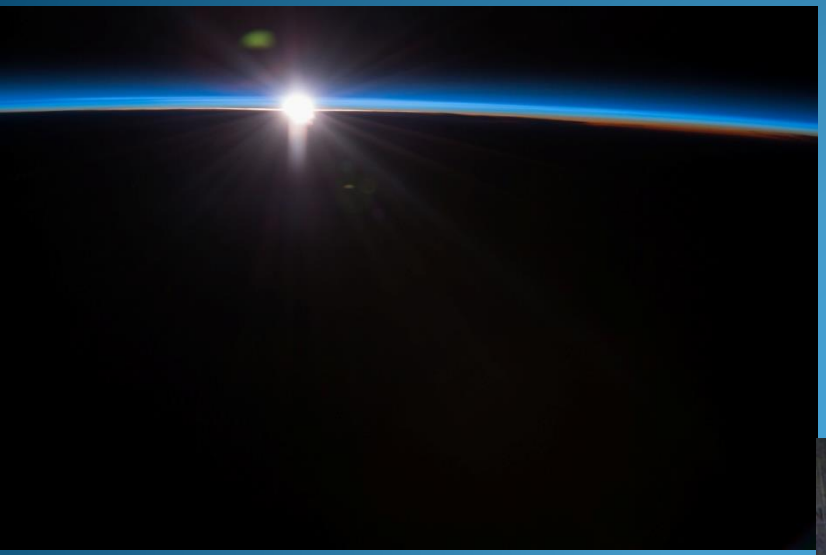
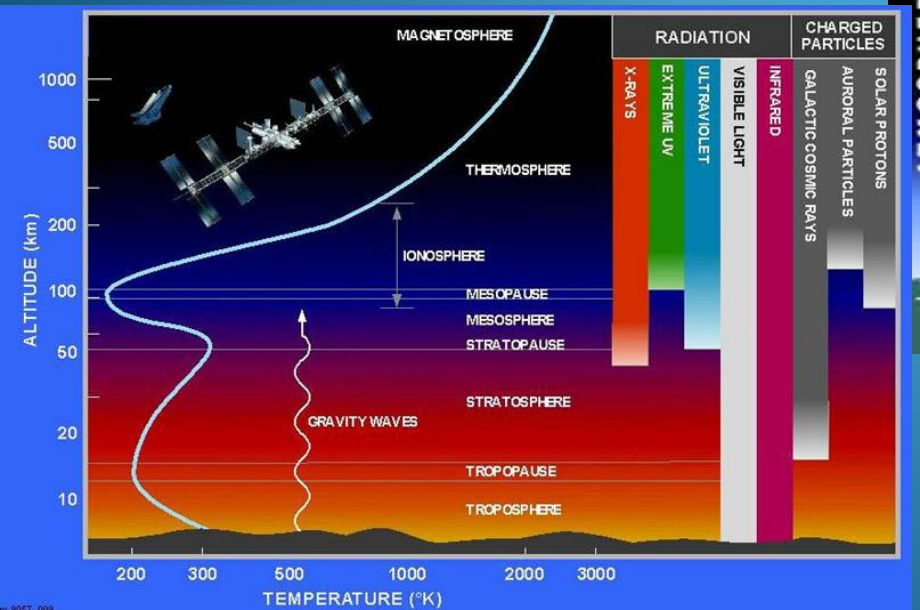
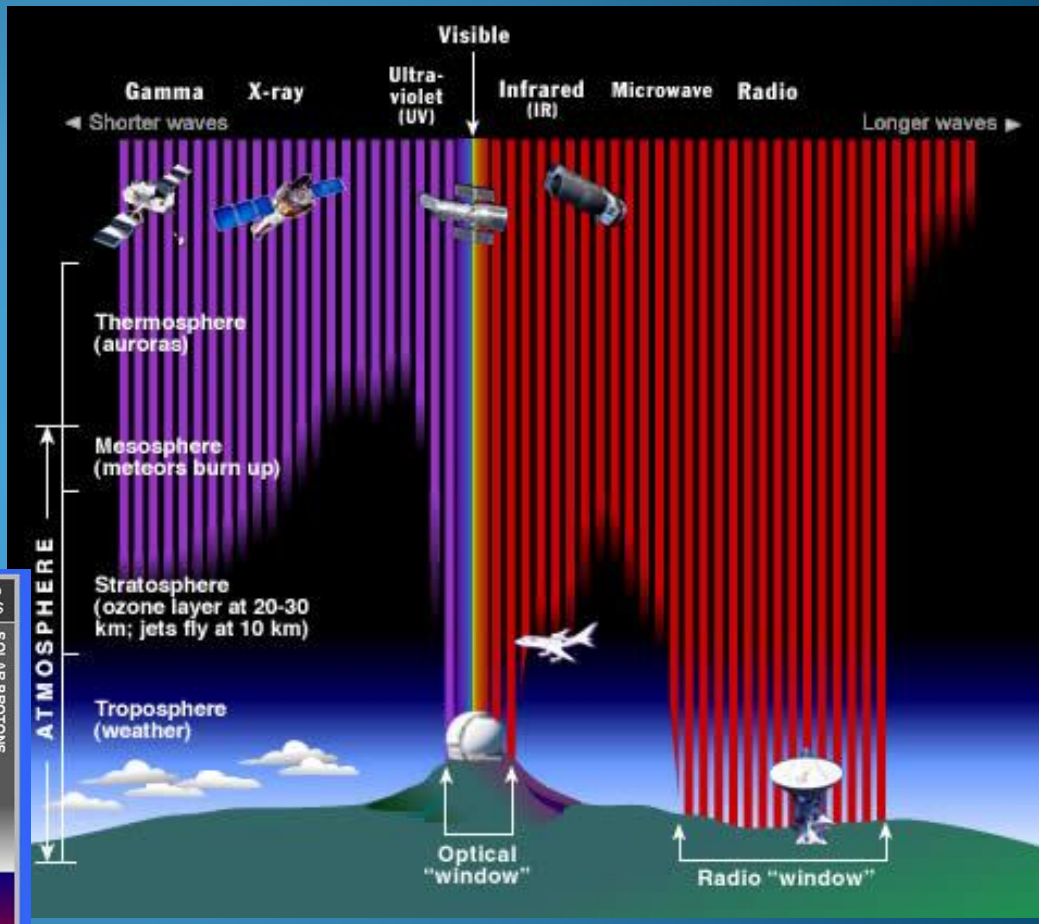
Solar Radiation and the Atmosphere



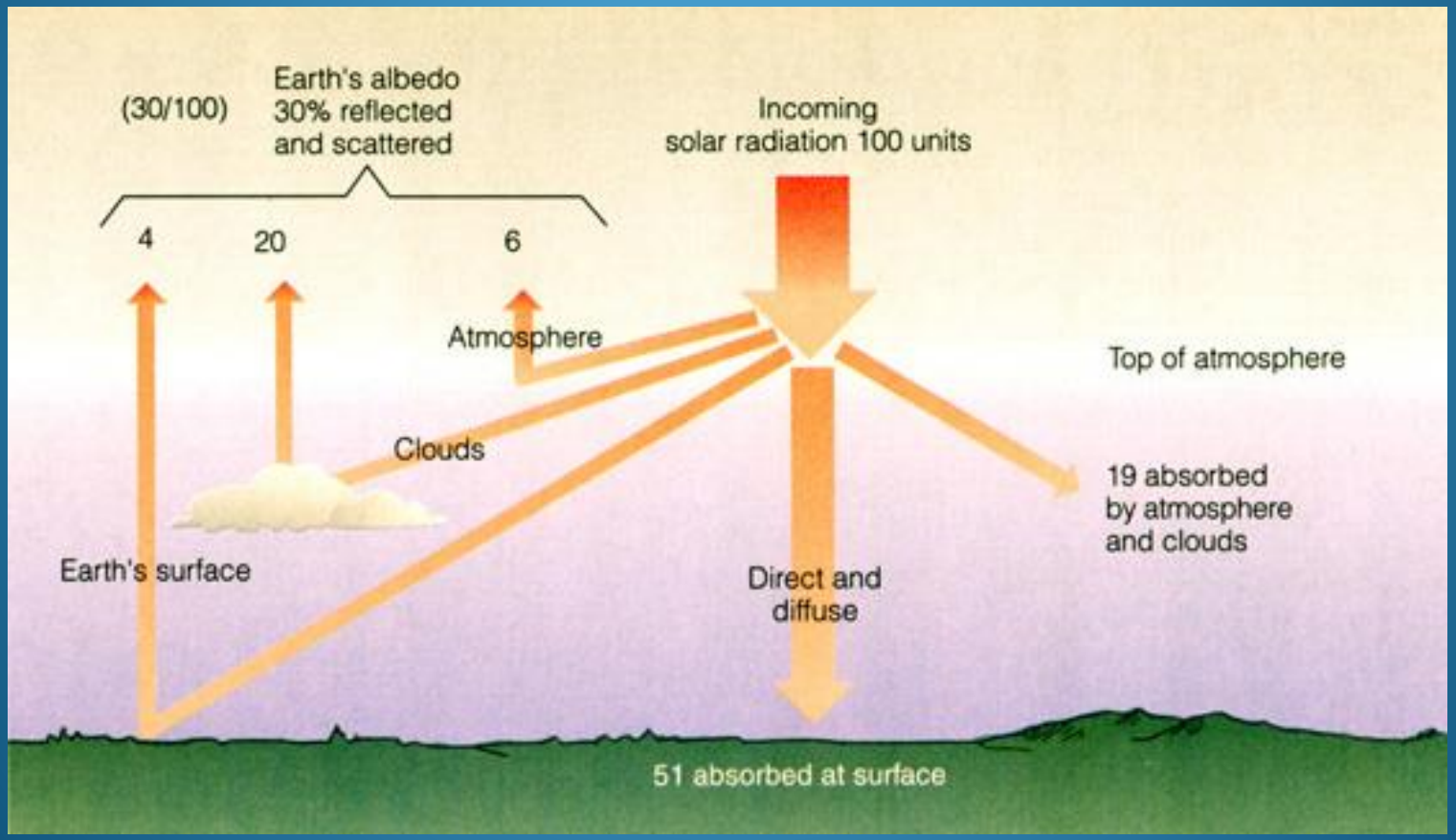
- Atmosphere heated by **TRANSFER OF ENERGY** from sun
- All energy hitting earth from the sun is radiation
- Radiation: form of waves such as light, x-rays, infrared waves, and radio waves



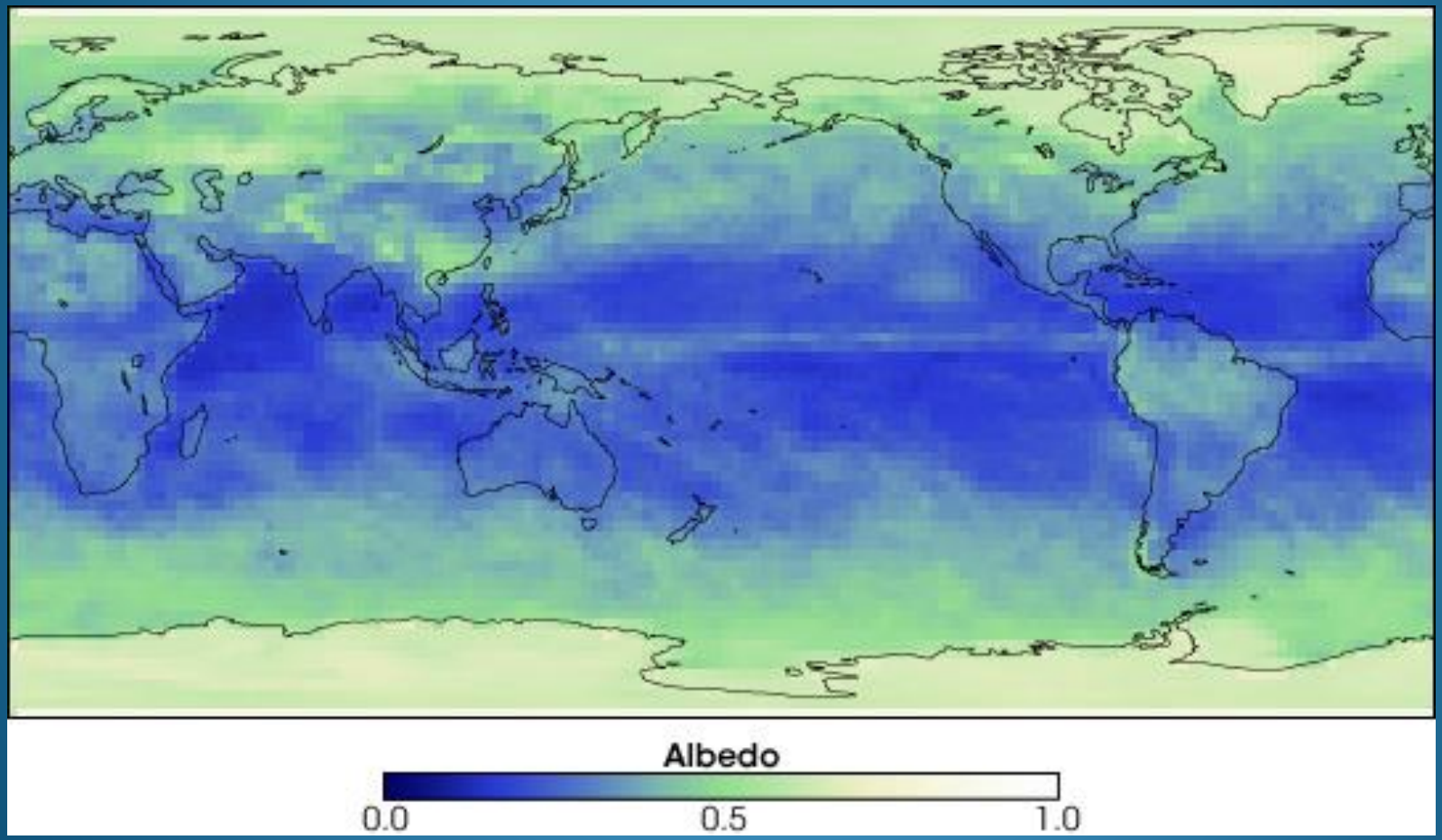


- Radiation: scattered, absorbed, or reflected
- 50% = absorbed by earth's surface (some in photosynthesis)
- 20% = absorbed by clouds, dust, gas
- 30% = reflected back into space

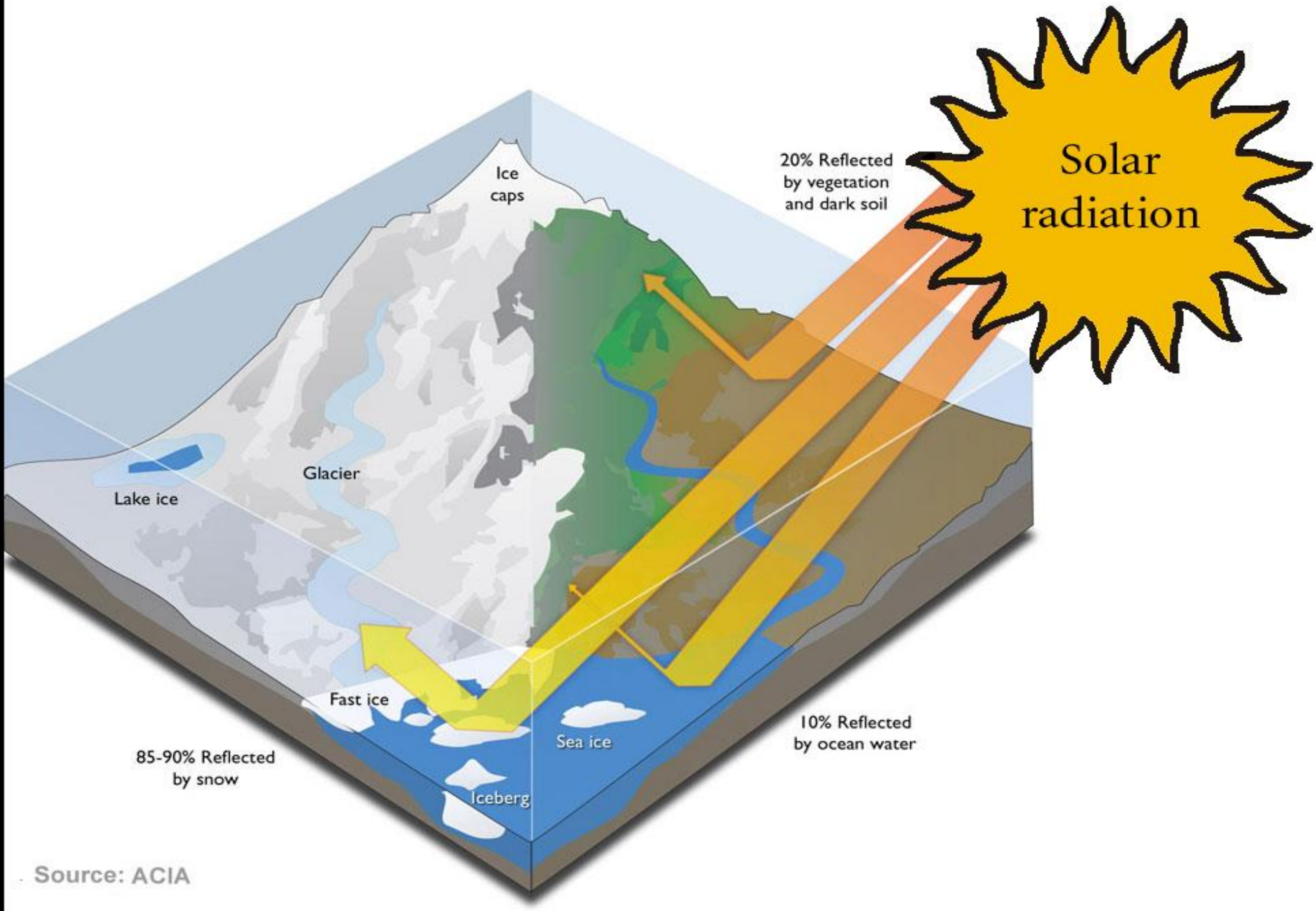
Photosynthesis verse



Albedo: fraction of solar radiation reflected back into space

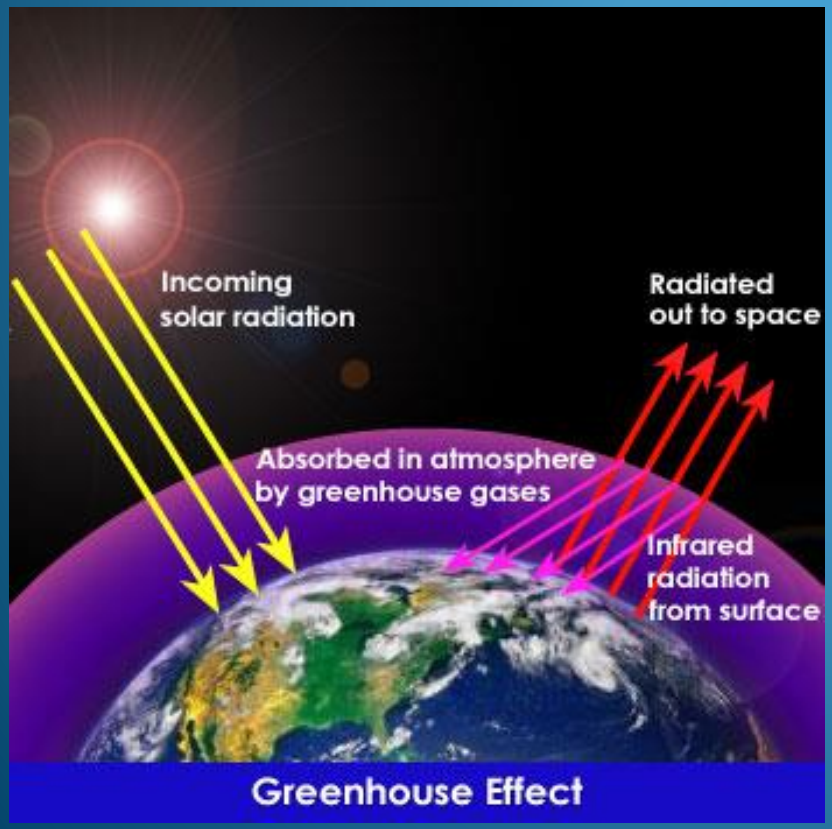


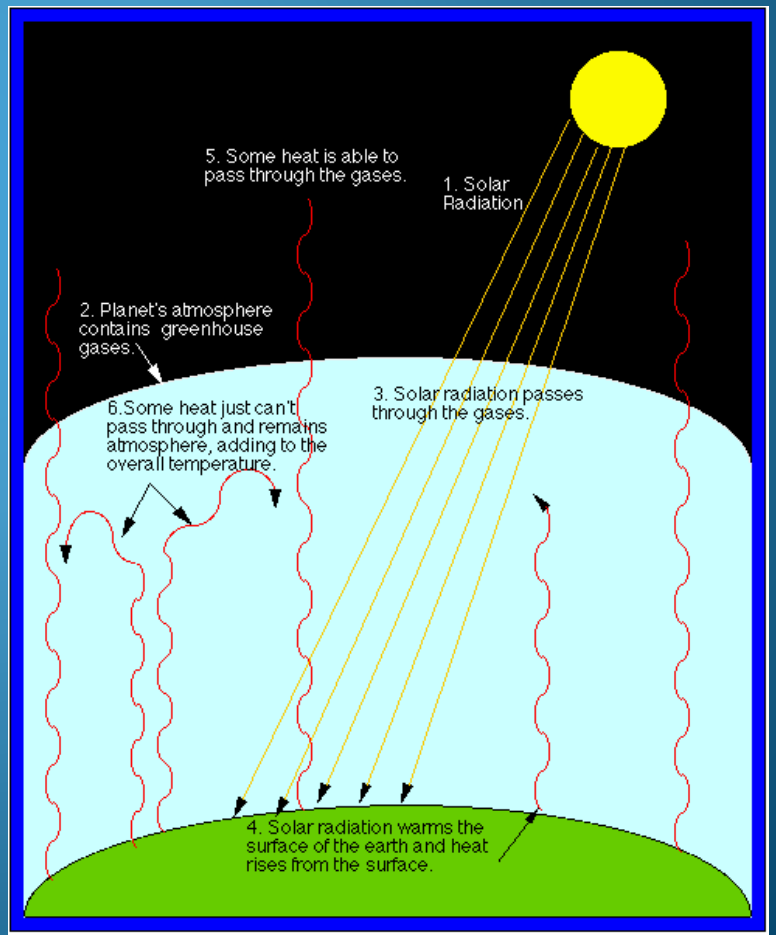
Mar, 2005: Albedo declined from 2000-2004
Too much decline will drastically increase the temperatures on Earth


Solar radiation
20% Reflected by vegetation and dark soil
Ice caps
Glacier
Lake ice
Fast ice
Sea ice
Iceberg
85-90% Reflected by snow
10% Reflected by ocean water

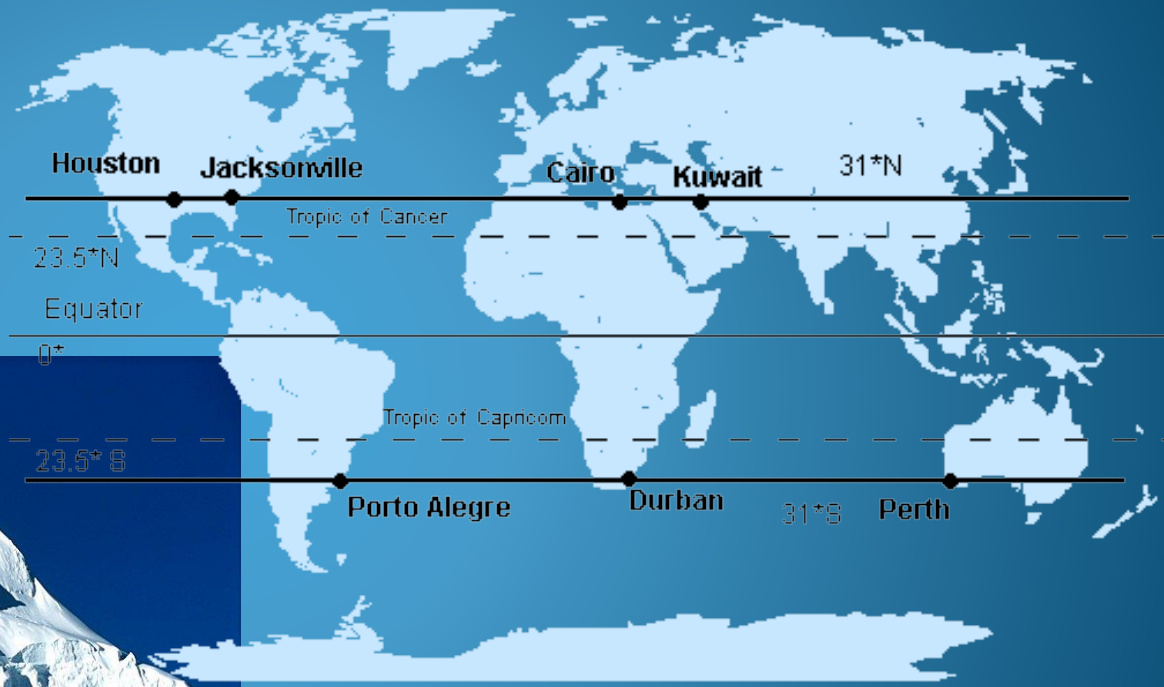
Source: ACIA

- **Greenhouse Effect:**
- Infrared Rays felt as sun's warmth, radiating back into atmosphere
- Rays absorbed by carbon dioxide (CO_2) and water vapor
- Heat trapped in atmosphere The Greenhouse Effect

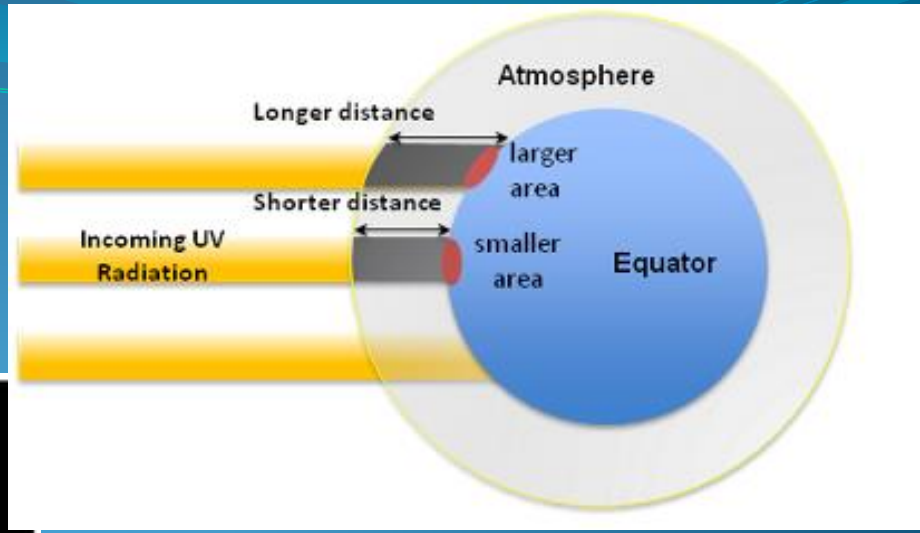


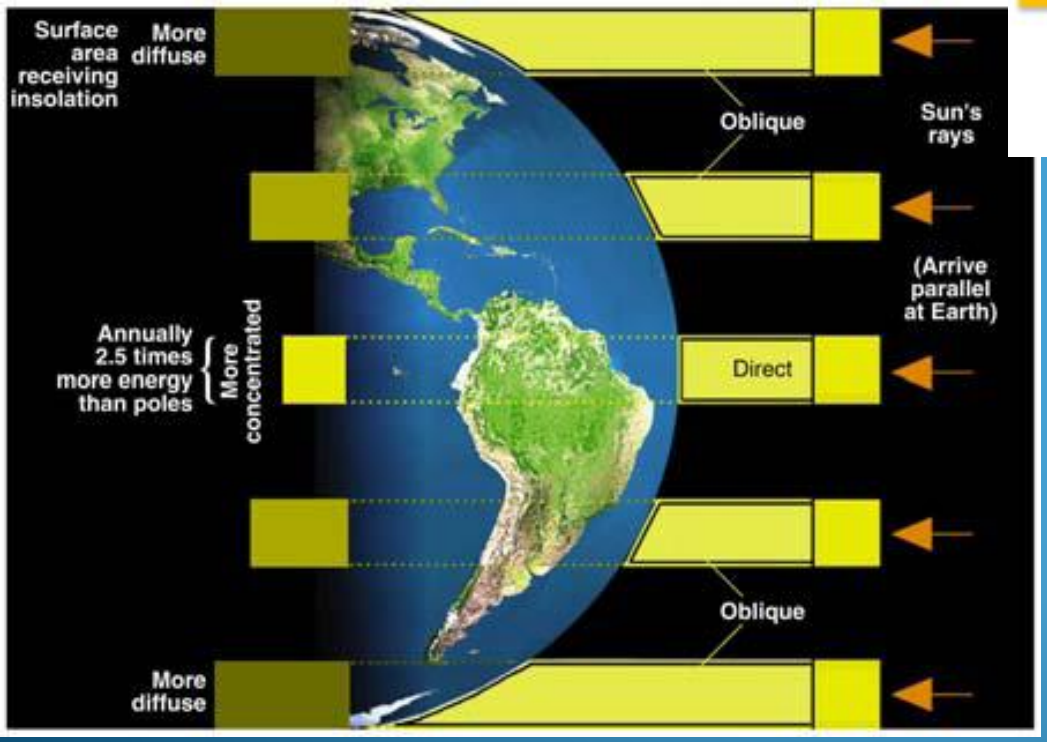


- Earth is heated unevenly
- Plays key role in weather, air movement, all life
- Two main factors: latitude and altitude



Latitude





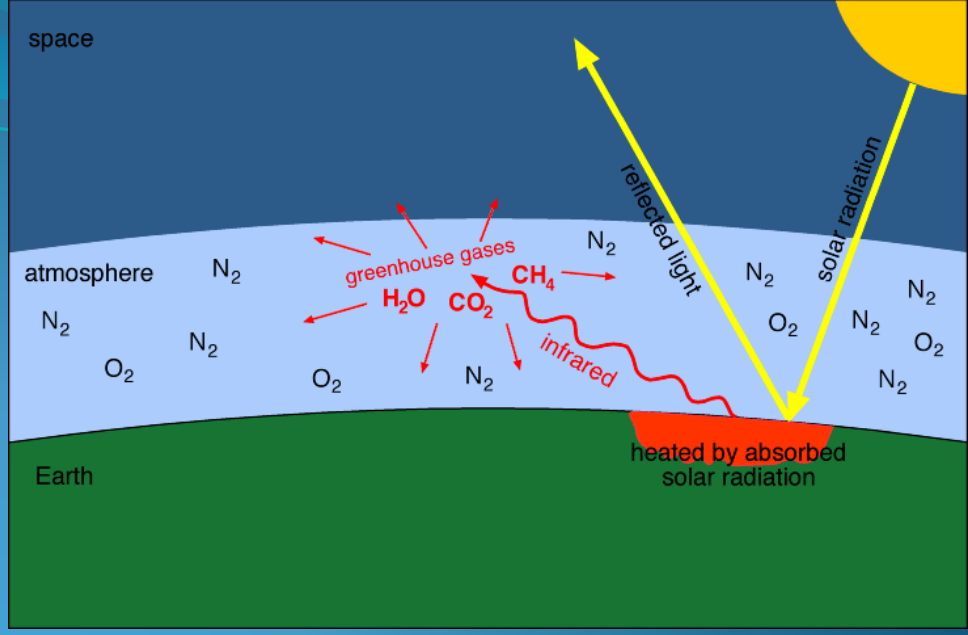
- Direct rays of sun striking equator make it warmer
- Indirect rays on poles make it cooler

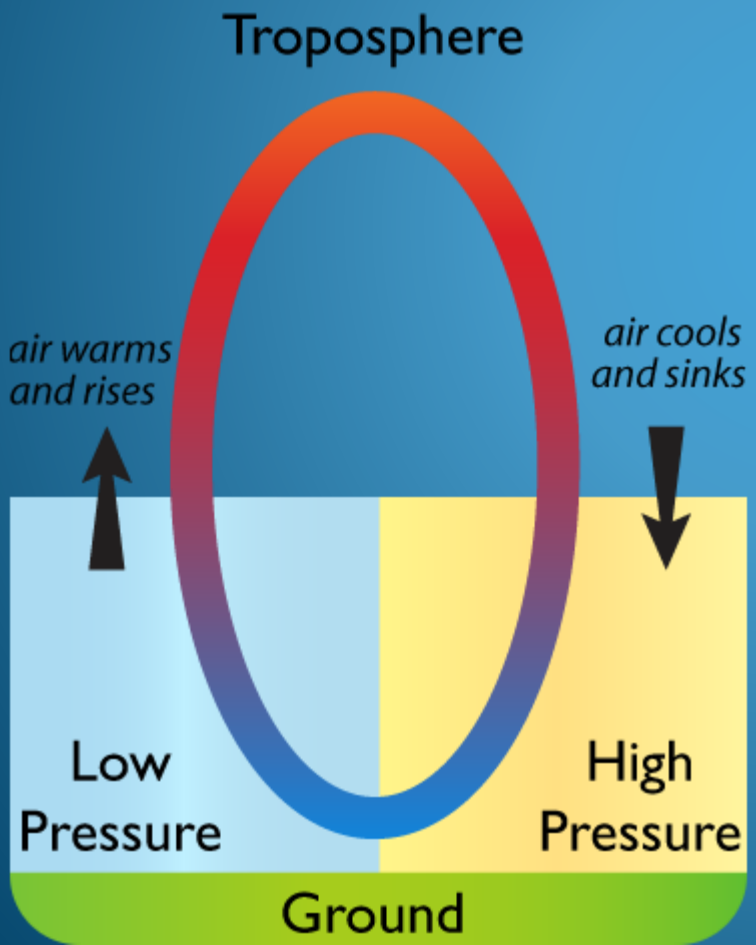
- Altitude
- Altitude ⬆, temperature ⬇ because less CO_2, water vapor, and other greenhouse gases to store heat

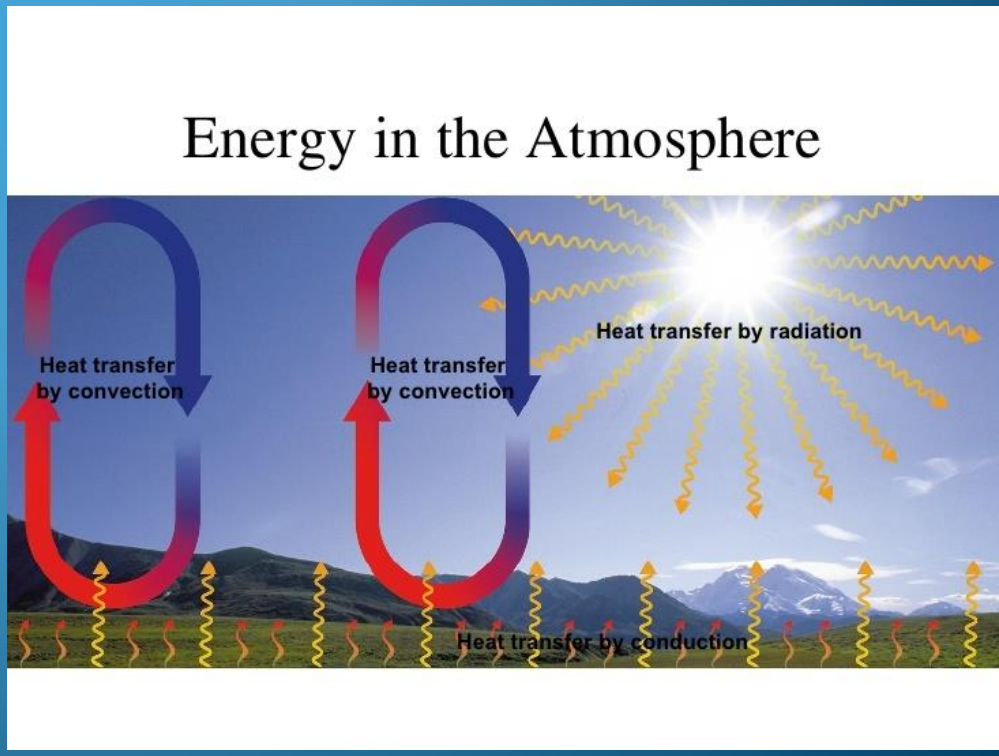
Bill Nye The Science Guy on The Atmosphere

3 ways Earth is heated:

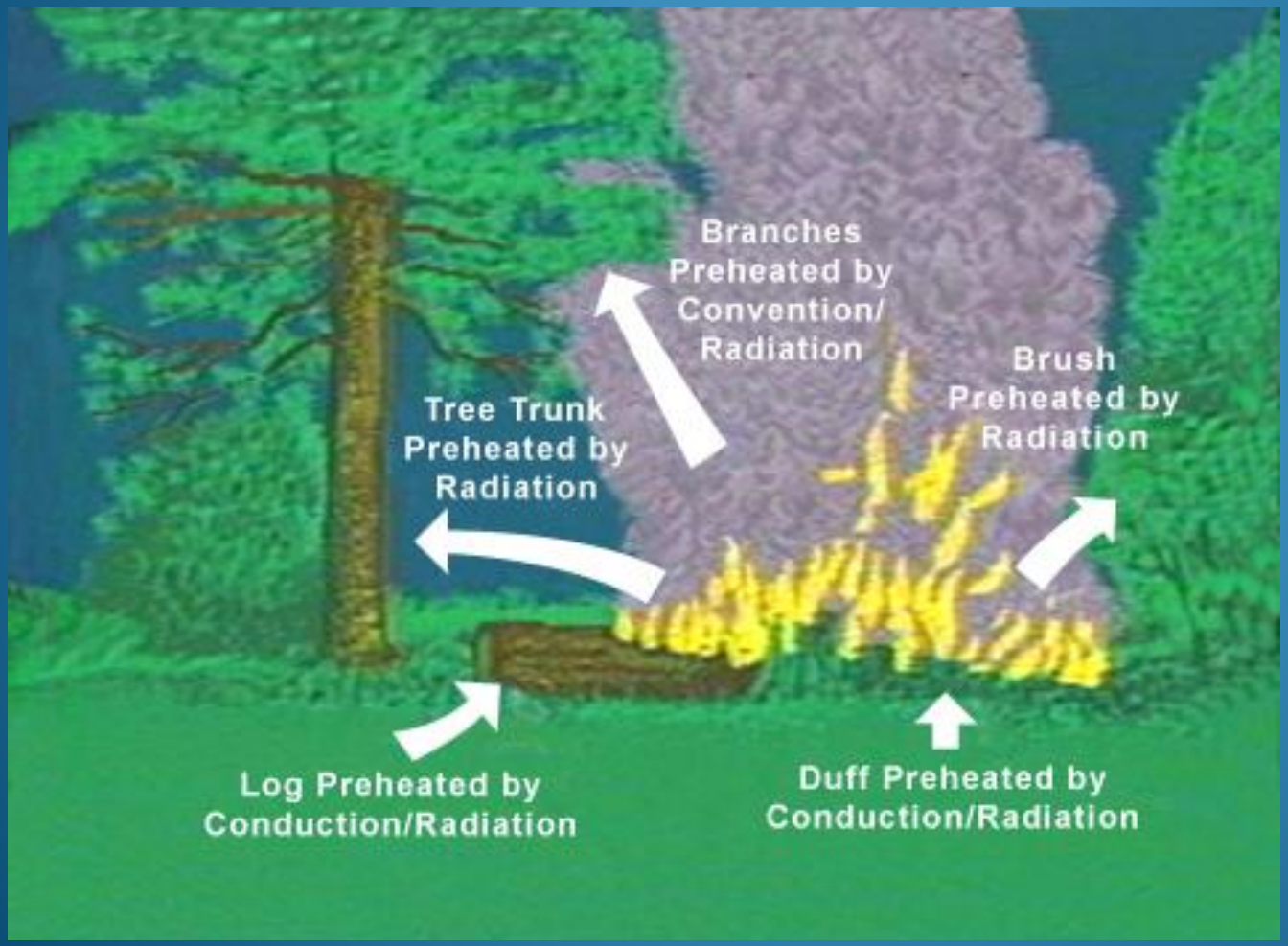
1. Radiation
2. Conduction
3. convection



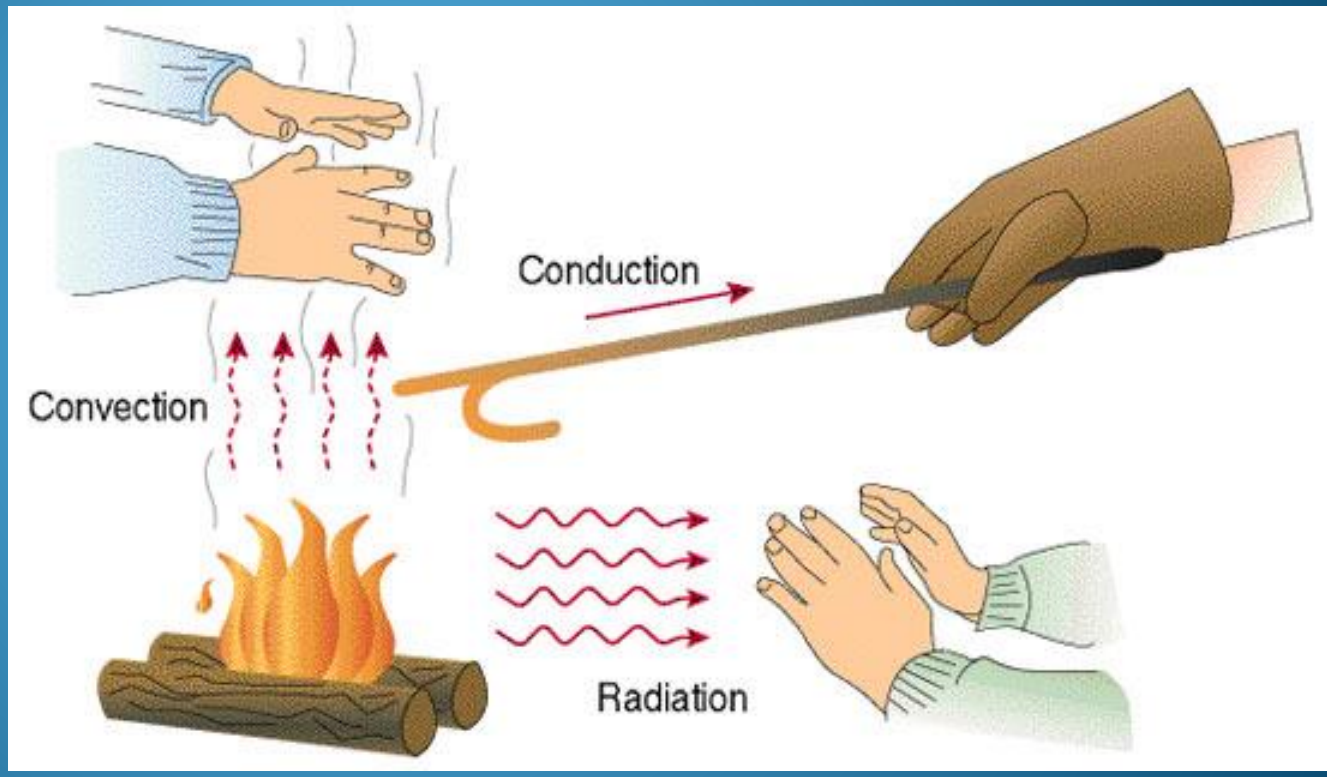




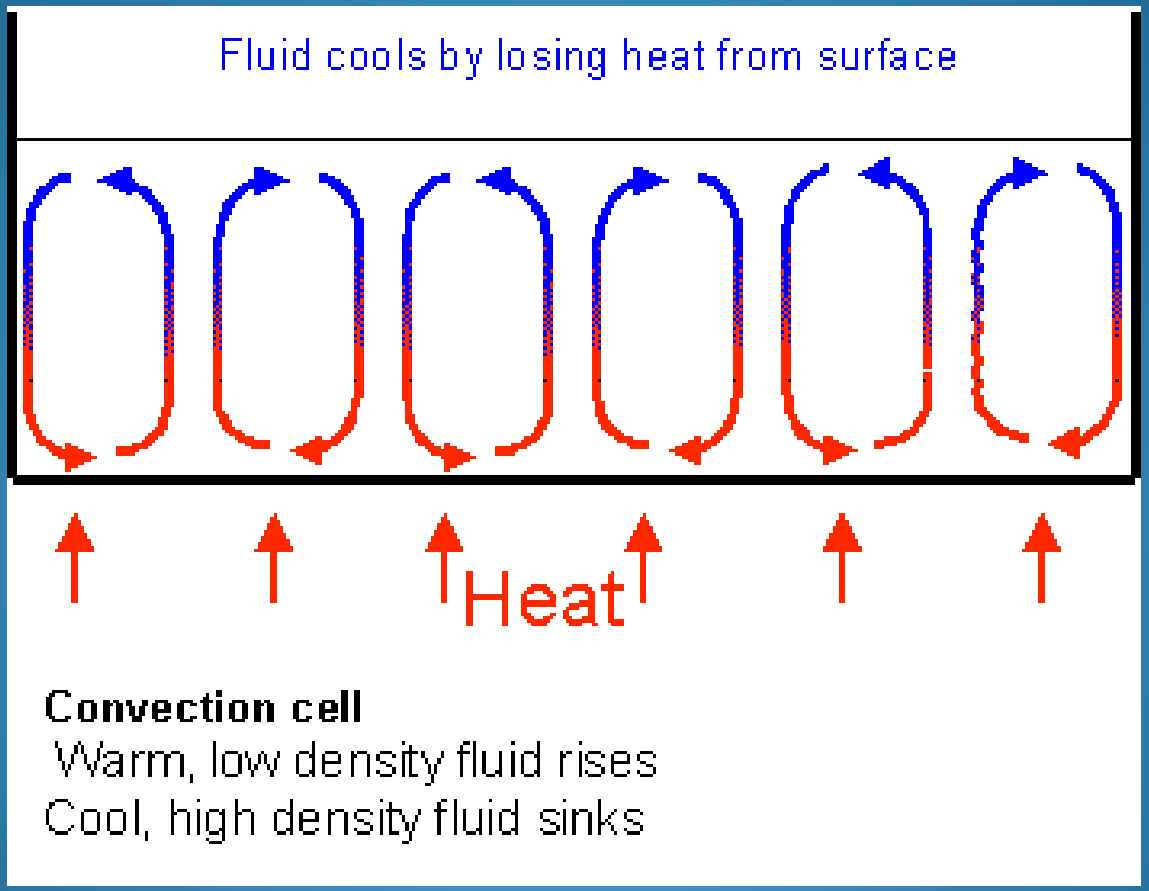
Radiation: transfer of heat by waves, no contact



- Conduction: transfer of heat through objects
- Ex. When air comes in direct contact with something hotter



Convection: when air is heated, then rises, cools, and sinks



- Warm air = less dense, lower pressure so it will rise
- Cool air =more dense, higher pressure so it will sink

- High pressure always moving towards lower pressure
- unequal heating and convection creates wind

Heat Transfer

Conduction, Convection, and Radiation Rap