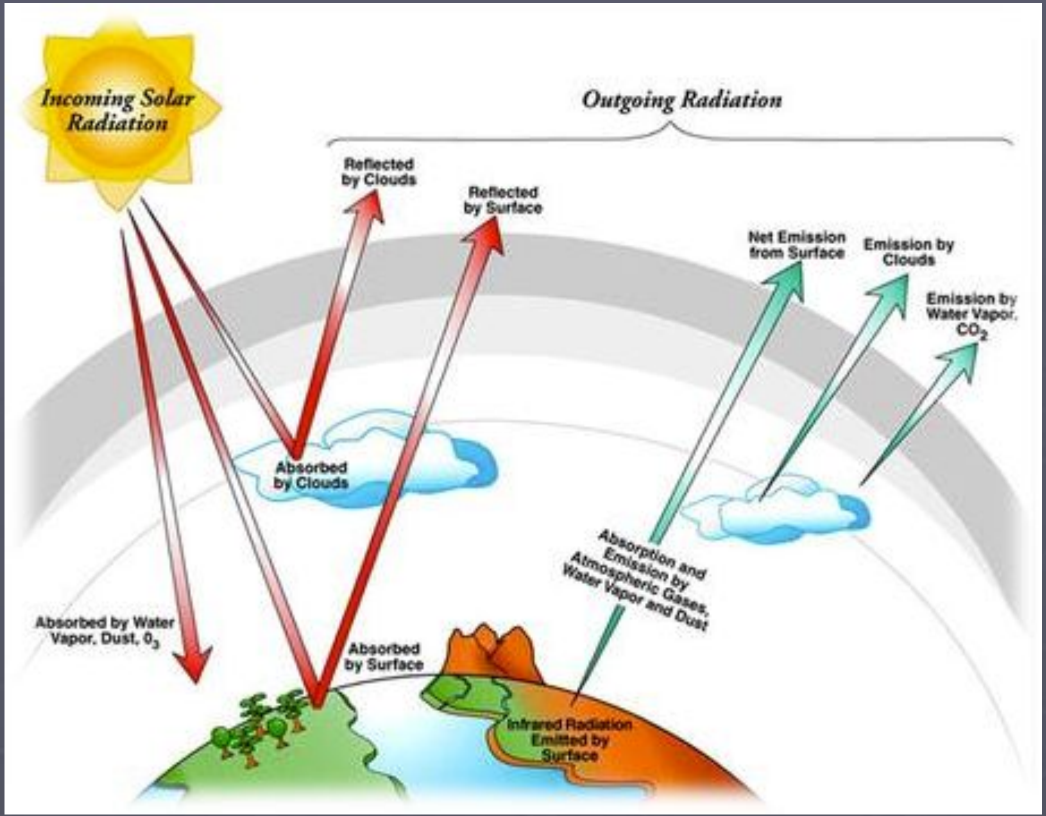
Solar Insolation

Solar Factors the Affect Seasonal Climatic Variations

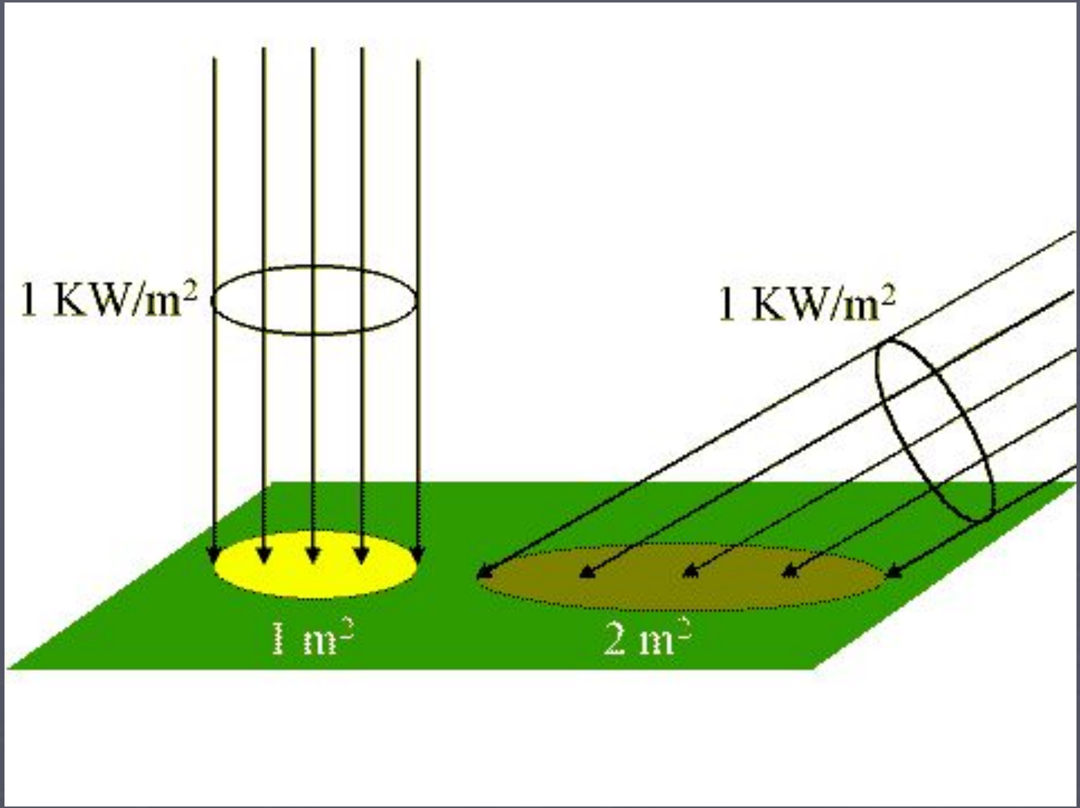
Insolation

- *INcoming SOLar radiATION*
- Insolation refers to the amount of solar radiation that the Earth's atmosphere and surface receives



Effect of Direct vs. Indirect Sunlight

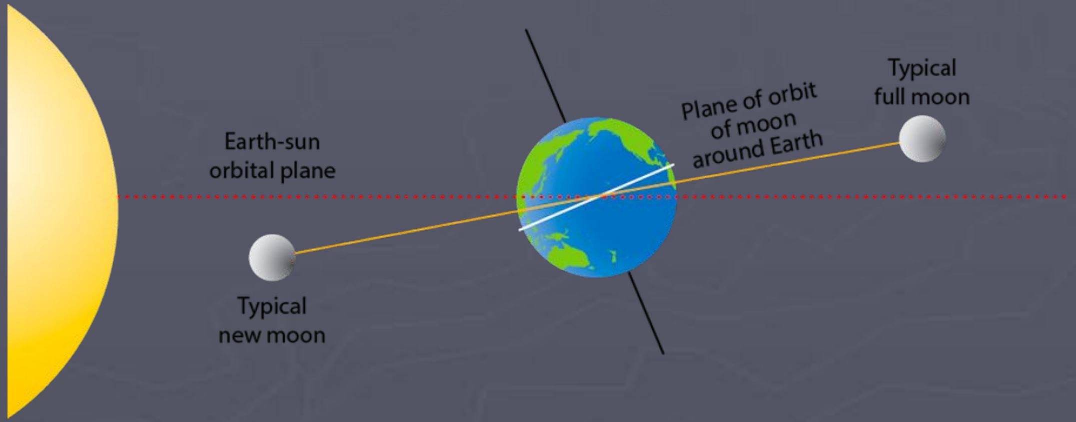
- Angle that sun's energy hits the earth's surface affects the amount of available energy
  - The more direct the sunlight the more energy there is available



Sun's Direct and Indirect light at Equinox and Solstice

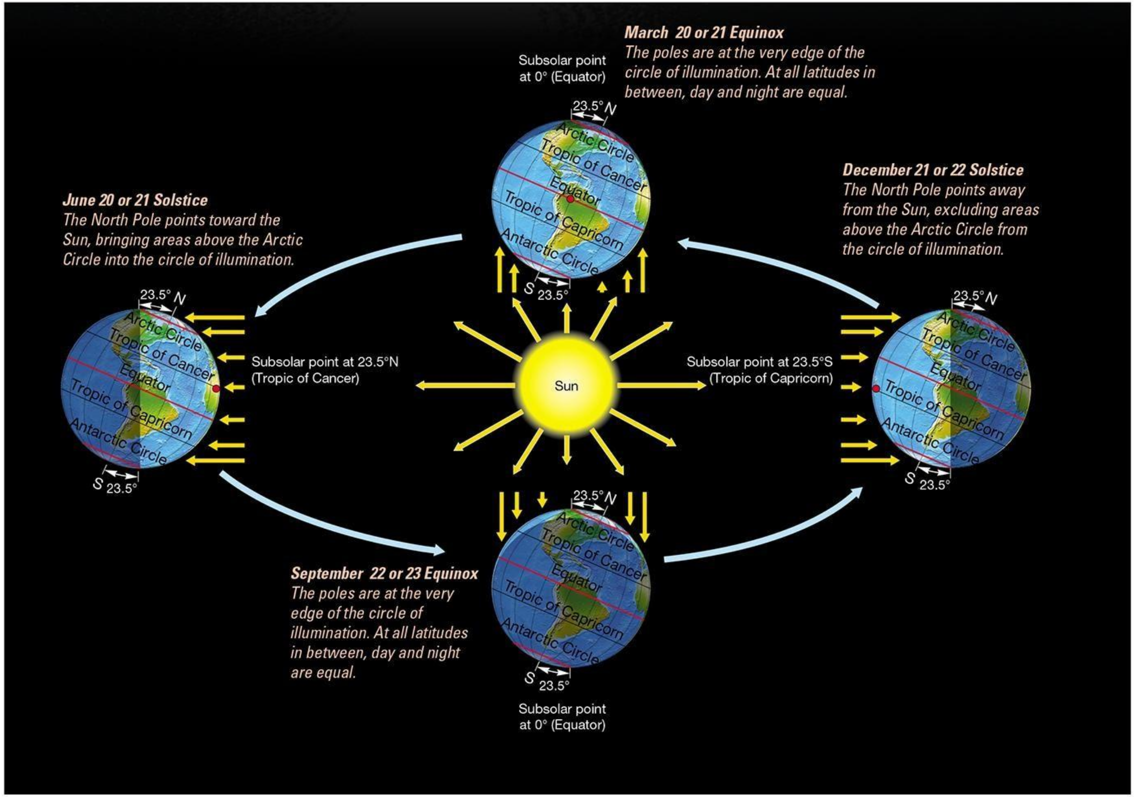
Plane of Orbit and tilt

- Earth spins on its axis which is about 23.45 degrees in relation to the orbital plane around the sun
    - Moon rotates around the Earth about 5 degrees of the Earth's Equatorial plane



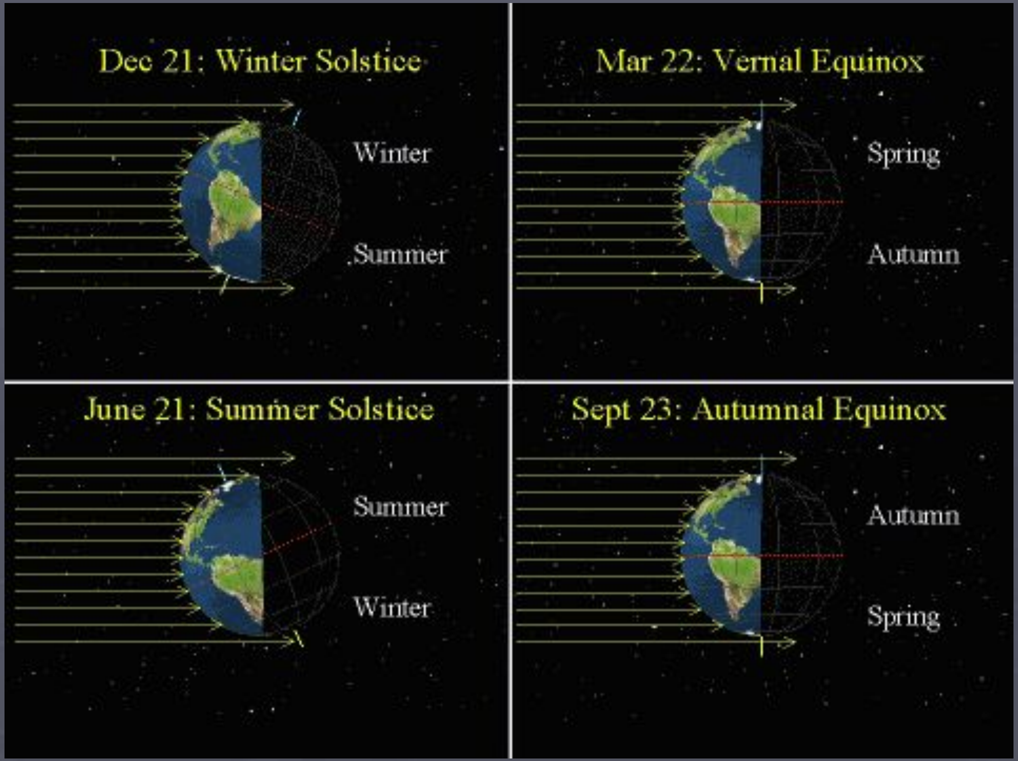
Seasonal Variations in Insolation

Seasonality: the changes in the Sun's position above the horizon and day lengths during the year



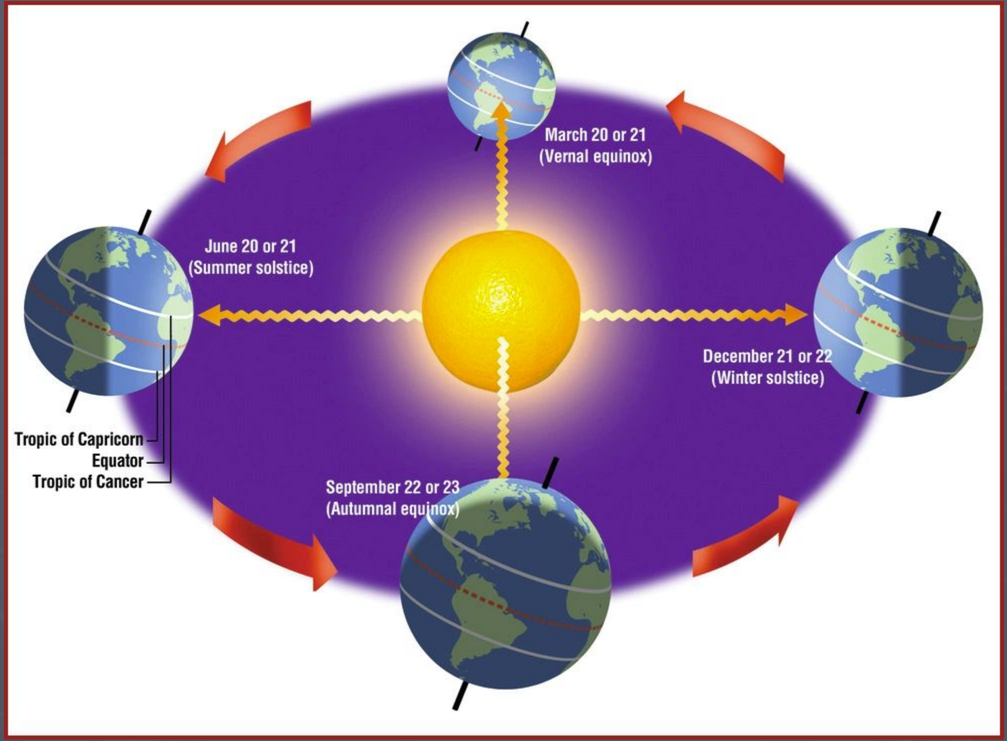
Seasonal Changes

- Seasonal Variations due to tilt of the Earth
  - NOT distance from the sun
- Seasonal variations dependent upon amount of sunlight



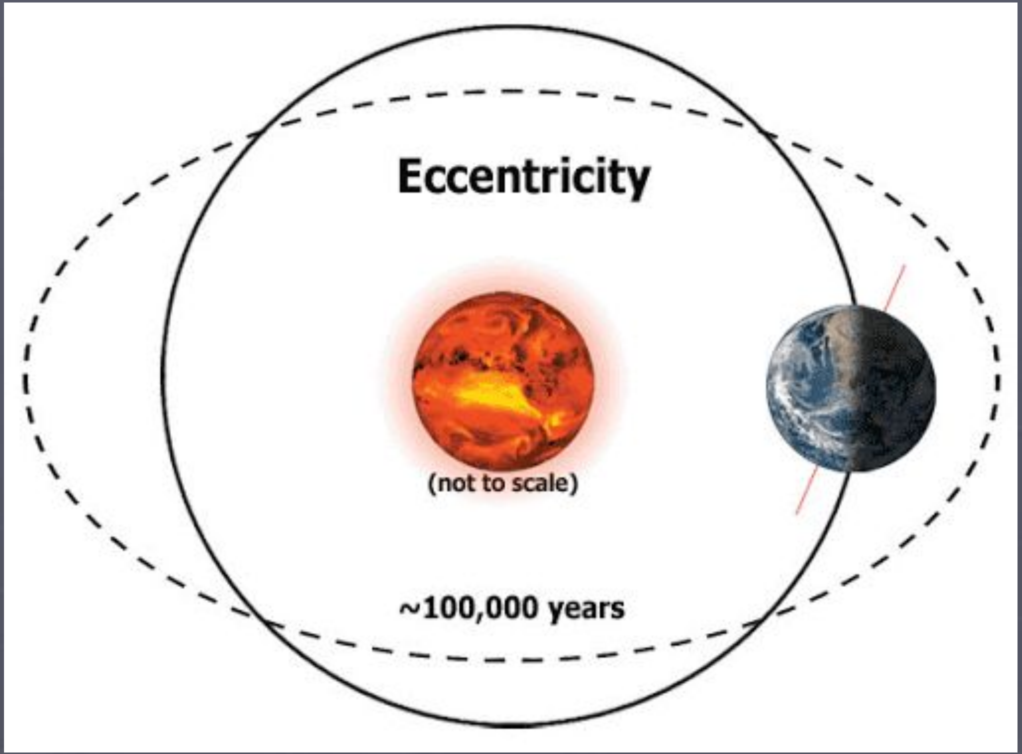
The Solstices and Equinoxes

- Winter Solstice (Roughly December 21)
  - Maximum southern declination
- Summer Solstice (Roughly June 21)
  - Maximum northern declination
- Equinoxes (Roughly March 21 for Vernal and September 21 for Autumnal)
  - Sun on the Celestial Equator



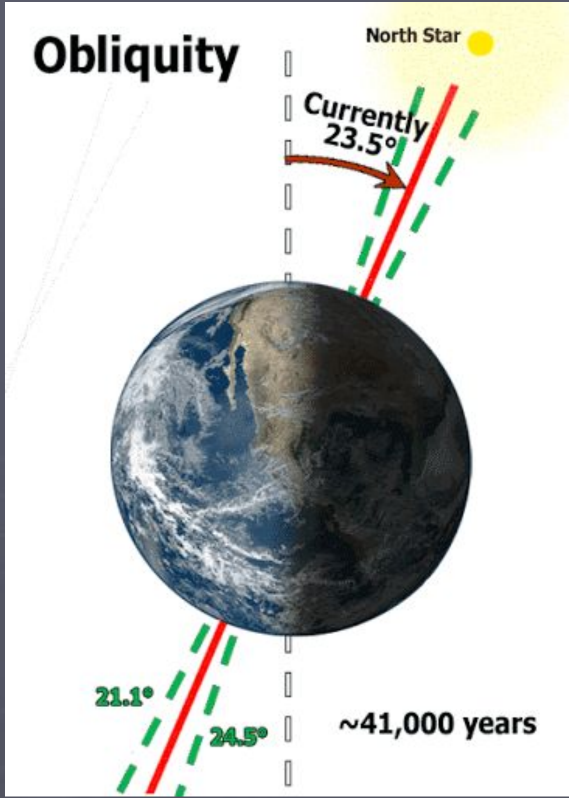
Milankovitch Cycles - Eccentricity

- Changes in Earth’s orbit leading to veritably in amount of energy



Milankovitch Cycles - Obliquity

- Minor changes in the tilt resulting in variation at the poles



Milankovitch Cycles - Precession

- Changes in the orientation of the tilt because of the Earth's wobble due to equatorial bulge