Earth Science 11
The Atmosphere

Weather

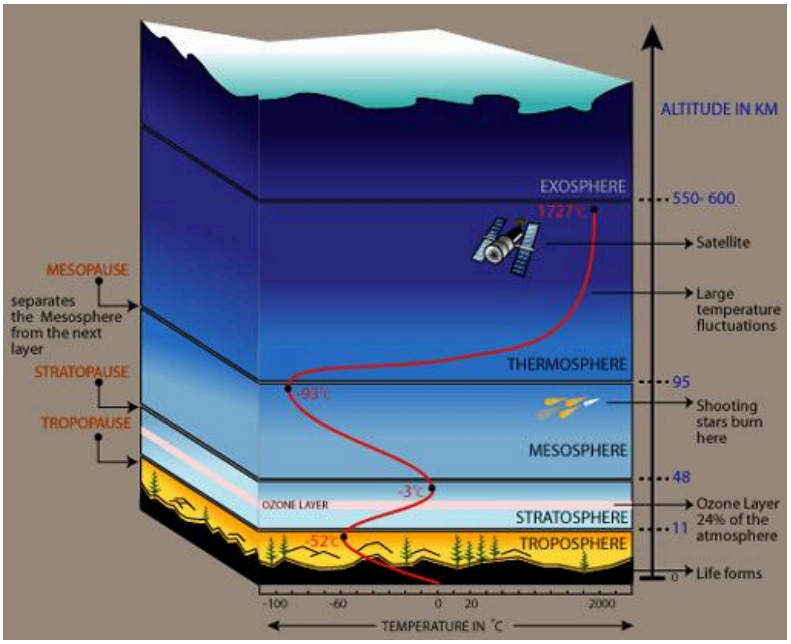
- Weather is the state of the atmosphere at a given time and place.
- Meteorology is the study of the atmosphere, including its weather.

The Atmosphere

- The gaseous mass that surrounds the Earth
- Composed of:
- 78% nitrogen
- 21% oxygen
- 1% argon
- 0.03% carbon dioxide
- Water vapour is also present in the atmosphere. The amount varies according to humidity.
- The ozone layer (a form of oxygen) is found at heights of 10 to 50 km. It absorbs harmful UV rays.
- Dust (composed of dirt, pollen, soot, pollution) helps form fog and rain.

Layers of the Atmosphere

- **Troposphere**: 8-18 km thick, where weather occurs.
- Temperatures decrease with altitude (height).
- **Stratosphere**: from troposphere to 50 km.
- Steady weather conditions (good for flying).
- Temperature increases with altitude because of absorption of sunlight by ozone.
- **Mesosphere** : 50 – 80 km, temperature decreases.
- **Thermosphere**: 80 to about 500 km above Earth, temperatures rise.



Heating of the Atmosphere

- Heat energy drives weather.
- Heat energy from the sun enters and moves through the atmosphere in 3 ways.

Radiation

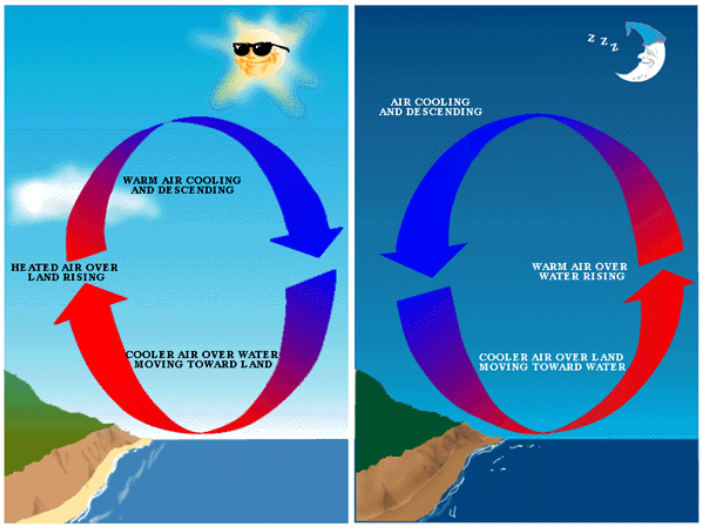
- Heat can be radiated through space by radiation.
- This is how we receive energy from the sun.
- Heat is also radiated away from the Earth.

Conduction

- Conduction occurs when a hot object touches a colder object.
- Heat is conducted to the cooler object.
- This is true for air that comes in contact with a warm/cold ground or warm/cold ocean.

Convection

- Convection occurs when water or air is heated and currents form.
- Currents form when the warmer air/water rises (lower density) and cooler air/water sinks.
- This causes wind.



Greenhouse Effect

- The warmed Earth radiates heat out towards space.
- Greenhouse gases absorb this heat and prevent it from escaping.
- Water vapour and carbon dioxide are the main greenhouse gases.
- Others include methane, nitrous oxide, and CFCs.

Global Warming

- Human activity has increased the build up of greenhouse gases in the atmosphere.
- This has increased the greenhouse effect and is warming the planet.
- As the planet warms, climates change, glaciers melt and ocean levels rise.