

Earth rotates, and has land and ocean!
What does it do to the air circulation?

ATMOSPHERIC CIRCULATION CELLS

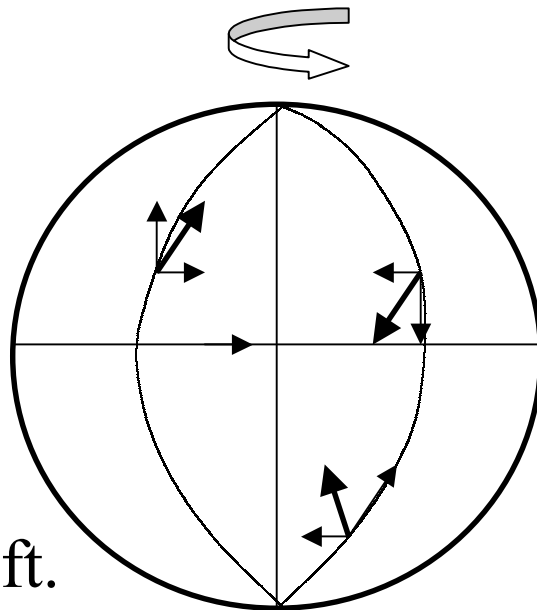
1. Global atmospheric circulation

Earth's rotation → deflection of the moving air

Coriolis effect

Northern hemisphere
the deflection is to
the right.

Southern hemisphere
the deflection is to the left.
(See Figures 8.8 & 8.9)



Due to the Coriolis effect there are:

- three sets of atmospheric convection cells (Hadley, Ferrel, Polar cells) from the Equator to the Poles
- six surface wind bands
 - Northeast trade winds (0-30°N)
 - Southeast trade winds (0-30°S)
 - Westerlies (30 - 60°N)
 - Westerlies (30 - 60°S)
 - Polar easterlies (60 - 90°N)
 - Polar easterlies (60 - 90°S)
- zones of vertical air motion (unsteady surface winds)
 - Doldrums (Equator)
 - Horse latitudes (30°N & 30°S)
 - Jet stream

(See Figure 8.12 to find all of them)

2. Local patterns of circulation

Ideal versus actual circulation

Land and Ocean Heat Capacity

Land – low heat capacity → rapid temperature changes as it gains or loses heat

Ocean – high heat capacity → large amounts of heat received or lost with very little change in temperature

Geographical vs. Meteorological Equator

(0 latitude)

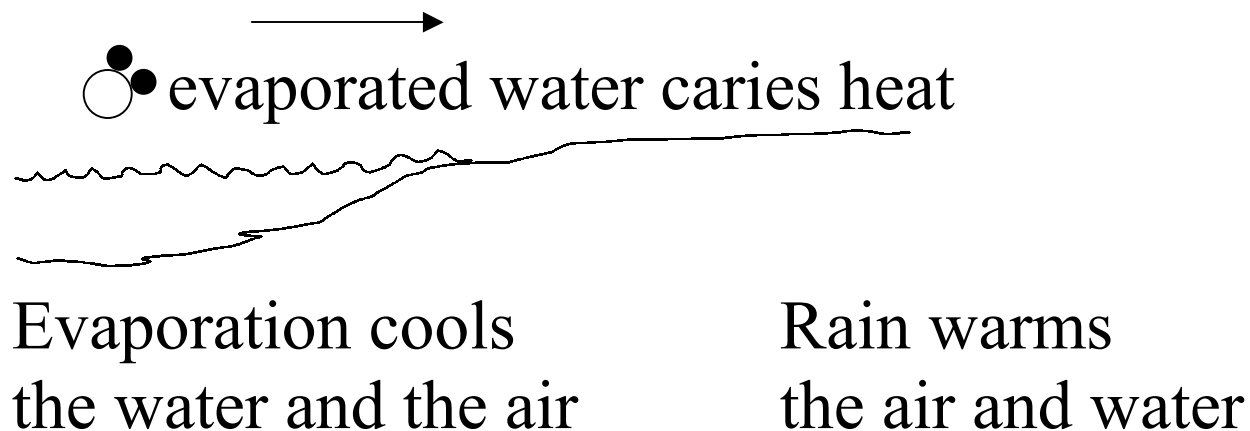
(5°N of geographic equator)

(Figure 8.13)

Morning and evening winds

(Figure 8.16)

Differences in HEAT at certain LOCATION at certain TIME.



Moving water and heat from ocean to land

How much does it rain in Ohio?

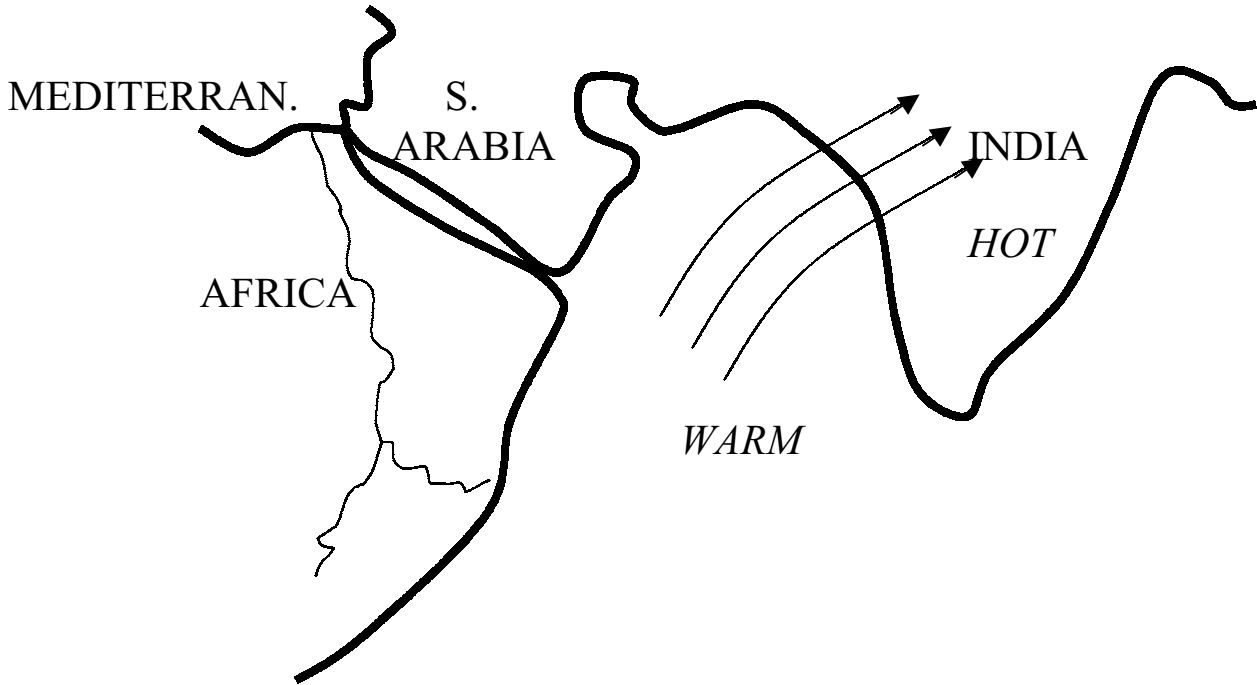
35-40" per year

India, 1042" per year (366" in a month)

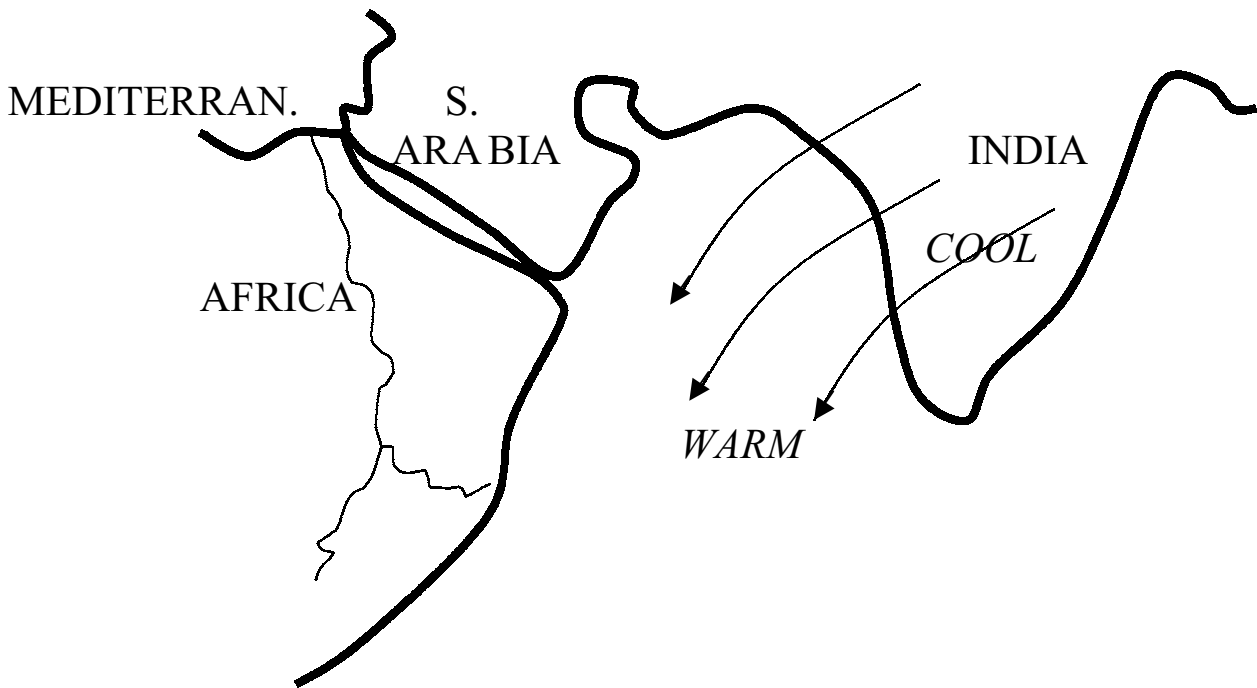
Bagdad, 0" in three years

Extremes in the rain fall. Why?

Summer monsoon WET



Winter monsoon DRY

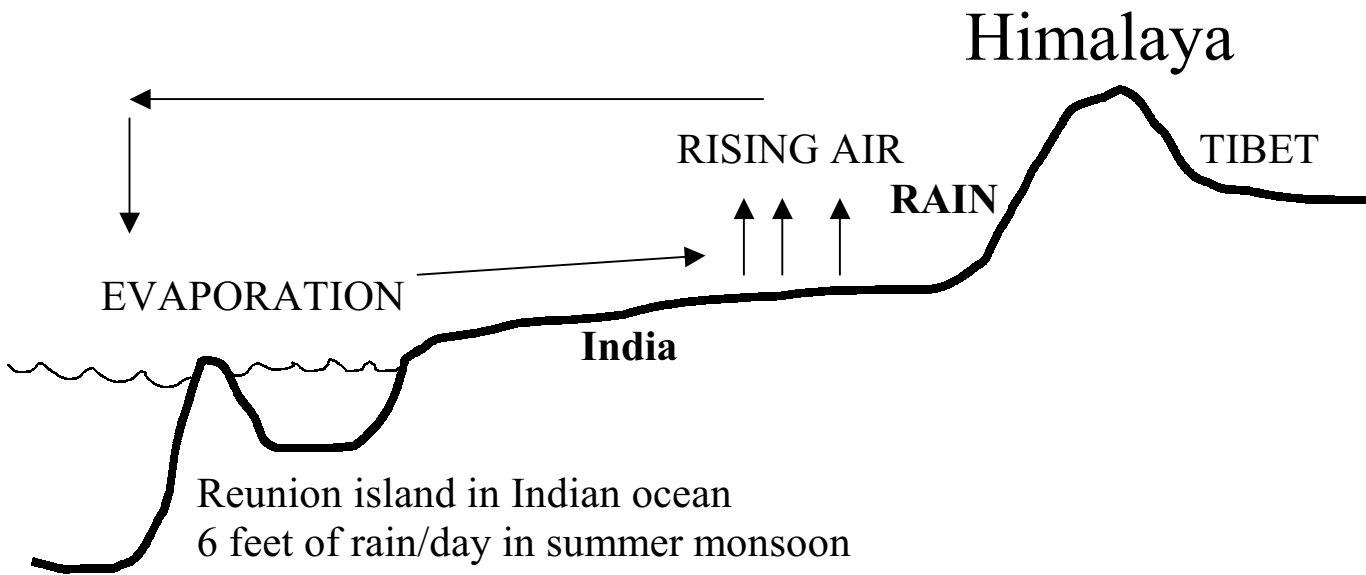


Why does monsoon sometimes fail?

Orographic effect

Olympic rain forest 200"/year

Over the mountain (leeward side) 20"/year



Heavy rain by U.S. standards: 1/3" per hour
India : 3" per hour