

Basics of Climate

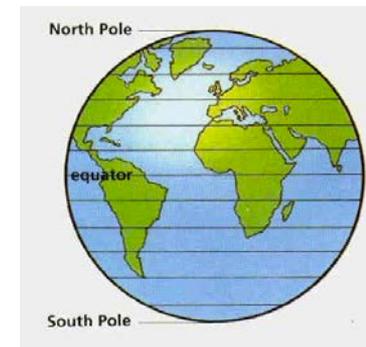
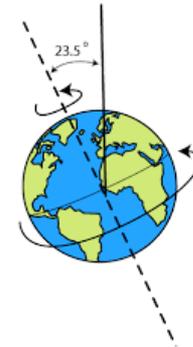
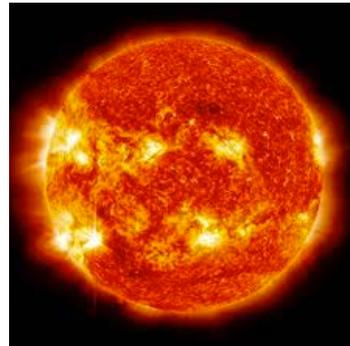
Beyond Intro



SOUTH CENTRAL
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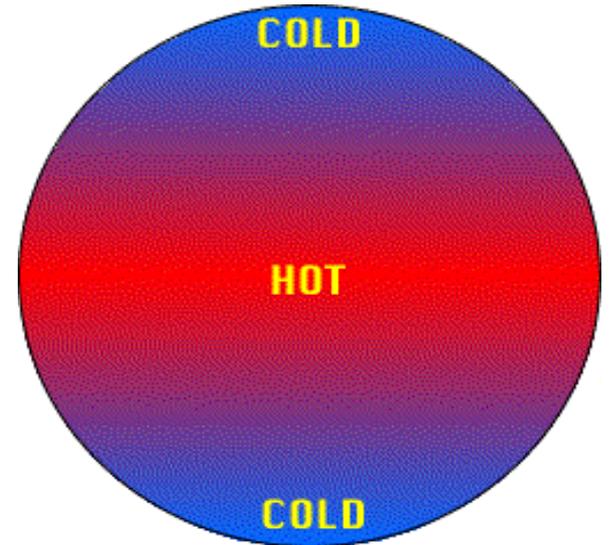
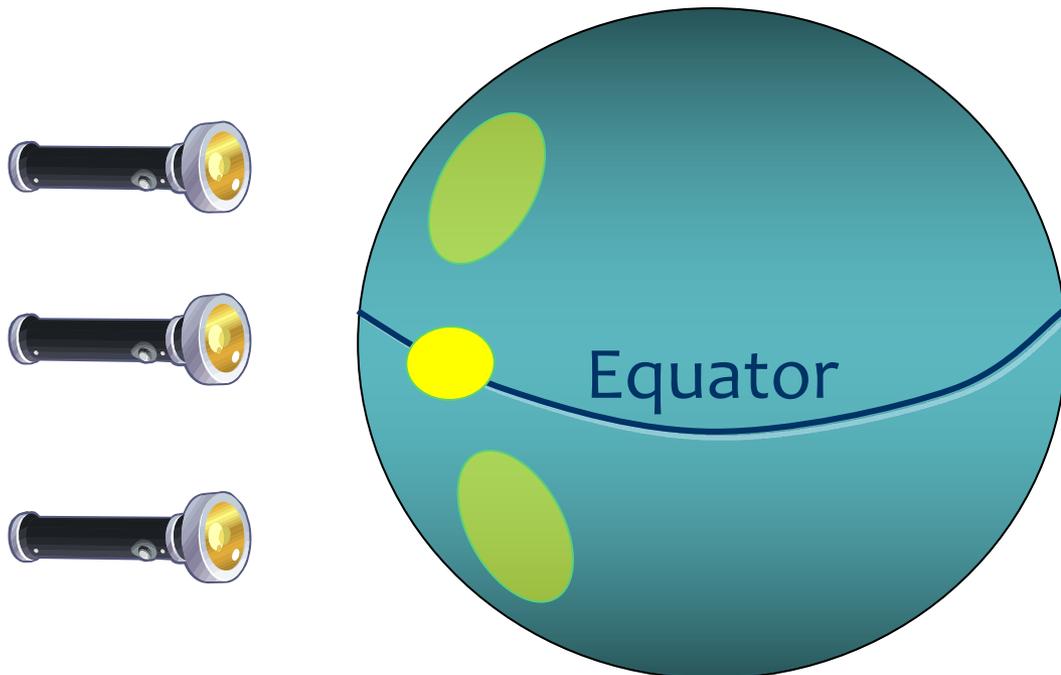
What Determines Climate?

- Variety of factors related to Earth's surface and atmosphere:
 - The Sun
 - Revolution and Tilt
 - Rotation and Circulation
 - Latitude
 - Altitude
 - Surface Type



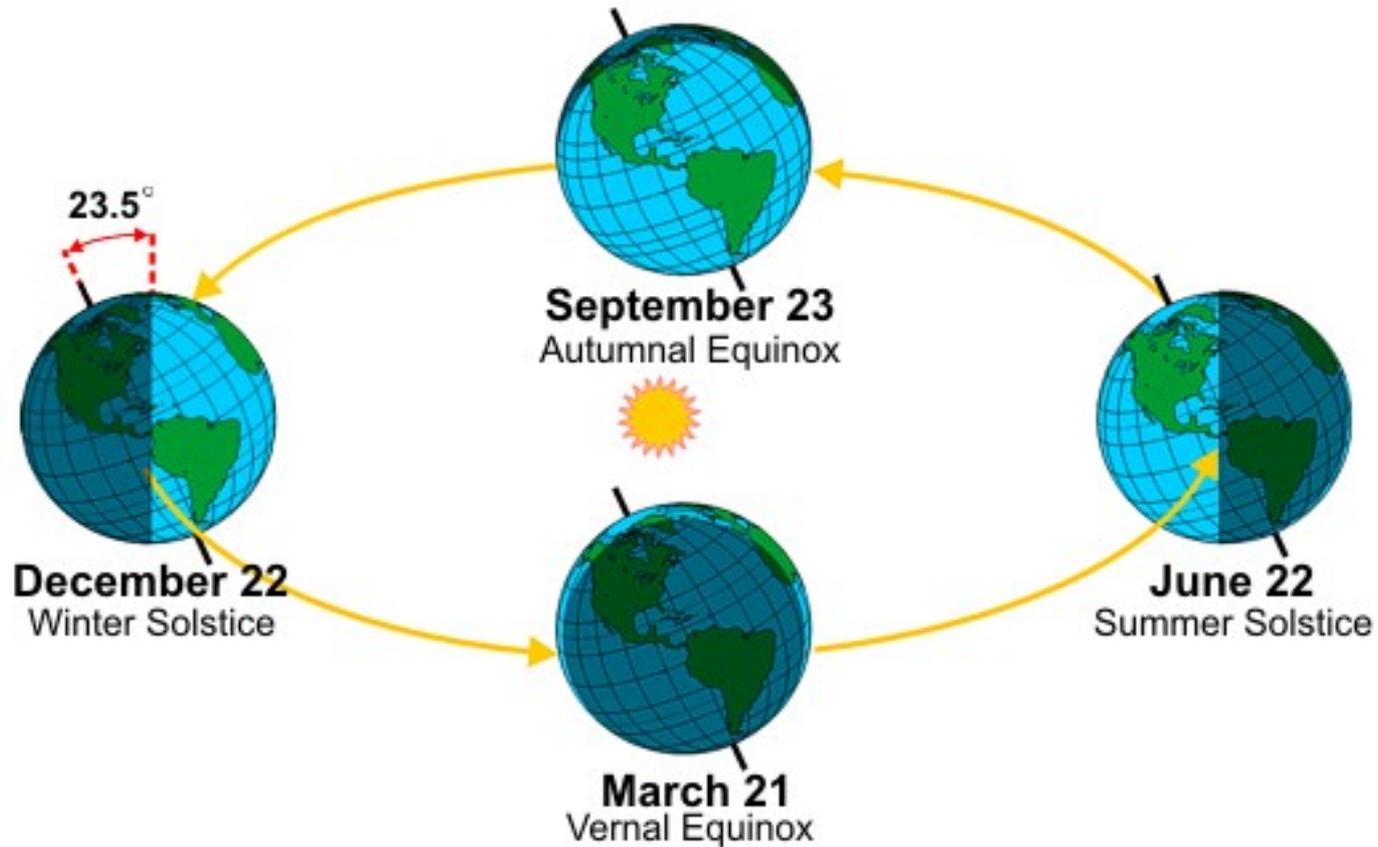
The Sun

The shape of the Earth causes solar radiation to hit it at different angles and intensities at different locations.



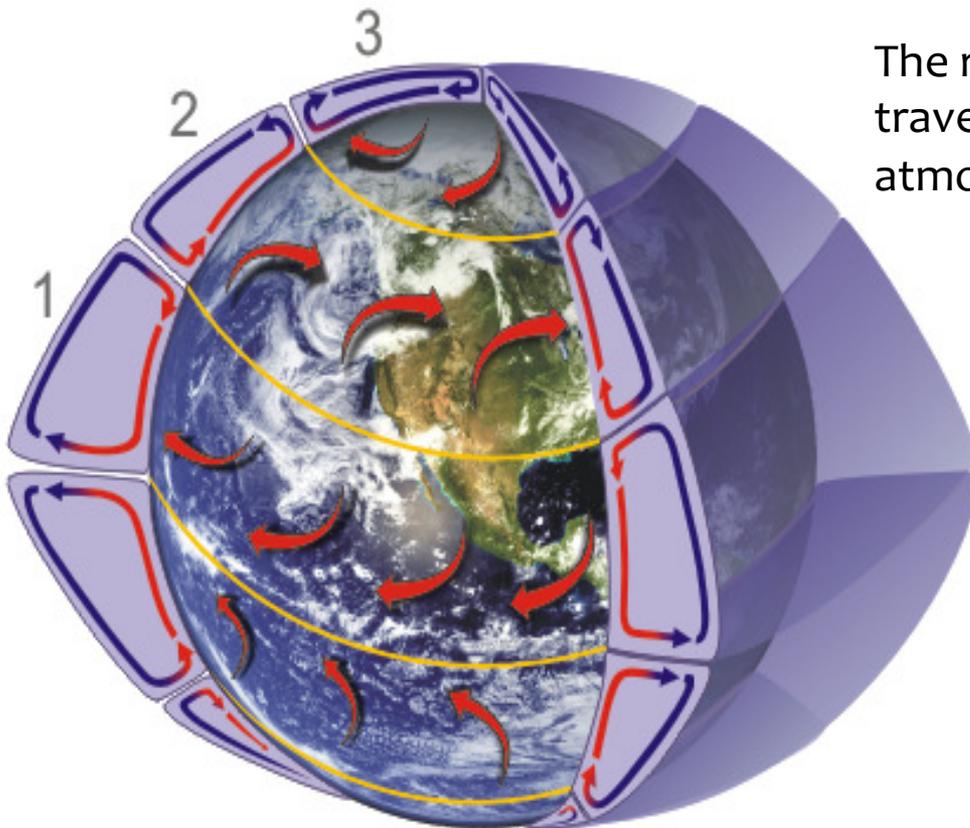
In general: the closer to the equator, the stronger the solar radiation, the greater the heat!

Revolution and Tilt



The reason we have seasons! Combination of tilt ($\sim 23.5^\circ$) and position around sun.

Rotation and Circulation



The rotation of the earth causes winds to travel in certain patterns through the atmosphere.

Three major circulation belts:

1 - Near equator to $\sim 30^\circ$ N/S latitude (Trade Winds/easterlies)

2 - From $\sim 30^\circ$ to $50-60^\circ$ (westerlies)

3 - Around the poles (N/S of $50-60^\circ$, polar easterlies)

Latitude

Variation in sunlight affects temperature at different latitudes

As mentioned earlier, climate at the equator = warmer, but it is also less variable!

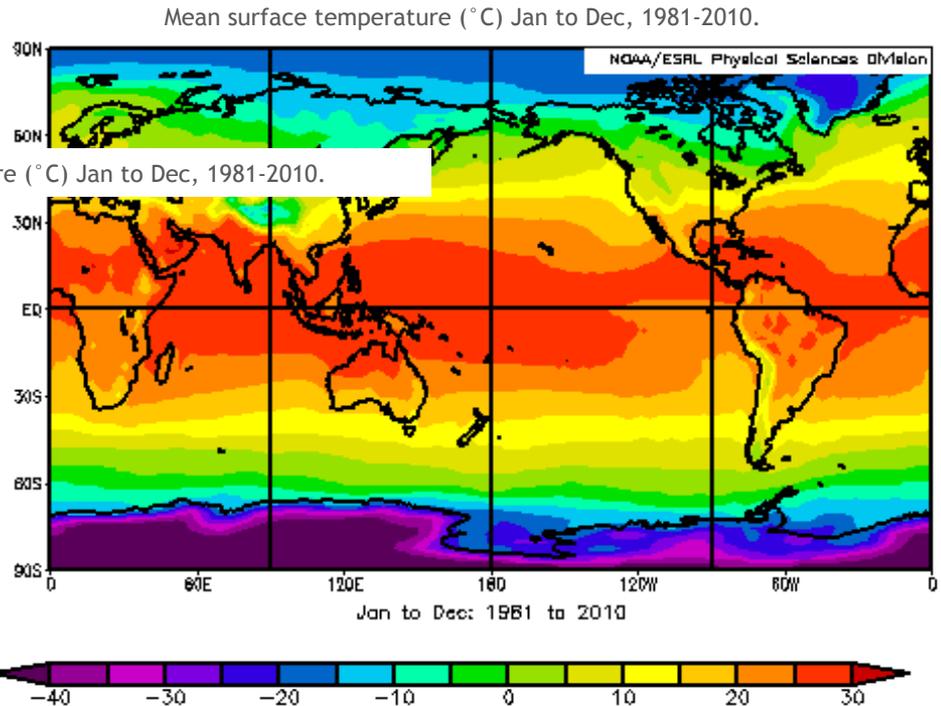
In general, the closer to the equator, the less temperature variability seen year-round.

Alaska average temperature:

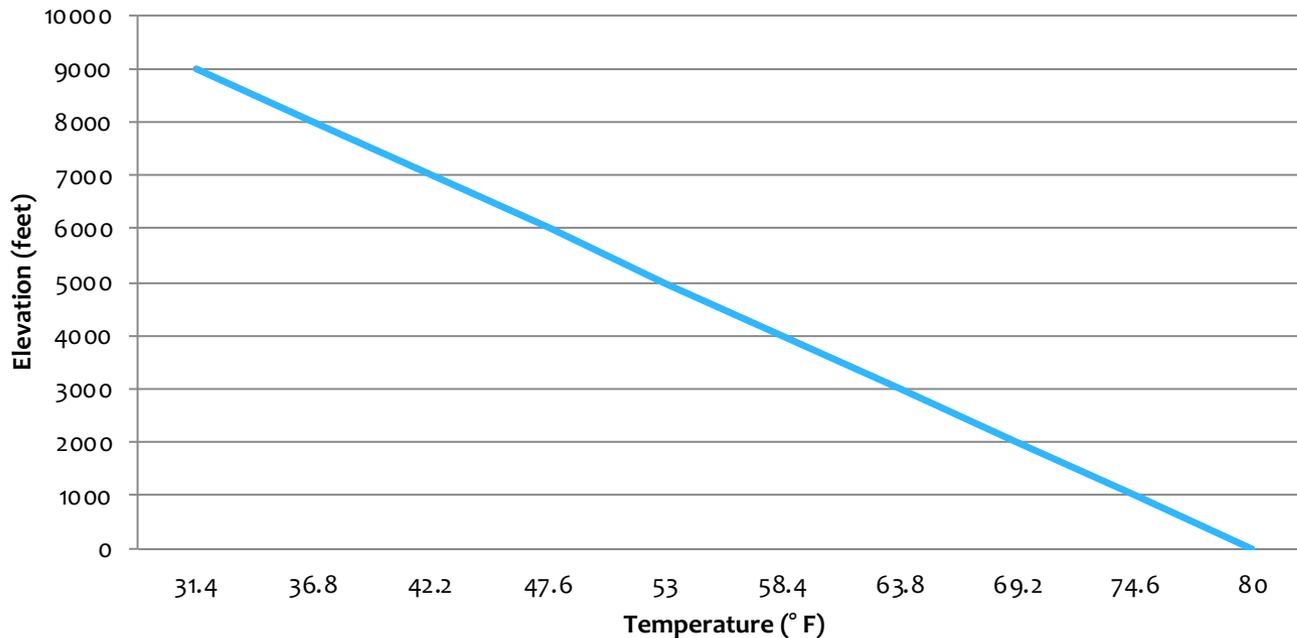
37° F, July: 52°, January: 17°

Louisiana average temperature:

68°F; July: 83°, January: 52°



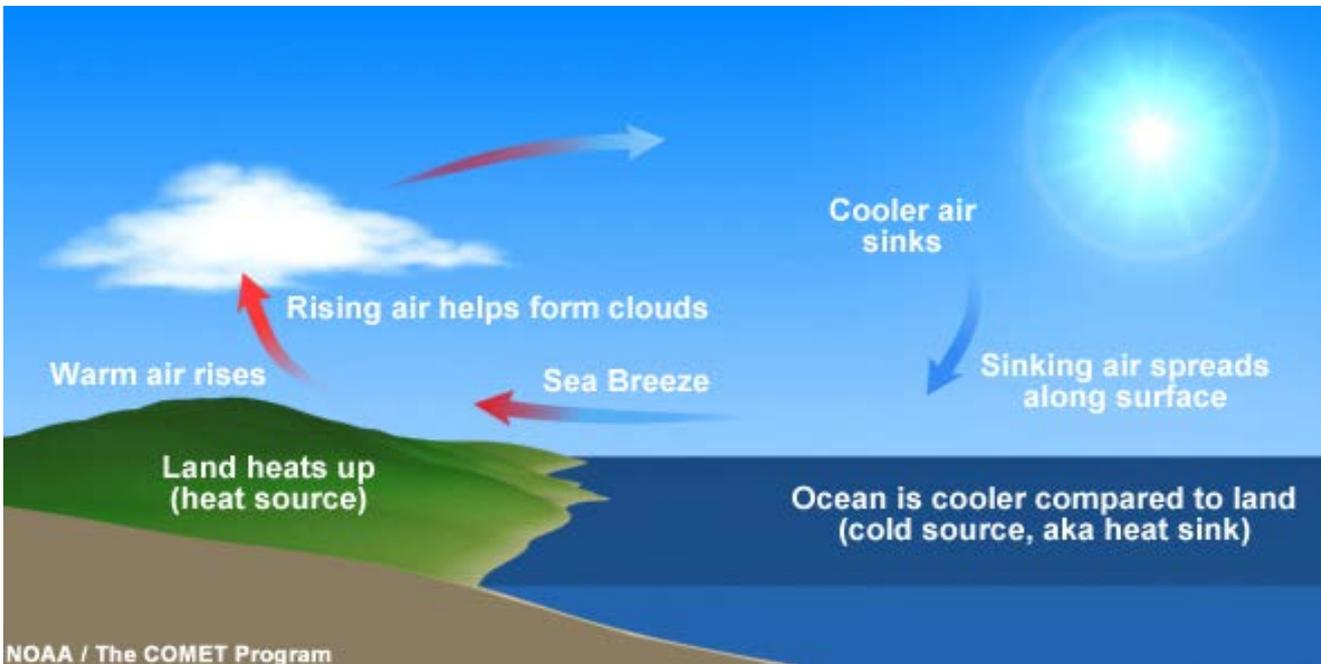
Altitude



In general, the higher the altitude of an area, the colder its average temperatures will be. It will also be drier.

Approximately 5.4° F colder per 1000 ft of elevation during summer, 3.3° during winter.

Surface Type



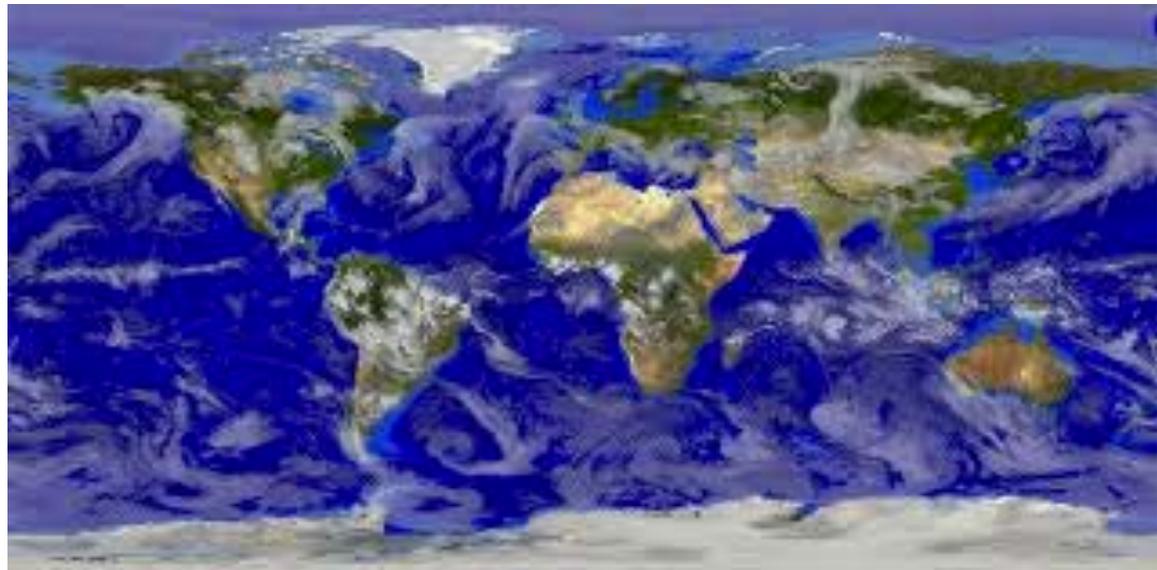
NOAA / The COMET Program

In general, land heats and cools faster than water.

The ocean helps moderate temperature over land along coastlines.

Weather Patterns

The combination of all of the previously mentioned inputs creates patterns, including jet streams, teleconnections, and convergence zones.



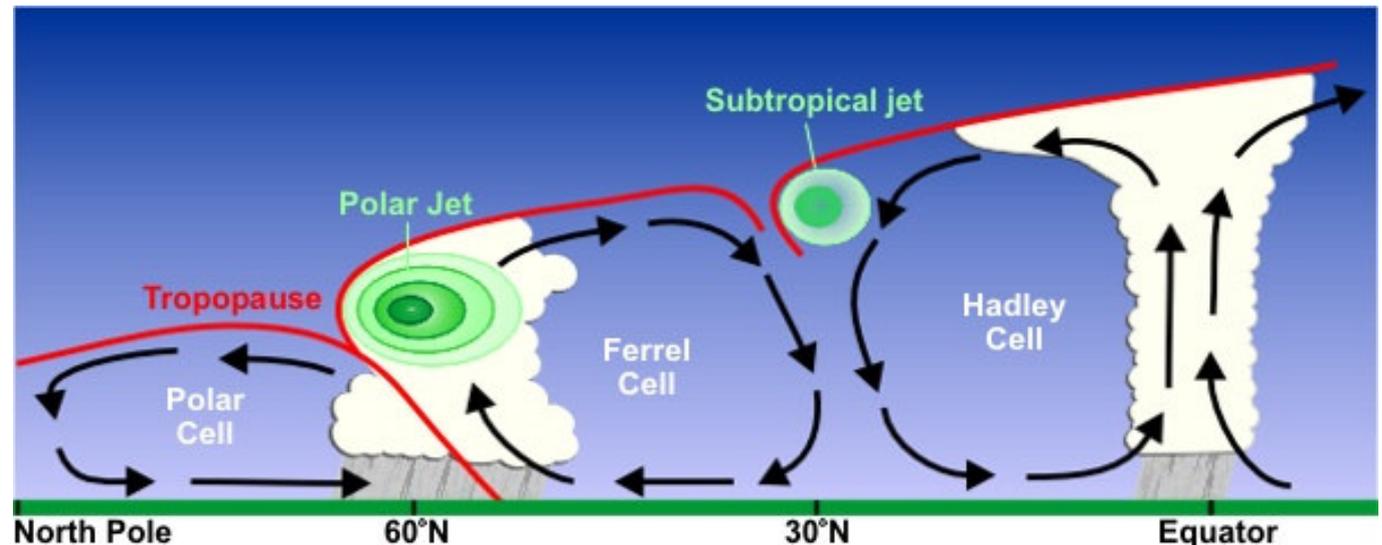
cimss.ssec.wisc.edu

Jet Streams

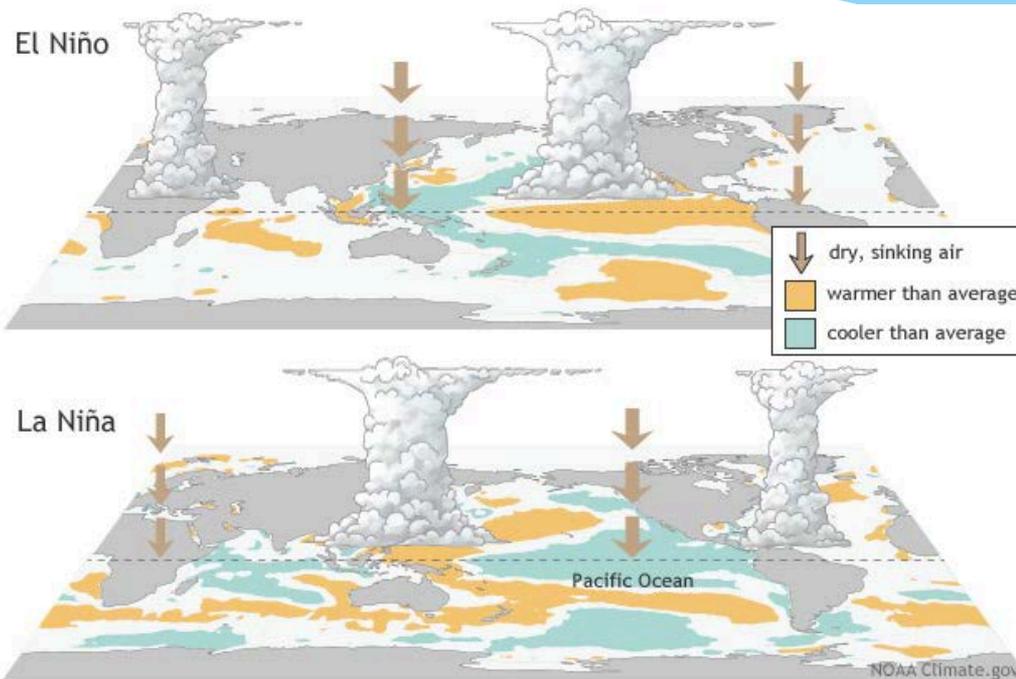
Narrow bands of wind in the upper atmosphere.

Generally blow east to west, but can shift north and south.

Follow temperature boundaries, in between circulation cells.



Teleconnections



During El Niño years, the Gulf coast tends to experience less hurricanes and more during La Niña years.

- Teleconnections are shifts in climate that influence places across great distances. Examples include:
 - El Niño – Southern Oscillation (ENSO)
 - Atlantic Multidecadal Oscillation (AMO)
 - Arctic Oscillation (AO)
 - Pacific Decadal Oscillation (PDO)
 - And others!

Convergence Zones

Convergence zones are places where different pressure gradients meet. They can be very localized, or cover the entire earth.

These pressure zones influence wind.

The most famous, and possibly largest, is the Intertropical Convergence Zone (ITCZ).

