Factors that Influence Temperature

Factors that Influence Climate

• Unequal heating of Earth’s surface by the Sun.
  • Angle of insolation, albedo, proximity to water.
• Atmospheric Convection Currents
• Rain Shadow Effect

Shape of the Earth

The light is more intense when it hits the Earth’s surface at higher angle.

Earth’s Tilt and Orbit Around the Sun

• There are three ingredients that create the seasons on Earth.
  – Earth revolves around the sun.
  – Earth’s axis is tilted.
  – Earth’s axis always points in the same direction.

• Because of this, the angle of insolation changes in a given location, which changes the:
  – Intensity of the insolation.
  – Temperature of the area.
Other Factors To Consider...

• Elevation
  – Because we live in the troposphere, the temperature decrease with altitude.
  – Mountain tops are cooler than sea level.

• Proximity To Water
  – Because water heats up and cools down slowly, coastal areas have a more steady climate.
  – Warmer winters and cooler summers than inland areas.

Other Factors To Consider...

• Albedo
  – Some areas reflect the sun’s light better than others.
    • Use albedo to quantify how well it reflects.

Changes In Albedo

• The concern with global warming is the melting of the polar ice caps, glaciers, and sea ice.
Urban Heat Island Effect

- The increase in temperature of a man-made area in comparison to the area’s natural landscape.
  - The annual mean air temperature of a city with 1 million people or more can be 1-3°C warmer than its surroundings.
  - In the evening the difference can be as high as 12°C.
    - More pronounced at night because of the slow release of heat from urban infrastructure.

Consequences

- Increased urban temperatures leads to...
  - Increased energy demands
  - Elevated Air Pollution Emissions
  - Elevated Greenhouse Gas Emissions
  - Compromised human health and comfort
  - Impaired Water Quality

Solutions

- Change the albedo by...
  - Cool paving materials
  - Increasing tree and vegetative cover
  - Installing cool - mainly reflective - roofs
  - Creating green roofs