Earth's Climate

1. Global Air Circulation Revisited
    a. Convection Cells and Surface Winds
    b. Global Circulation if Earth did not rotate
        i. Rotation creates complexity
        ii. Coriolis Effect
    c. Convection cells
        i. Hadley cell - Low latitude air movement toward the equator that with heating, rises vertically, with poleward movement in the upper atmosphere. This forms a convection cell that dominates tropical and sub-tropical climates.
        ii. Ferrel cell - A mid-latitude mean atmospheric circulation cell for weather named by Ferrel in the 19th century. In this cell the air flows poleward and eastward near the surface and equatorward and westward at higher levels.
        iii. Polar cell - Air rises, diverges, and travels toward the poles. Once over the poles, the air sinks, forming the polar highs. At the surface air diverges outward from the polar highs. Surface winds in the polar cell are easterly (polar easterlies).
    d. Surface Winds
        i. Trade winds – low latitude wind that blow from east to west
        ii. Westerlies – mid latitude winds that blow from west to east
    e. Jet Stream
        i. Narrow bands of strong wind in the upper levels of the atmosphere.
        ii. Blow from west to east, placement shifts to the north and south.
        iii. Follow the boundaries between hot and cold air.
2. Climatic Regions
    a. Köppen-Geiger Classification
    b. Division based upon temperature precipitation (average monthly and total annual)

Letter	Name	Description
A	Tropical	Wet, hot; extends north and south from the equator to about 15° to 25° latitude. Average temperatures (T) > 64°F (18°C), monthly precipitation (ppt) > 2.4", & and annual ppt > 59".
B	Dry	Evaporation and transpiration exceed precipitation (DRY). Extend from 20°-35° North and South of the equator. Annual ppt < 29"
C	Warm Temperate	Warm and humid summers with mild winters. Extent is from 30°-50° of latitude mainly on the eastern and western borders of most continents. Average summer T > 50°F (18°C), and average cold month 32 °F< T < 64°F.

D	Cool Temperate	Moist continental mid-latitude climates have warm to cool summers and cold winters. Located poleward of the C climates. Average T of the warmest month > 50°F (10°C), while the coldest month < -22°F (-30°C). Winters are severe with snowstorms, strong winds, and bitter cold from Continental Polar or Arctic air masses.
E	Polar	Year-round cold T, with the warmest month < 50°F (10°C). Polar climates are found on the northern coastal areas of North America, Europe, Asia, and on the landmasses of Greenland and Antarctica.
H	Highland	Unique climates based on their elevation. Highland climates occur in mountainous terrain where rapid elevation changes cause rapid climatic changes over short distances.