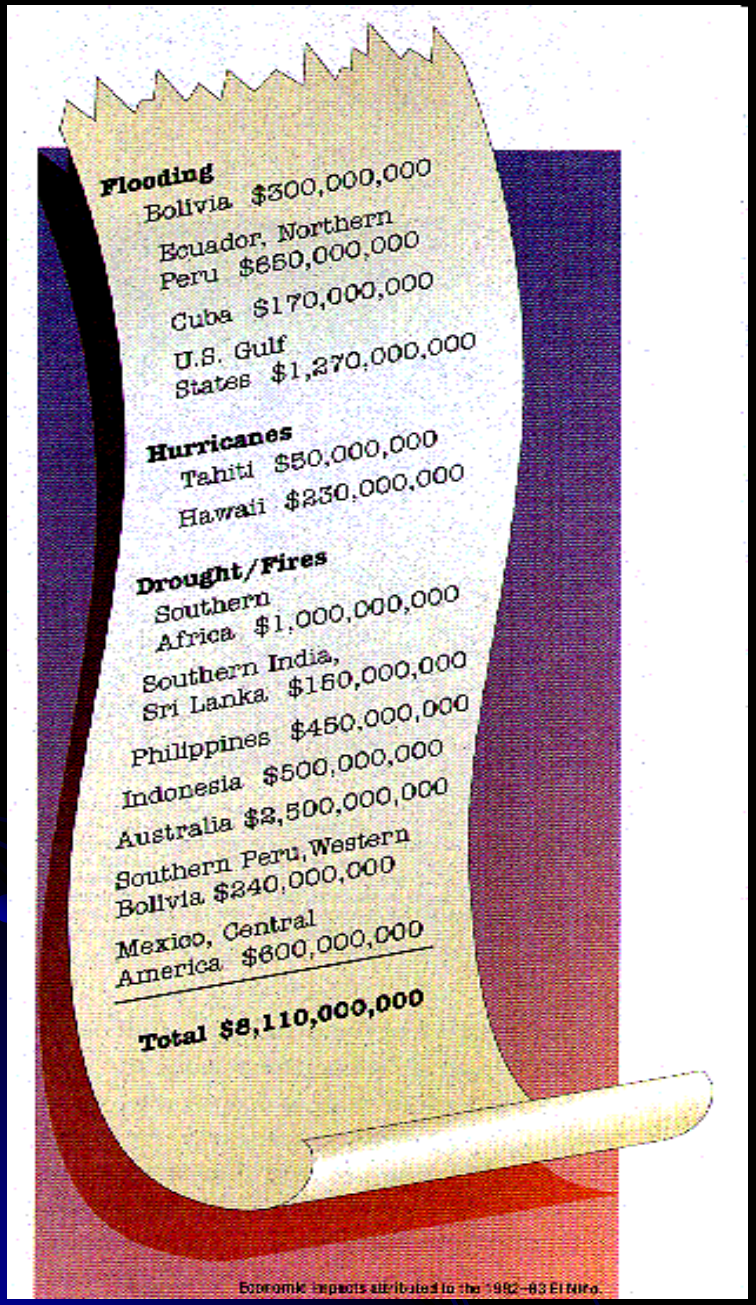
Fires in Australia (Victoria)

10th January 1997



11th January 1997





Economic impacts

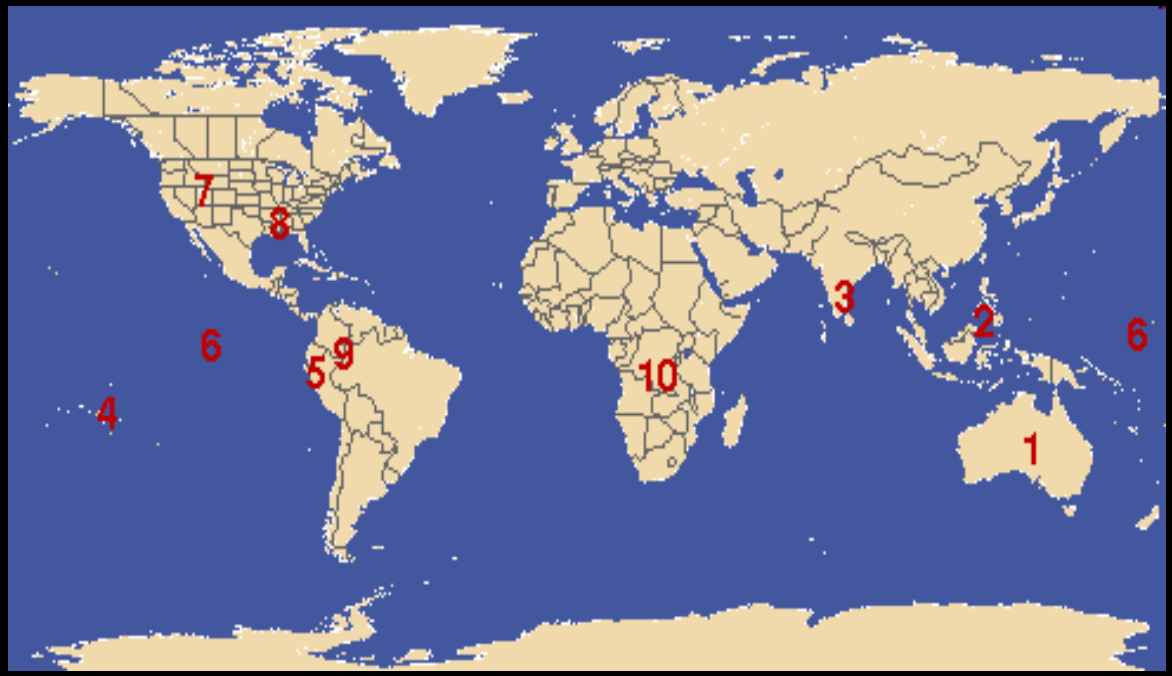
- El Niño 1982-1983 damage worth more than 8 billion

- El Niño 1997-1998
- El Nino was estimated to be on the order of $25 billion.

www.pmel.noaa.gov

El Niño 1982 - 1983

1. Drought and bush fires
2. Crops fail, starvation follows
3. Drought,fresh water shortages
4. Tahiti-6 tropical cyclones
5. Fish industry devastated
6. Across the Pacific-Coral reefs die
7. Colorado River basin-flooding, mud slides
8. Gulf states-Downpours cause death, property damage
9. Peru, Ecuador-Floods, landslides
10. Southern Africa-Drought, disease, malnutrition



- Manyara National Park – trees destroyed by floods during El Niño 1997

www.yeungstuff.com

Floods in Peru, 1997

skywatch-media.com

Floods in California 1997

Sources

- *NASA (National Aeronautics and Space Administration)*
- *NOAA (National Oceanic and Atmospheric Administration*), http://www.nws.noaa.gov/
- CHMU (Czech Hydromoteorological Institute), *www.**chmi**.cz*
- Ahrens, C.D., Meteorology today, Brooks/Cole, 544 p., ISBN 0-534-39771-9