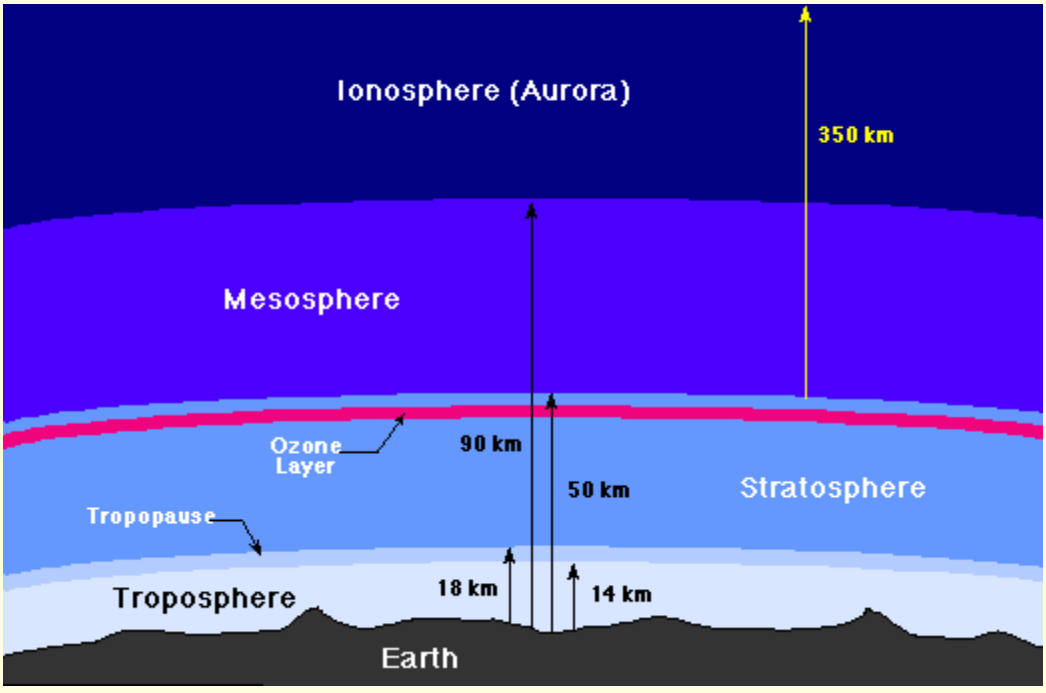
Module 3: The Atmosphere

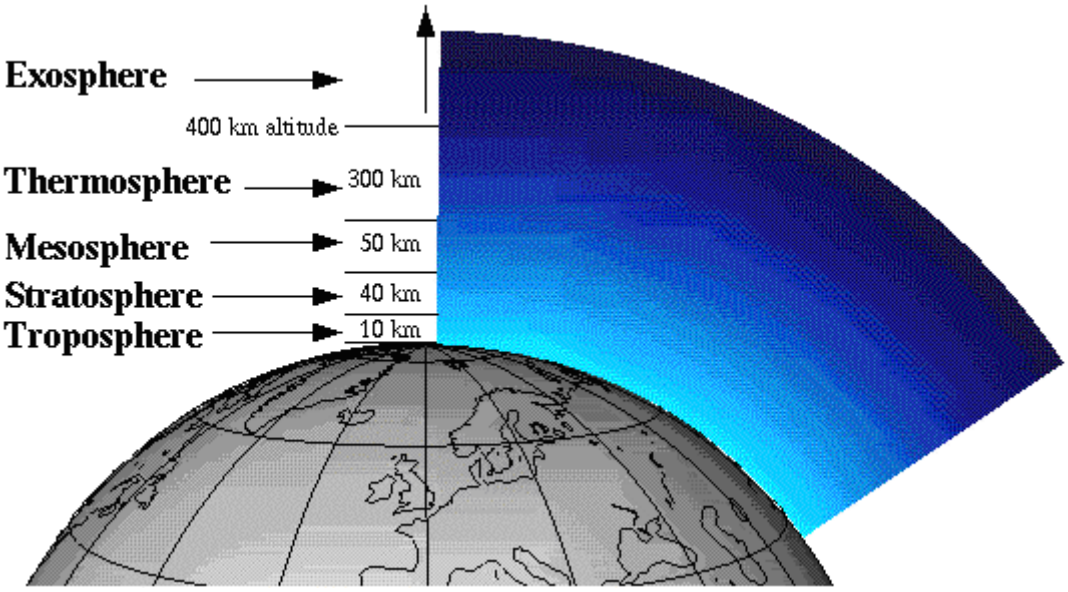
Vocabulary for Module 3:

Atmosphere – The mass of air surrounding a planet
Barometer – An instrument used to measure atmospheric pressure
Heat – Energy that is being transferred
Heteropshere – The upper layer of earth's atmosphere, which exists higher than 80 kilometers (50 miles) above sea level.
Homosphere – The lower layer of the earth's atmosphere, which exists from ground level to roughly 80 km(50 miles) above sea level.
Jet Stream – A narrow band of high-speed winds that circle the earth, blowing form west to east.
Temperature - A measure of the energy of motion in a substance's molecules.



Layers of the Earth's atmosphere

This image comes from the website at: http://www.theozonehole.com/atmosphere.htm



Cambridge University Graphic

The atmosphere is divided into five layers. It is thickest near the surface and thins out with height until it eventually merges with space.

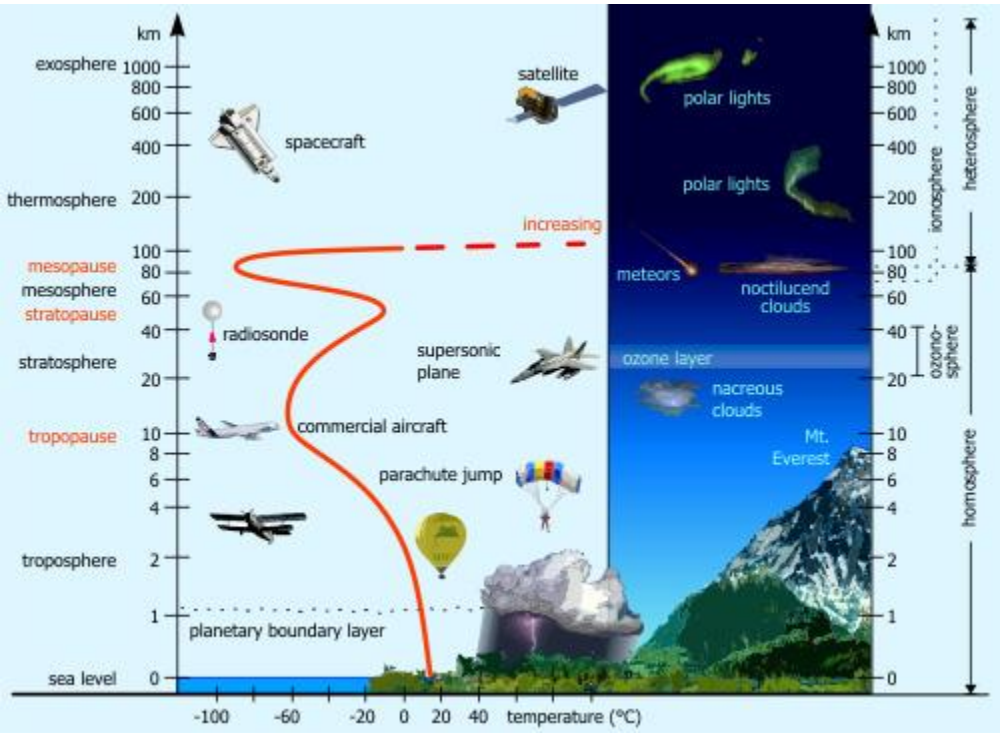
1) The **troposphere** is the first layer above the surface and contains half of the Earth's atmosphere. Weather occurs in this layer.

2) Many jet aircrafts fly in the **stratosphere** because it is very stable. Also, the ozone layer absorbs harmful rays from the Sun.

3) Meteors or rock fragments burn up in the **mesosphere**.

4) The **thermosphere** is a layer with auroras. It is also where the space shuttle orbits.

5) The atmosphere merges into space in the extremely thin **exosphere**. This is the upper limit of our atmosphere.



This website has an interactive website on the Atmosphere:

http://earthguide.ucsd.edu/earthguide/diagrams/atmosphere/index.html

Extra Reading:

The Visual Dictionary of Physics by Jack Challmer

The Weather Book by Michael Oard

Taking Astronomy Back By Jason Lisle.

More Websites on the Atmosphere:

http://www.srh.noaa.gov/jetstream/atmos/layers.htm

http://www.vtaide.com/png/atmosphere.htm

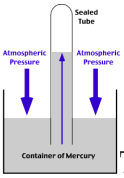
- Draw a diagram of the layers of the atmosphere. Include as much detail as you think is necessary. Look at Figure 3.3, 3.5, and 3.8 to help.

- Evangelista Toricelli, an Italian Physicist and Mathematician, built the first barometer in 1644. The Barometer measures the changes of atmospheric pressure in our atmosphere. This is helpful for weather forcasting and predicting as well as research.

http://inventors.about.com/od/tstartinventors/a/Barometer.htm

http://www.juliantrubin.com/bigten/torricellibarometer.html

- Activity: Draw a barometer and describe how it works



Torricelli's Barometer

http://library.thinkquest.org/C0112425/lab_child_barometer_1.htm- make a barometer of your own and diagram the measurements you receive.

Learn more about Atmospheric Pressure:

http://kids.earth.nasa.gov/archive/air_pressure/index.html

Atmospheric Pressure on Mt. Everest

http://www.pbs.org/wgbh/nova/everest/exposure/pressure.html

- The rotation of the earth is responsible for the direction of the Jet Streams. The winds which blow from West to East are often strongest during the winter.
  - Activity: Draw a map of the jet stream and the path(s) it follows.
- http://www.srh.noaa.gov/jetstream/global/jet.htm this website may give more info.
  - The Weather Book by Michael Oard p. 16-17 discusses the Jet Stream
- Research the science of Aeronautics:
  - At what altitudes to airplanes fly? Why?
- After reading the section on Temperature and Heat try this experiment.
  - Fill a glass with boiling water and fill a second glass with ice water.
  - When ready, take the ice cubes out of the 2nd glass and drop equal amounts of food coloring into each glass.
  - Make a note of what you see and explain why it is doing that.

Excellent Website on Temperature: http://www.eo.ucar.edu/skymath/tmp2.html

- Research the Ozone Layer and the controversy surrounding this layer of our atmosphere.

- Do you think that we should be concerned about the decreased concentration of Ozone over the Southern Hemisphere? Why or Why not?
- Do you think, after your study of Cost/Benefit Analysis in the previous Module, that CFC's should continue to be banned?

❖ An electrically charged atom is an Ion. The Aurora Borealis is an amazing phenomena which occurs in both the Northern and Southern Hemisphere when the radiation and solar winds streaming into our atmosphere react with the oxygen and nitrogen molecules, thus creating the visual colors lighting up the sky. The colors that you see depend on the altitude and amount of gas in that level.

Websites that may help:

http://science.howstuffworks.com/nature/climate-weather/atmospheric/question471.htm

http://www.geo.mtu.edu/weather/aurora/

http://www.visitnorway.com/en/Articles/Theme/What-to-do/Attractions/Nature/Let-there-be-northern-lights/