Ozone Depletion

EQ # 10 What is ozone depletion, what's causing it and why should we care?

Ozone Depletion Resources
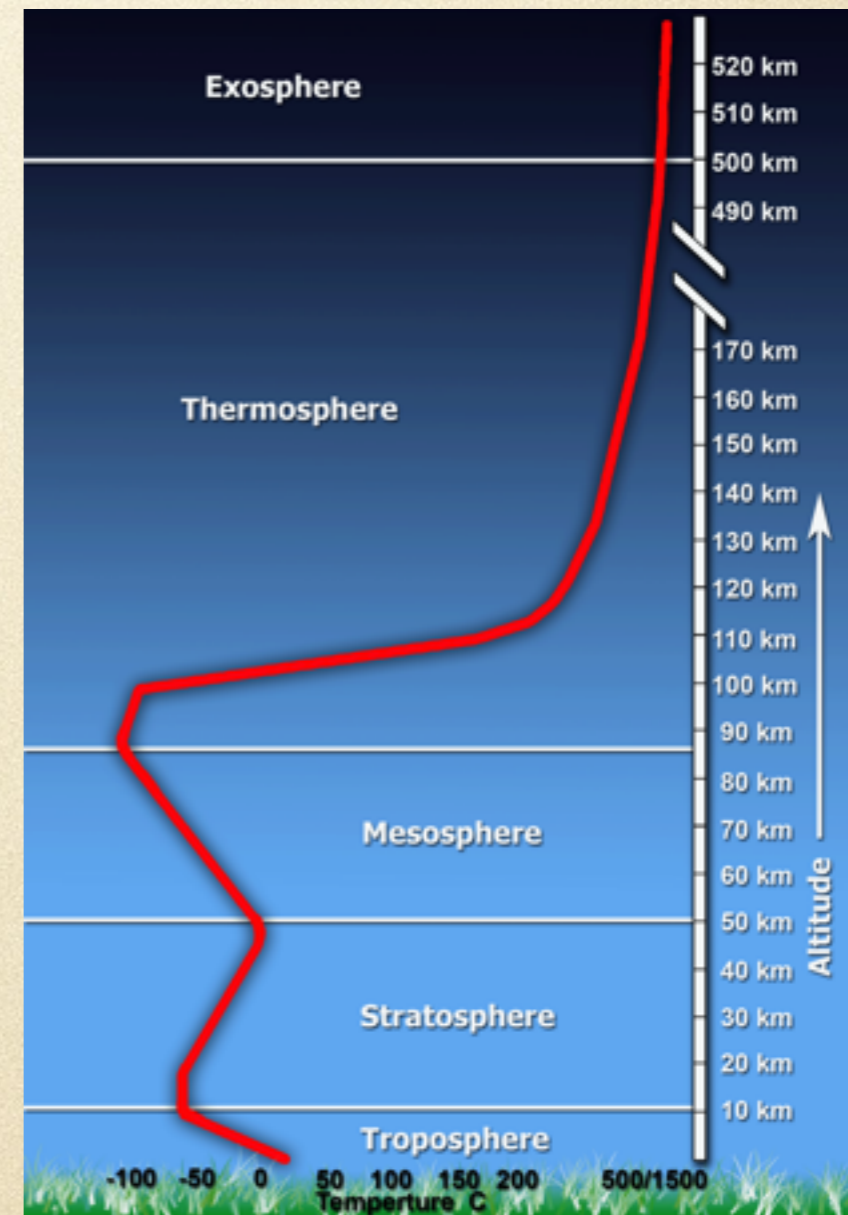
- Good overview of ozone depletion-http://eschooltoday.com/ozone-depletion/what-is-ozone-depletion.html

- Film- http://www.youtube.com/watch?v=AU0eNa4GrgU

- https://www.youtube.com/watch?v=XLY8m-dXOxo

Read the Ozone Handout

- Read the first page- What is Ozone

- Mark up your text to highlight key information
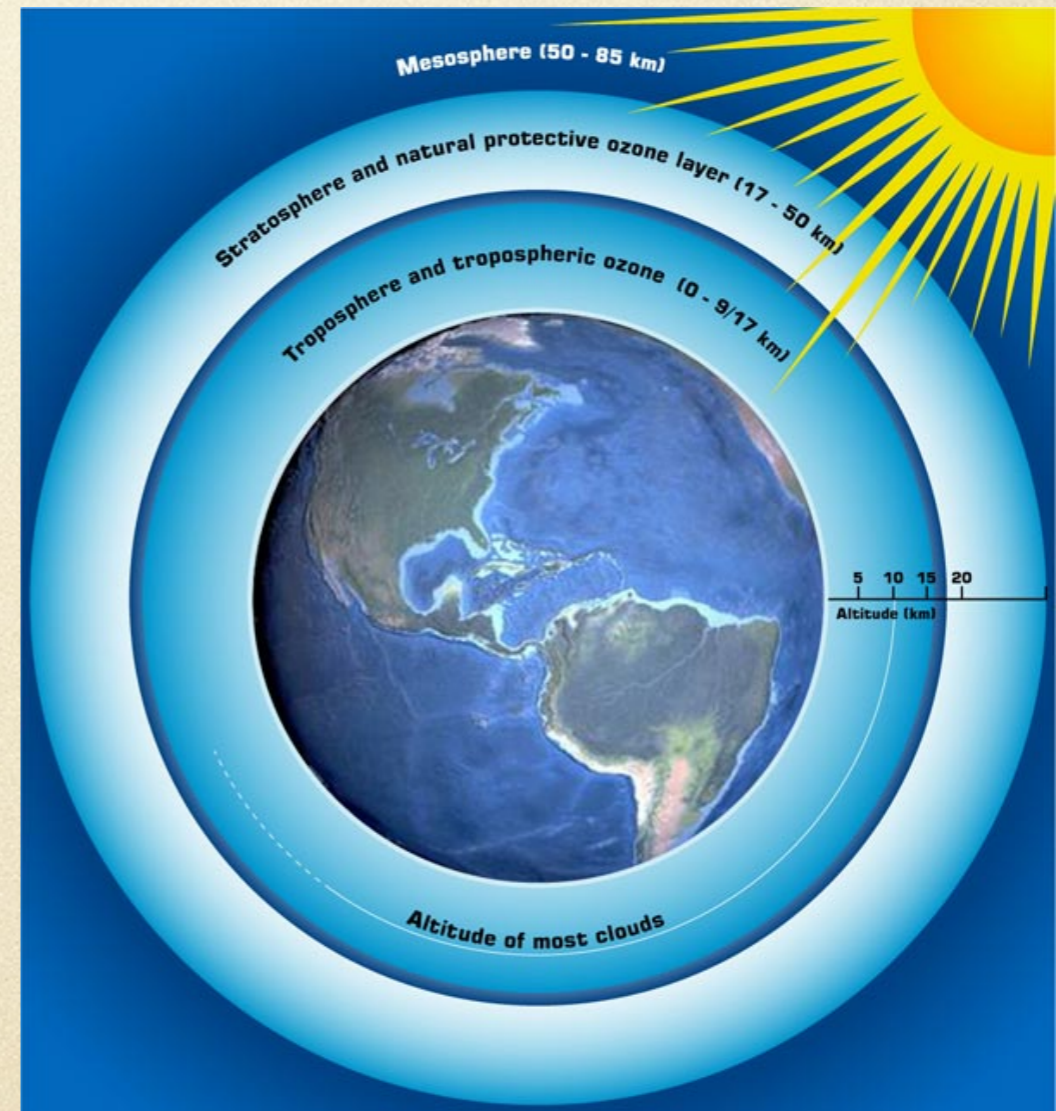
Where is the Ozone Layer?

- Ozone (O3) <u>is a highly reactive molecule</u> that exists in the <u>troposphere</u> and <u>stratosphere</u>.

- In the <u>troposphere</u> it is a <u>pollutant (BAD)</u> GL O3 *In the <u>stratosphere</u> it is <u>protective</u> and <u>helpful (GOOD)</u>

Where is the Ozone Layer?

- The Ozone Layer is a <u>naturally occurring belt of ozone gas that sits 9.3-18.6 miles above the earth</u>

Why is the Ozone Layer Helpful?

- The Ozone Layer <u>serves as a natural shield that blocks harmful UV (ultraviolet) B radiation</u> that comes from the sun.

- This good ozone prevents the UV radiation from reaching earth.

Why is the Ozone Layer being depleted?
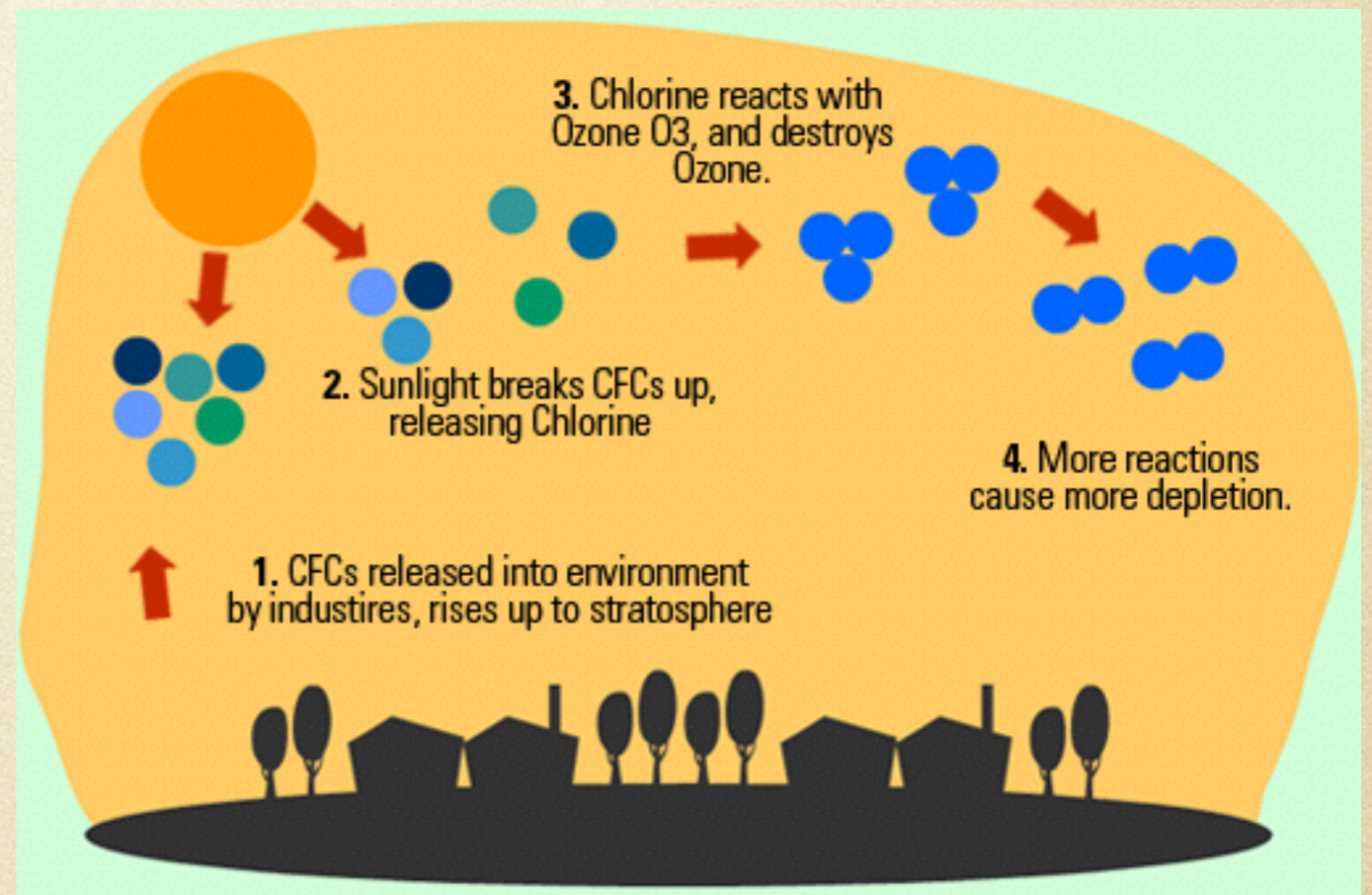
- Human pollutants called <u>CFCs have depleted the natural ozone layer</u>.

- Chlorofluorocarbons (CFCs) <u>were widely used</u> as propellants <u>in aerosol spray cans</u> and refrigerants.

- The <u>CFC's</u> travel to the stratosphere. The chlorine in them <u>breaks down ozone molecules</u>, <u>thinning the protective layer</u>.

Ozone Depletion Film

- https://www.youtube.com/watch?v=AU0eNa4GrgU
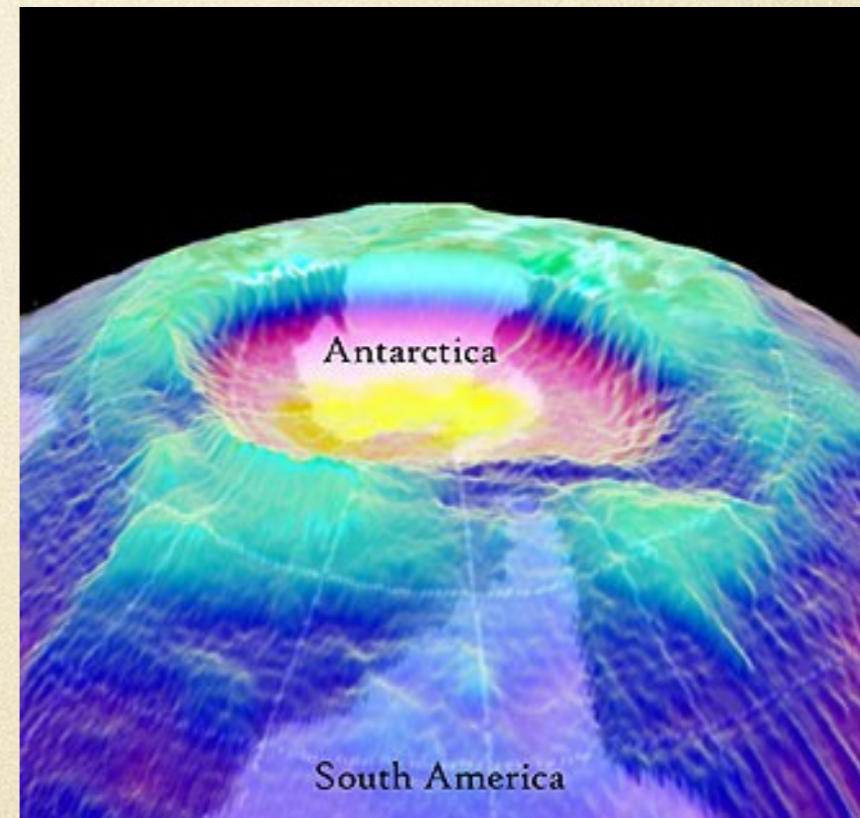
- Show Film Clip

How do CFC's Deplete the Ozone Layer?

- When the CFCs get into the stratosphere (within 2-5 years), sunlight breaks them down releasing chlorine, which destroys the protective Ozone layer.

3. Chlorine reacts with Ozone O3, and destroys Ozone.

2. Sunlight breaks CFCs up, releasing Chlorine

4. More reactions cause more depletion.

1. CFCs released into environment by industires, rises up to stratosphere

Where is Ozone Depletion Worst?

- The ozone layer above the Antarctic has been particularly impacted by CFC pollution.

- In the southern spring and summer, when the sun shines for long periods of the day, chlorine reacts with ultraviolet rays, destroying ozone on a massive scale, up to 65 percent.
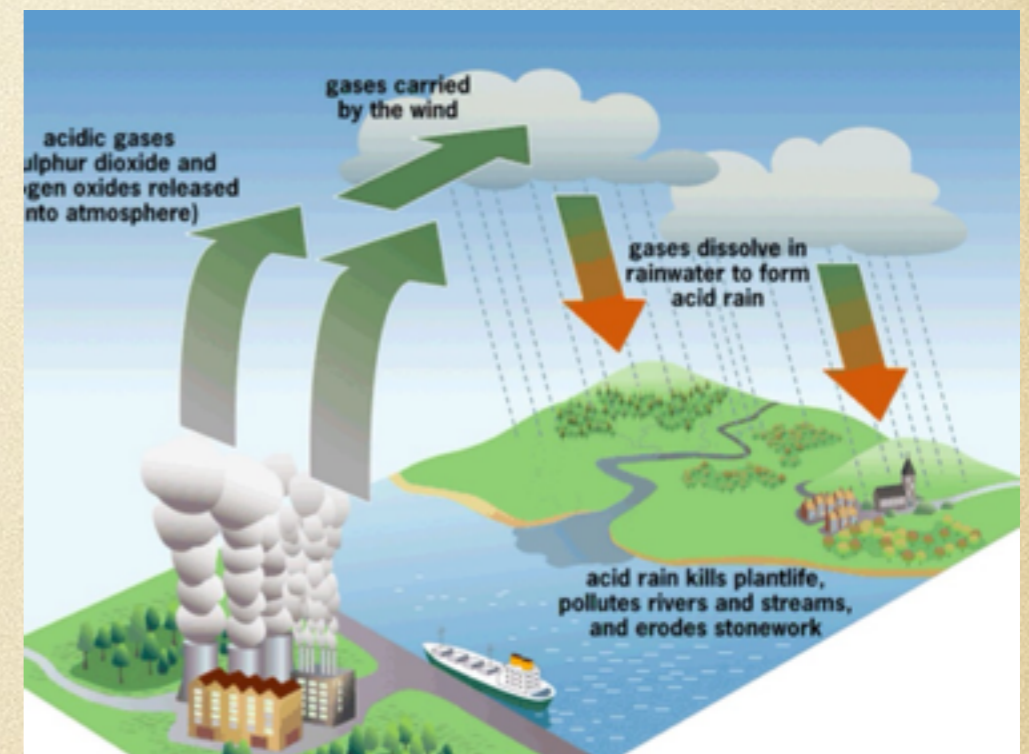
What are the human health effects?

- UV radiation causes <u>sun burns</u>, <u>skin cancer</u>, and <u>eye cataracts</u> that can lead to blindness.

- UV radiation can lead to <u>immune system suppression</u> which <u>makes people more susceptible to disease</u>.

What are the environmental effects?

- Increased acid rain and solid acid deposits which can change the pH of water and soil on earth.

- Lower crop yields and agricultural productivity

- Increased acid in oceans can cause plankton to die.
  They are the base of the food chain!

What is the solution?

- **Repair of the ozone layer is possible when CFC's are reduced and/or eliminated**.

- The U.S. has banned nearly all CFC's since the 1980s.

- It will take about 50 years for the ozone to repair itself to 1980's levels and 100 years to repair itself to pre 1950's levels.

Tuesday 2/25

- Finish notes

- CAA Unit Study Guide

- Review CAA Unit Game
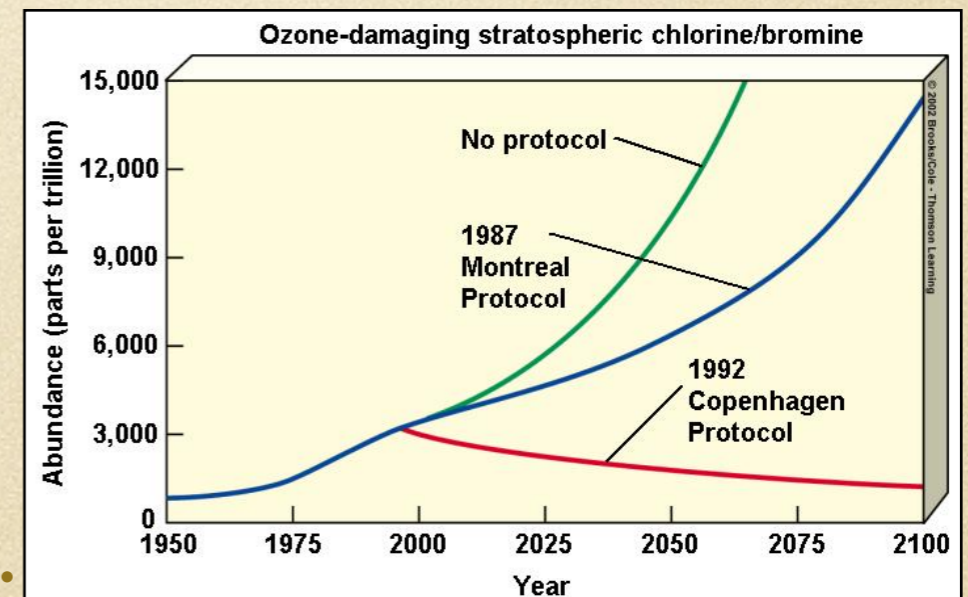
- INB #9-10- Notes and summaries

Warm-Up
Ozone Depletion

- 1. Where is GOOD ozone? Where is BAD ozone?

- 2. Are they chemically different? If so, how?

- 3. What are Chlorofluorocarbons (CFCs)?

- 4. Describe THREE effects of ozone depletion.

What is the Montreal Protocol?

- In 1987, 24 countries signed an agreement to reduce CFC's and cut their use to 50% by 1999.

- Copenhagen Protocol- Updated this agreement in 1995 to ELIMINATE the use of CFCs totally.

- Most large countries have stopped use; poor countries get more time.

Ozone-damaging stratospheric chlorine/bromine

No protocol

1987 Montreal Protocol

1992 Copenhagen Protocol

Abundance (parts per trillion)

15,000
12,000
9,000
6,000
3,000
0

1950 1975 2000 2025 2050 2075 2100

Year

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Ozone Depletion is NOT causing Global Warming

- Ozone depletion isn't a major cause of global warming but is **indirectly** related.

- The CFCs that deplete the Ozone Layer are also heat-trapping GHG (greenhouse gases).

- The elimination of CFC's will remove one source of greenhouse gases--so it's slightly positive in addressing climate change.

Things to Work On

- 1. LRAPA Air Quality in Eugene handout

- 2. Unit Study Guide

- 3. Diagram of Ozone Depletion in INB

- 4. INB summary for EQ #10