Atmospheric Circulation Affects Climate

Tropical Hadley Cells

Subsolar point & intertropical convergence zone

For a given amount of air:

- Draw temperature vs. saturation vapor pressure.
- What is the saturation vapor pressure?
- What is the dew point temperature?
- What is the relative humidity?
The subsolar point moves

A moving subsolar point can affect climatic pattern in the tropics.

Which graph of monthly rainfall corresponds to Rio de Janeiro?

A  
B  
C  

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The ITCZ moves with the subsolar line. 
*But often lags behind – especially over the ocean*

Pacific slope of Panama during dry season
*January through April*

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**Thought Question**

If the angle between the orbital plane of the Earth around the Sun and the plane formed by the Earth’s equator were to decrease (currently it’s 23.5°), what effect would this have on the seasons in the N. Hemisphere?

If the angle were 0°, when would an equinox occur?
A. Air rises & cools (moist adiabatic cooling @ 6°C/km)
B. As air cools it reaches its saturation vapor density - then it rains.
Where might these mountains be found?

A) 40° N latitude
B) 10° N latitude
C) 45° S latitude
D) Both A & C

Orographic Effect in WV

Pickens
Randolph Co.
63"/yr

Morefield
Hardy Co.
25"/yr

Strausbaugh & Core 1970
Ocean Circulation Can Affect:

• Regional climate.

• The price of fish.

Large bodies of water heat up and cool down more slowly than land.
The Day After Tomorrow?

“The notion that a collapse of the thermohaline circulation may trigger a mini ice age is a myth.”

Wallace Broecker 2006

Effects of ocean currents on climate

El Nino (about every 3-5 years)
Normal

http://www.pmel.noaa.gov/toga-tao/el-nino/nino-home.html#
Economic Impacts Attributed to 1982-1983 El Nino

Severe El Nino in 1972

Estimated sustainable yield in 1972

Annual Catch (10^6 MT)

Peruvian Anchovy Fishery

Fishing starts in 1971

World leader in 1971

20% of world fishery
Low catch for ~ 20 years
Has improved but still sensitive