Climate Change And Its Implications (CCI)

Dr. Raji P

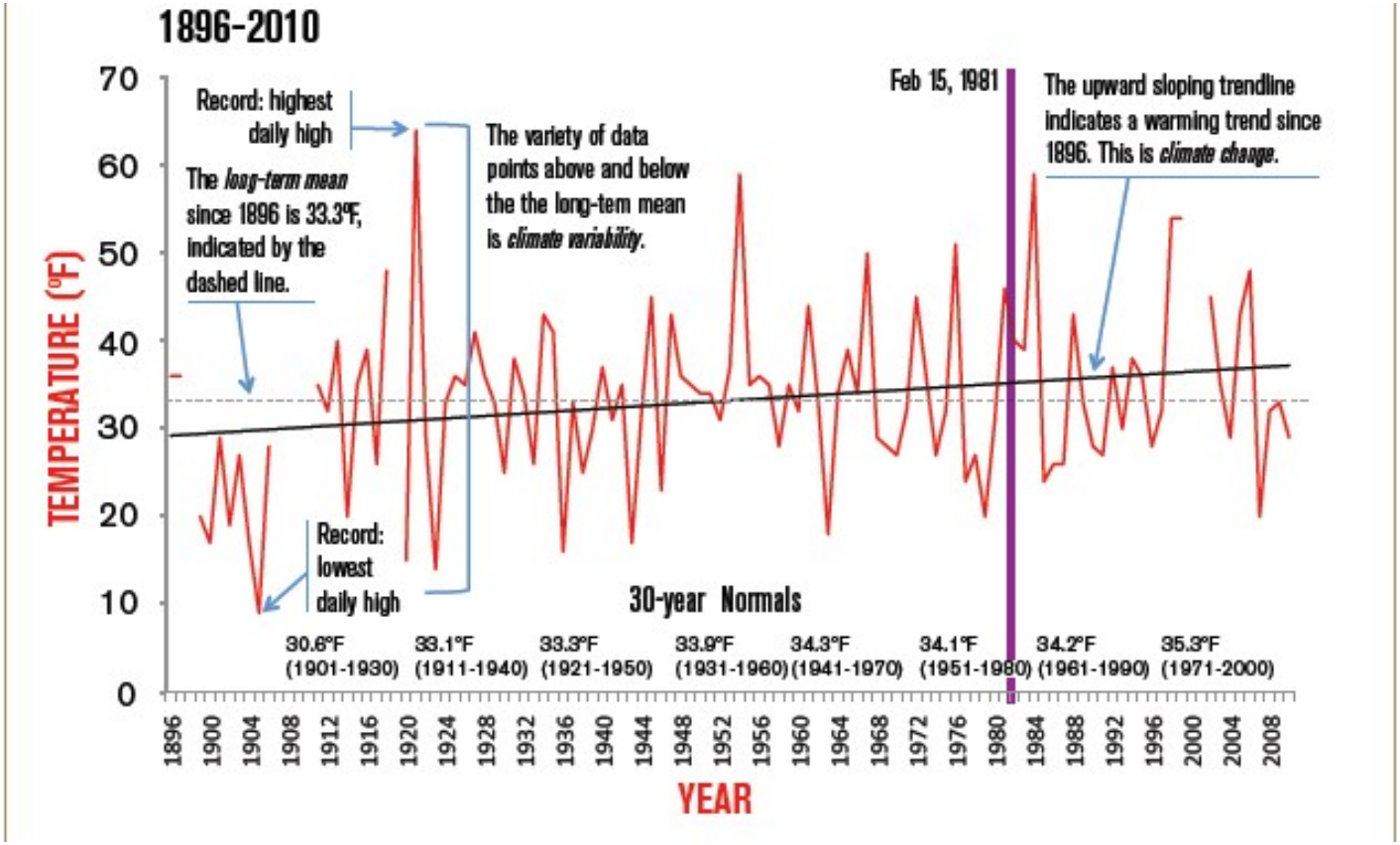
Lecture-4

Class outline

- Climate variability and climate change

- Reasons for climate variability & change

Climate Variability & Climate Change



- Climate varies over seasons and years instead of day to day like weather
- Some summers are colder than others and some years precipitations are higher than others

- Climate variability: The way the climate fluctuates yearly above or below a long term average

- Climate change: Long term continuous change to average weather conditions

- Climate change is slow and continuous unlike variability

Assignment-1

- Identify the trend in temperature and rainfall in your location from the historical data.

Download the data from 1980 to 2020 (30 years daily data) from NASA Power data (https://power.larc.nasa.gov/data-access-viewer/)

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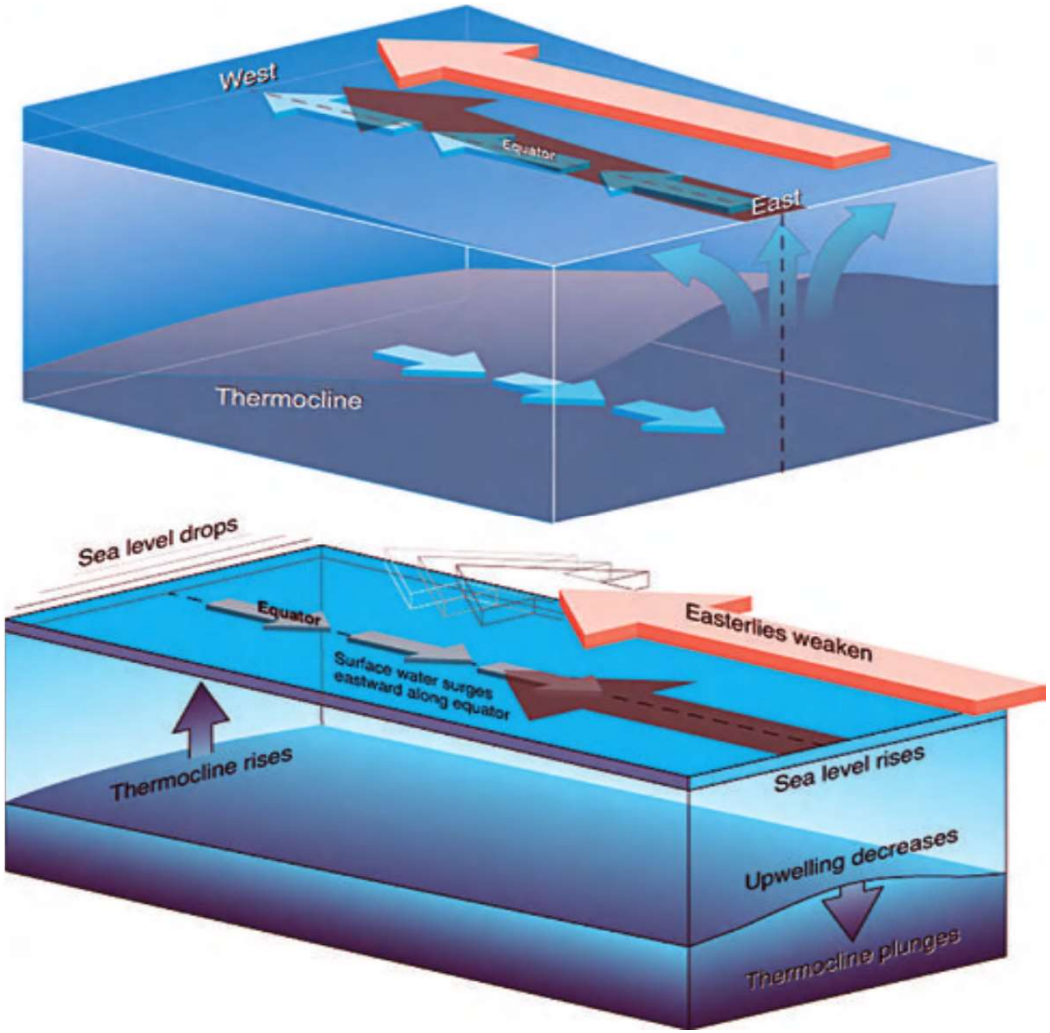
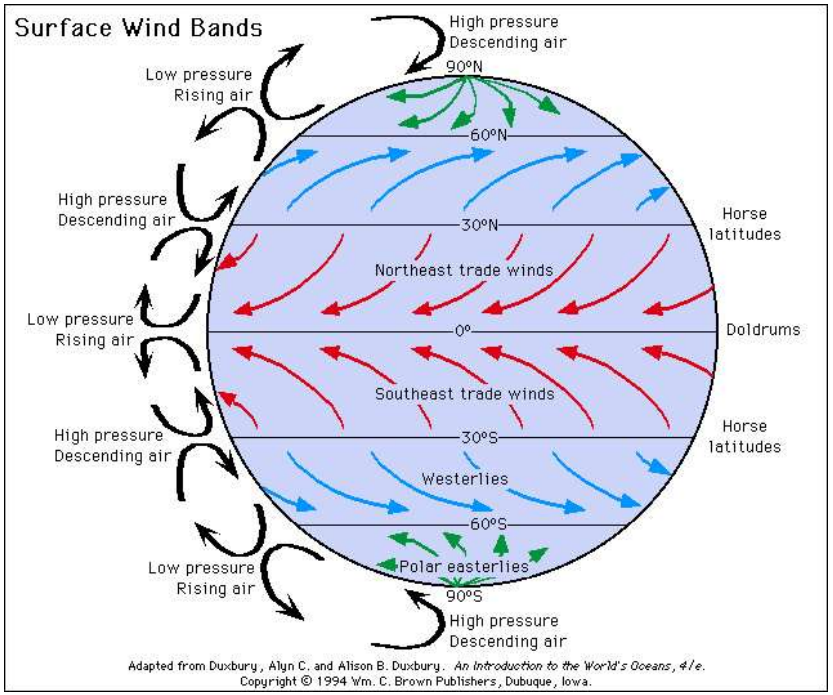
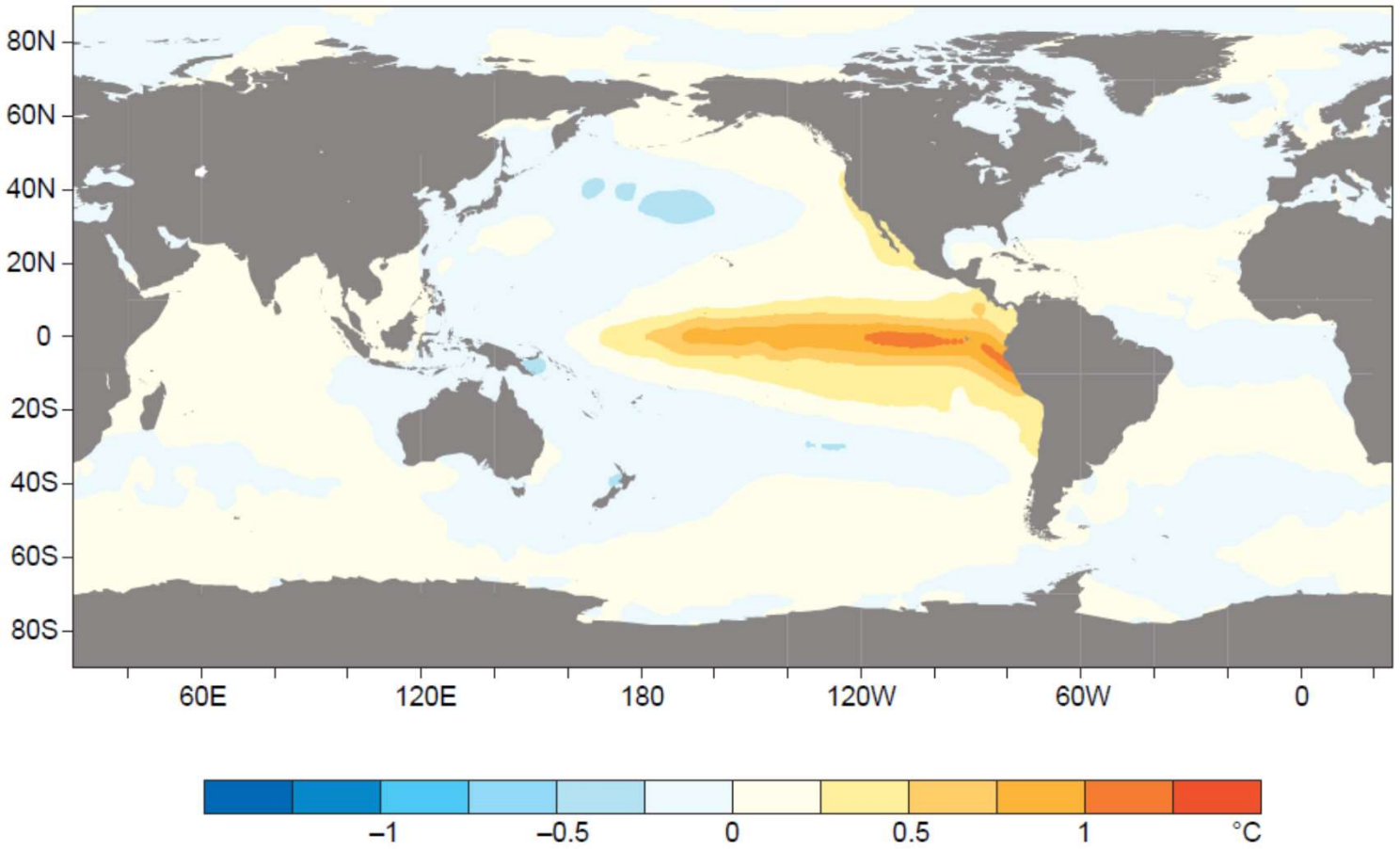
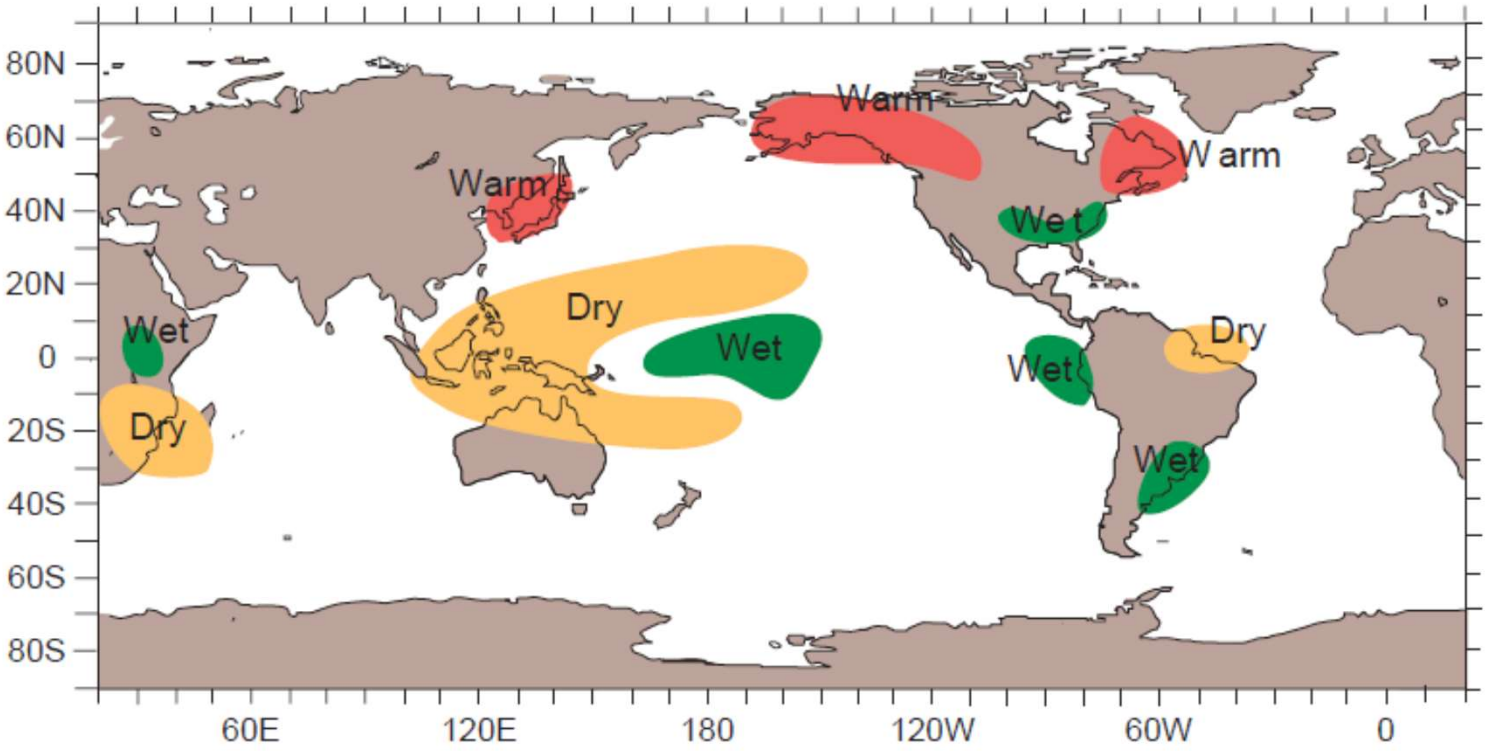
General circulation of the atmosphere



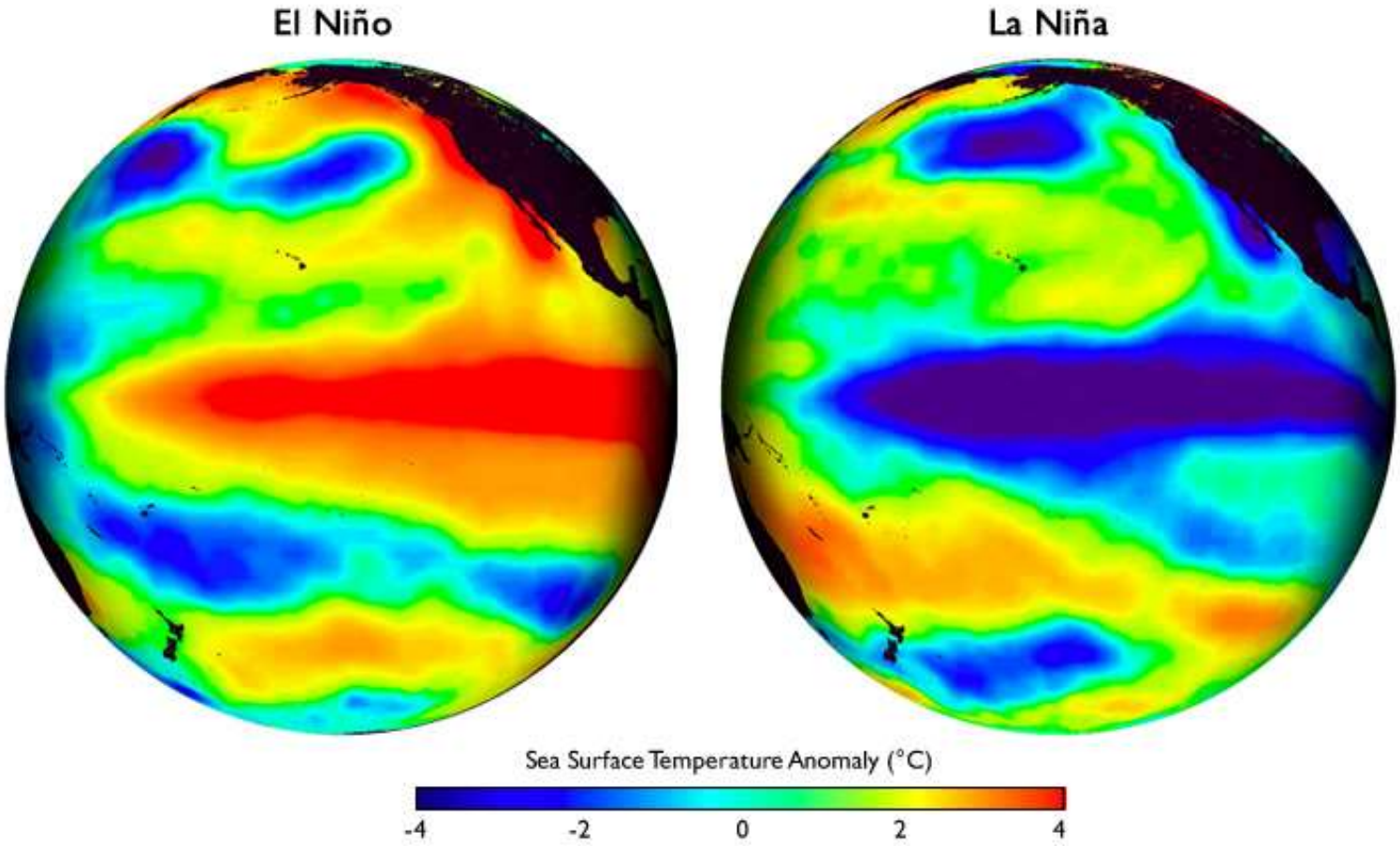




Global pattern of sea surface temperature (°C) anomalies observed during El Niño years

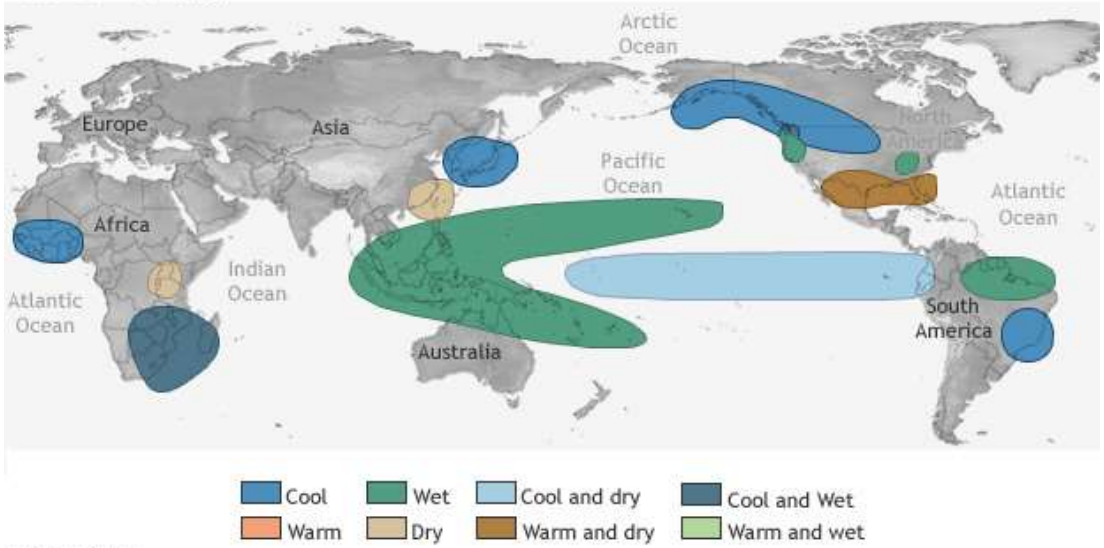


Impacts of El Niño on weather and climate

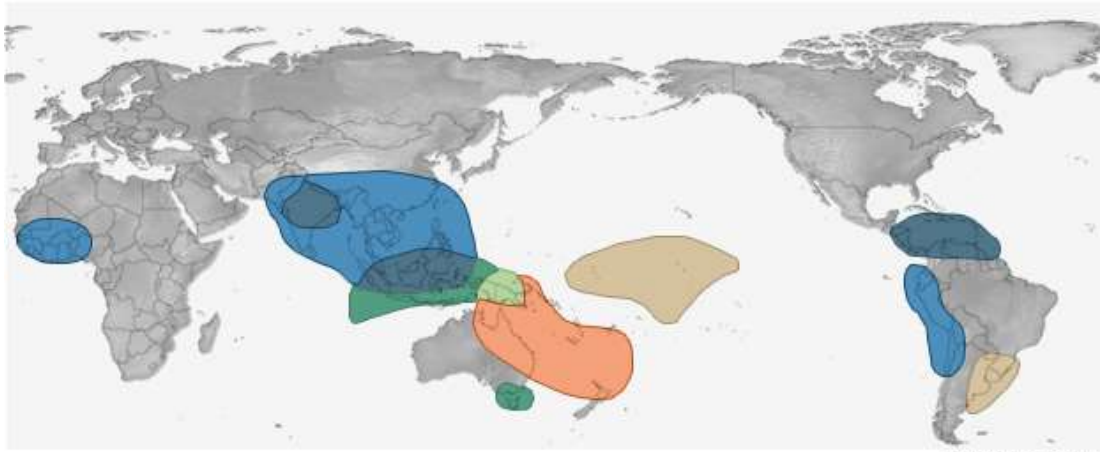

El Niño
La Niña
Sea Surface Temperature Anomaly (°C)
-4
-2
0
2
4

LA NIÑA CLIMATE IMPACTS

December-February



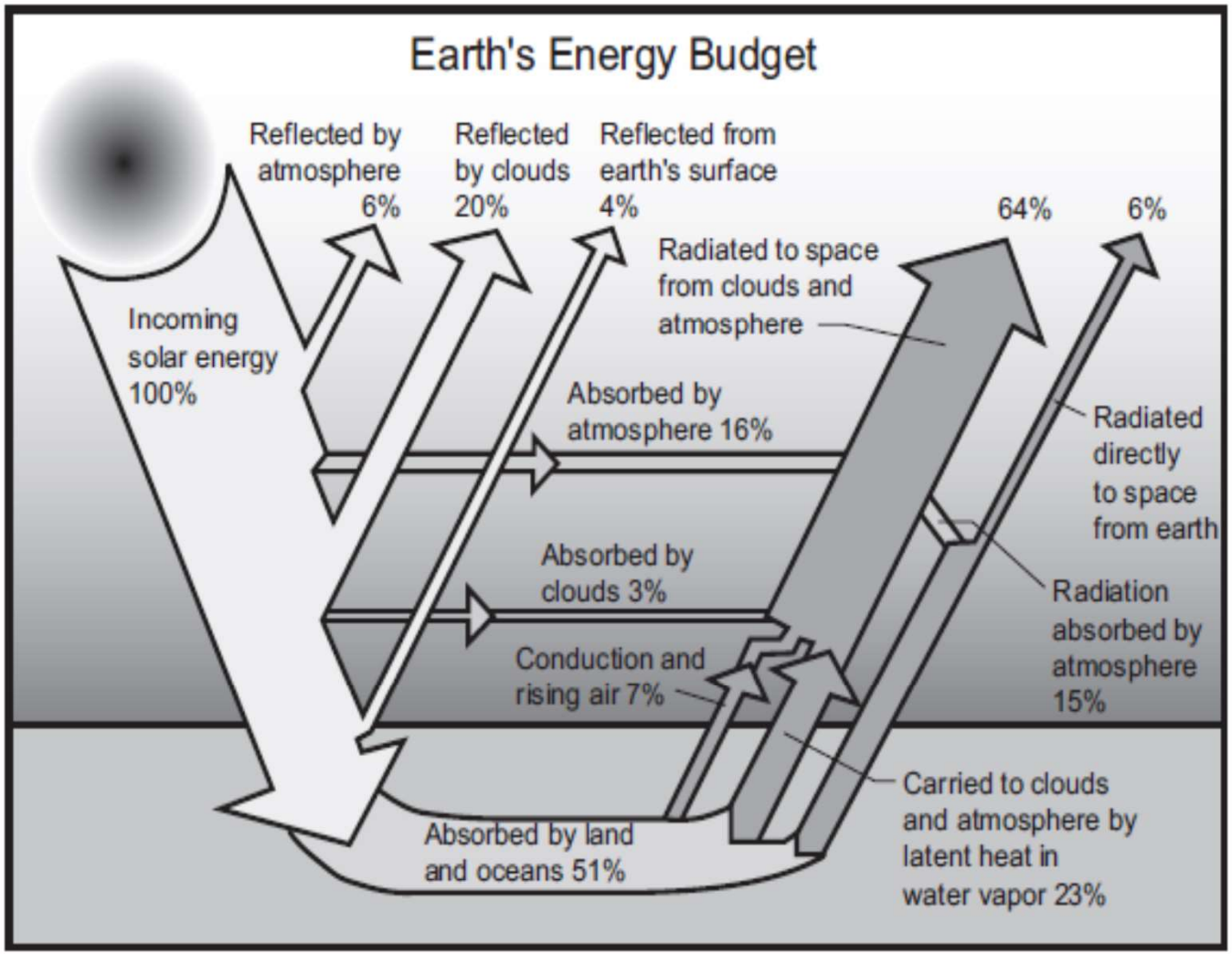
June-August



NOAA Climate.gov

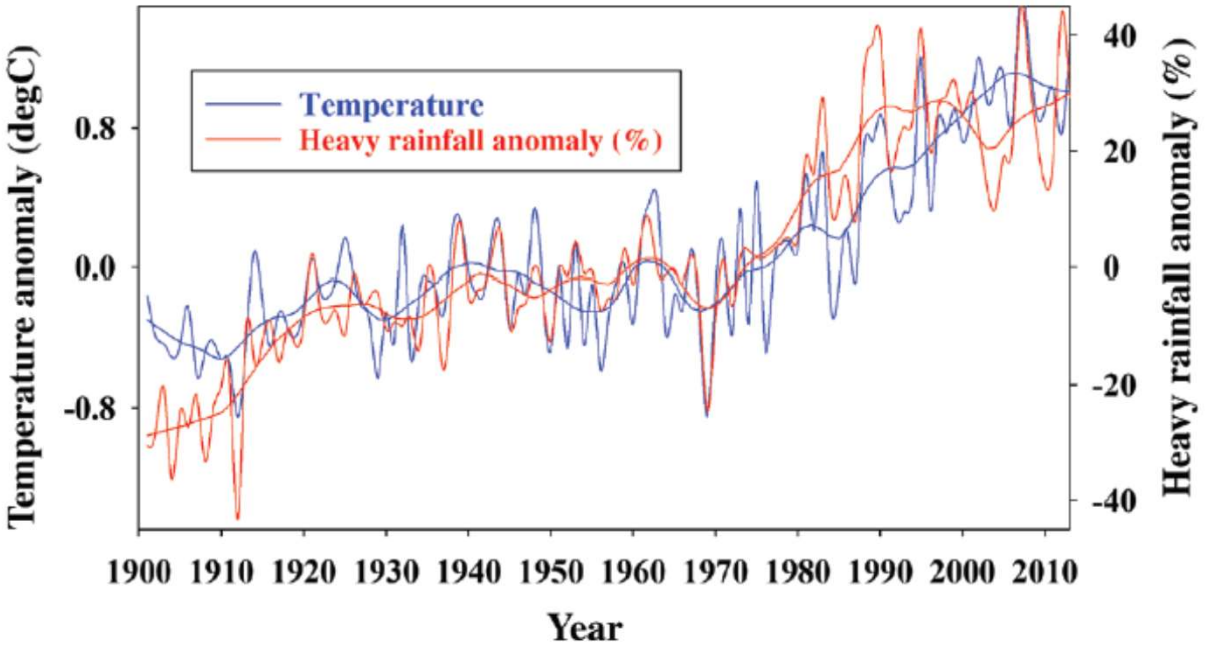
- El Niño and La Niña are opposite phases of a natural climate pattern across the tropical Pacific Ocean that swings back and forth every 3-7 years on average
- Together, they are called ENSO (pronounced “en-so”), which is short for **E**l **N**iño-**S**outhern **O**scillation
- El Niño (the warm phase) and La Niña (the cool phase) lead to significant differences from the average ocean temperatures, winds, surface pressure, and rainfall across parts of the tropical Pacific
- Climate Change is making El Niños more intense, leading to intensifying droughts, worsening floods, and shifting hurricane patterns
- Strong El Niños can cause severe drought in dry climates such as Australia and India, intense flooding in wetter climates such as the Pacific Northwest and Peru, and causes more hurricanes to form in the Pacific and fewer in the Atlantic

How the climate is changing?



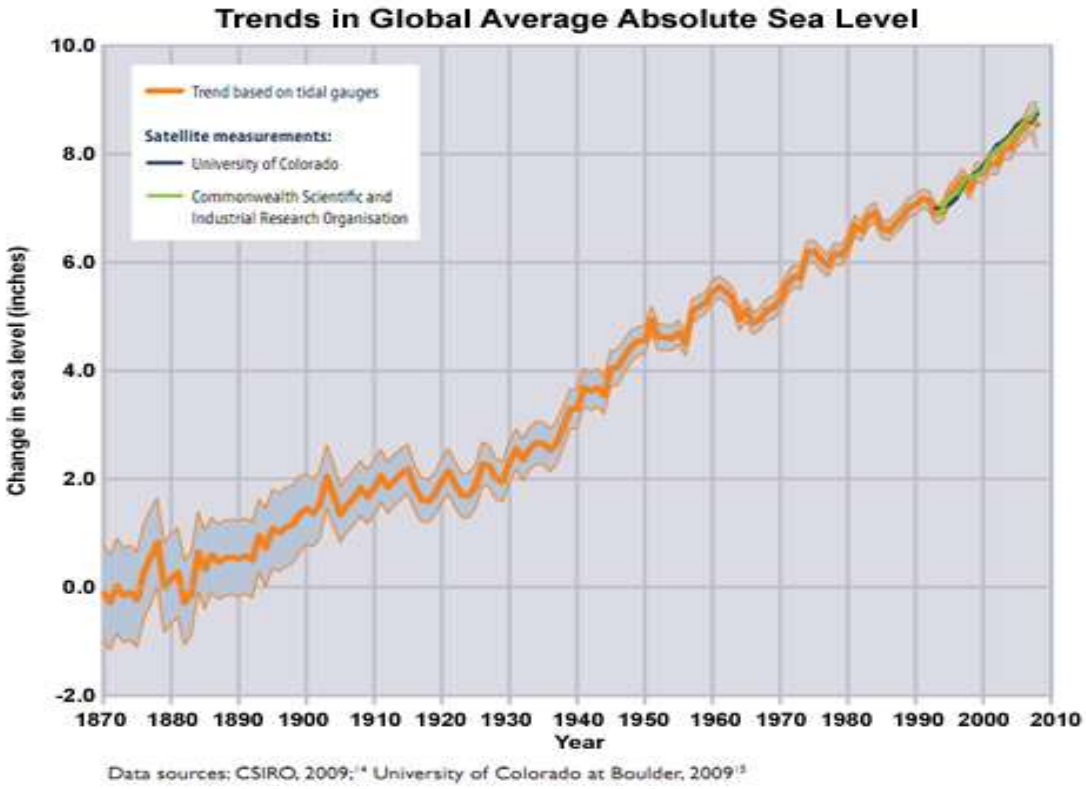
Atmosphere is responsible for radiating ~90% of total absorbed solar energy back to space!!

Climate Change: Is it real ?



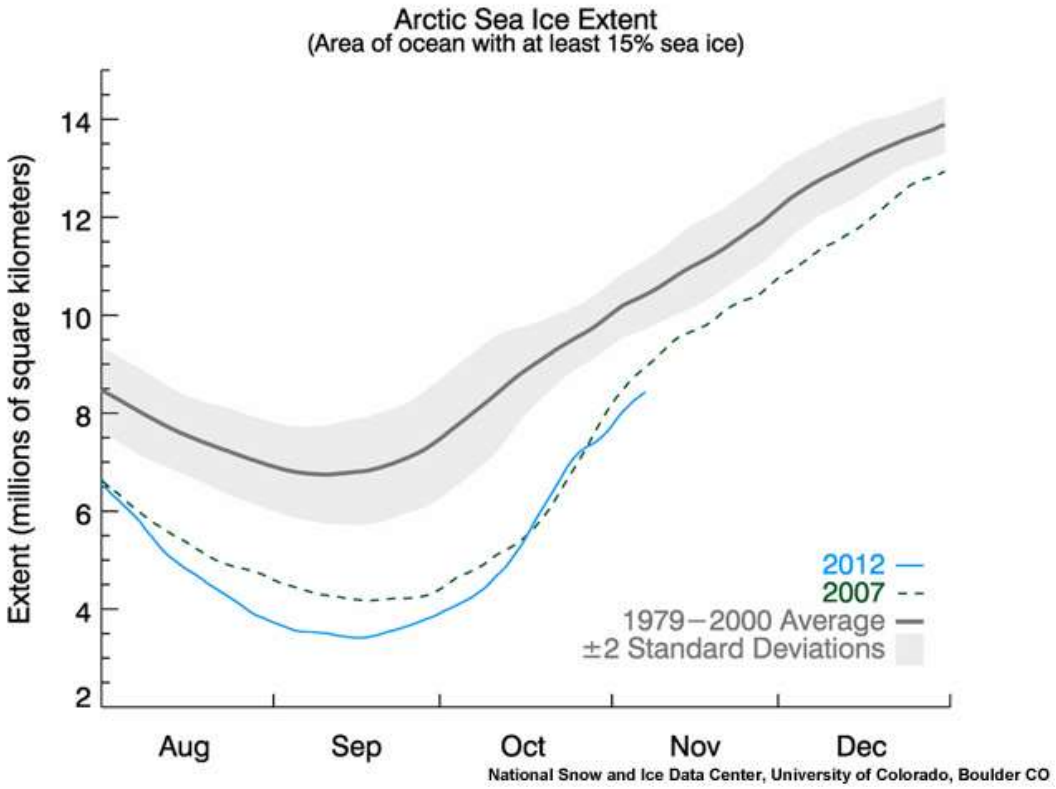
Earth is getting warmer and the temperature has been well above normal for more than 25 years.

Evidence of change: Oceans



The IPCC estimates that the oceans rose 4 to 10 inches (10-25 cm) in the 20th century from melting ice and snow and the physical expansion of warmer water.

Evidence of change: Sea Ice



Sea ice is diminishing in the Arctic. Satellites have observed winter Arctic sea ice shrink by about 3-4% per decade from 1979, and an even higher rate in summer.

Natural reasons for climate change