

Lecture 5

GLY102

2/16/2021

What's the difference between weather and climate?

Weather covers day to day temperatures.

Climate focuses on the weather over the course of 30 or more years.

What causes changes in temperature?

- Altitude (increase in altitude = decrease in temperature)
- Amount of sunlight
- Earth system (winds and currents)
- Unequal heating of land and water

Layers of the Atmosphere (from bottom to top)

1. Troposphere
2. Stratosphere
3. Mesosphere
4. Thermosphere

Air pressure goes down as one moves upward.

As altitude increases, air pressure decreases.

In what atmospheric layer does the pressure drop to near zero?

Stratosphere. Drops a lot at the Troposphere and Tropopause and then reaches zero in the Stratosphere.

Two primary controls on Temperature:

1. **Adiabatic cooling:** Air cools 6–10°C per km in altitude, due to pressure drop. (Inverse: Higher pressure warms air.)
Lapse rate: Change in temperature with altitude
2. **Solar heating:** Above the *tropopause* (and mesopause), some (shortwave) solar radiation is absorbed and directly heats the air.

A Few Facts About Our Troposphere

1. Temperature decrease with height (adiabatic cooling)
 - Lapse Rate: 6–10°C per km

2. Most of our weather occurs within the troposphere
 - Most of the water vapor is in this layer
 - Heating from below -> re-radiated heat from Earth's surface
3. The troposphere varies in thickness around the globe, higher at equator, lower at poles.

What is our atmosphere made up of?

- Nitrogen - 78.08%
- Oxygen - 20.95%
- Argon - 0.93%

UV-c is the most harmful form of UV light but even UV-b is very harmful!

Ozone is very effective at cutting down UV-c, somewhat effective at cutting down UV-b (the remainder is why we use sunscreen), and not really effective at cutting down UV-a.

Stratospheric ozone depletion (aka "ozone hole")

Note: this is NOT related to global warming or the greenhouse effect, but IS related to human activities

The Ozone is mostly present at the Earth's poles. The biggest Ozone hole is present at the South pole. Human manufactured chemicals depletes the amount of Ozone in the atmosphere.