

# Ozone Layer Depletion



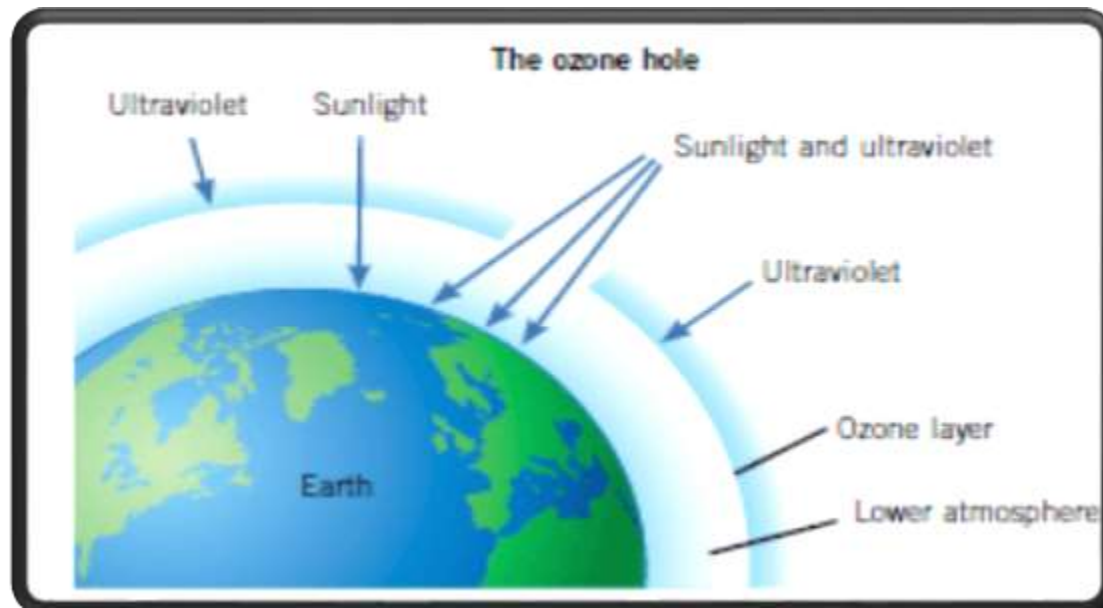
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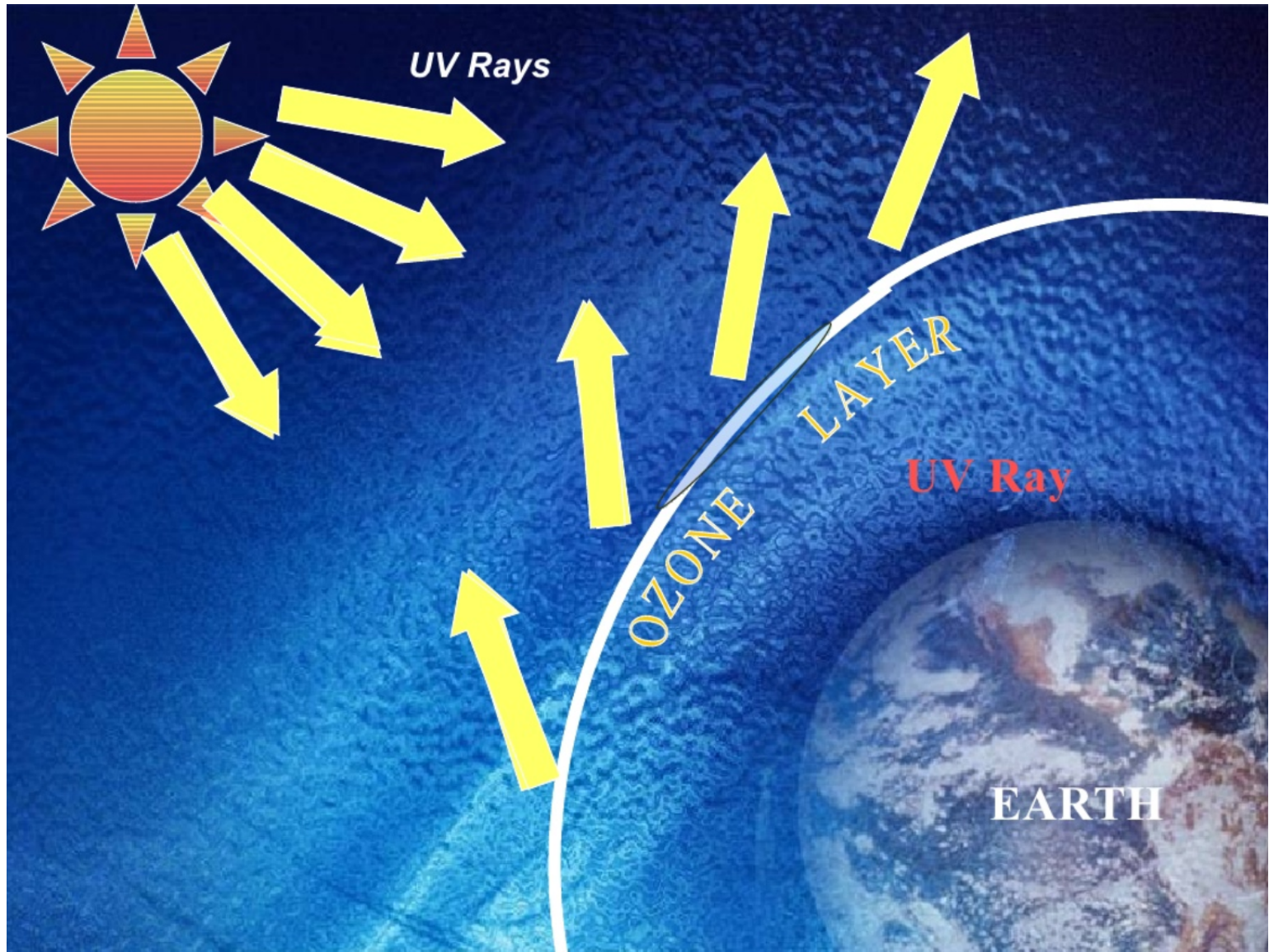


**Daffodil**  
*International*  
**University**

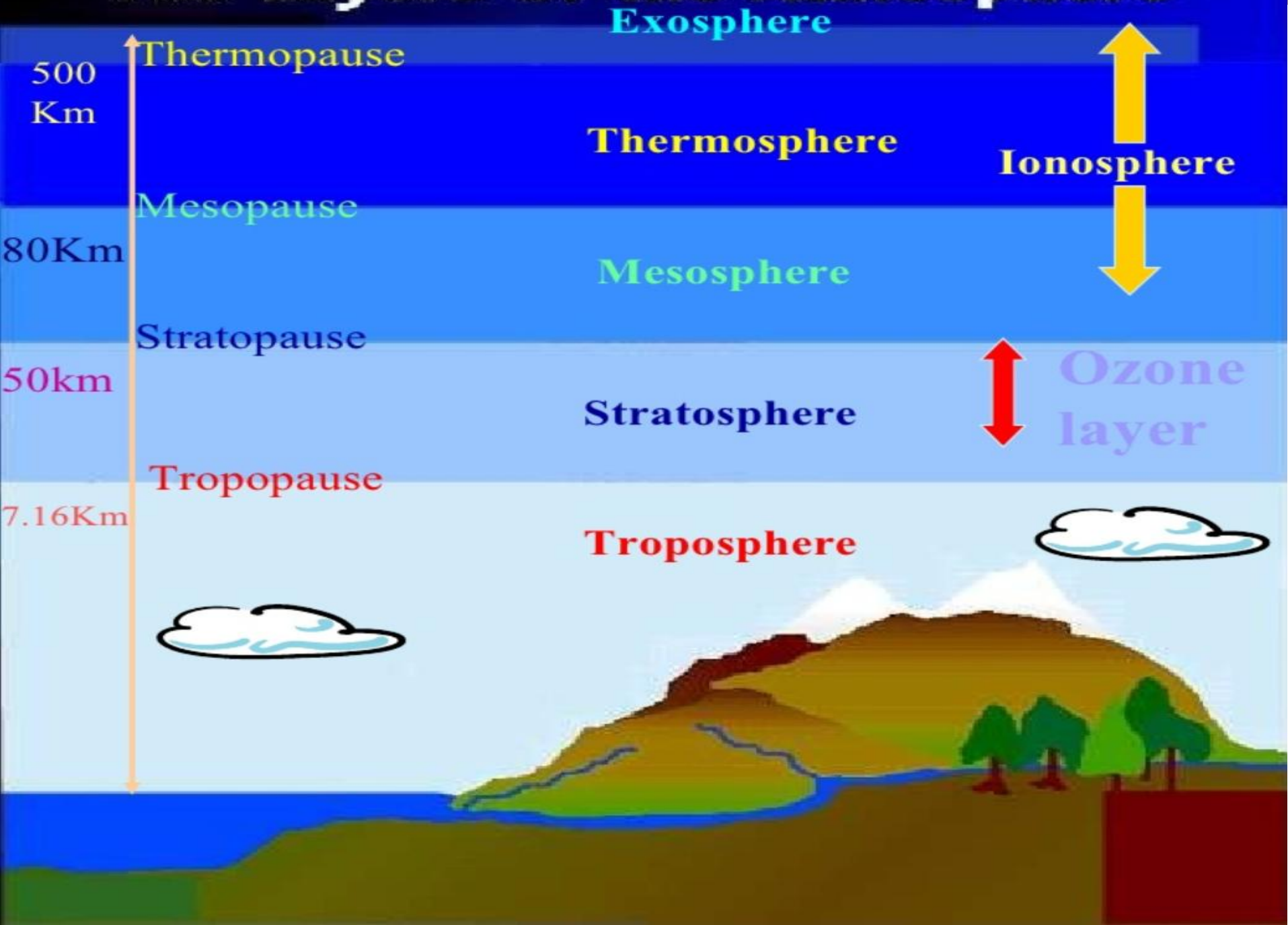
# WHAT IS OZONE?

1.  $O_3$
2. A gas composed of three atoms of oxygen
3. Bluish gas that is harmful to breathe
4. Nearly 90% of earth's ozone is in the **stratosphere** and referred to as the **ozone layer**.
5. Ozone absorbs a band of ultraviolet radiation called **UVB**.





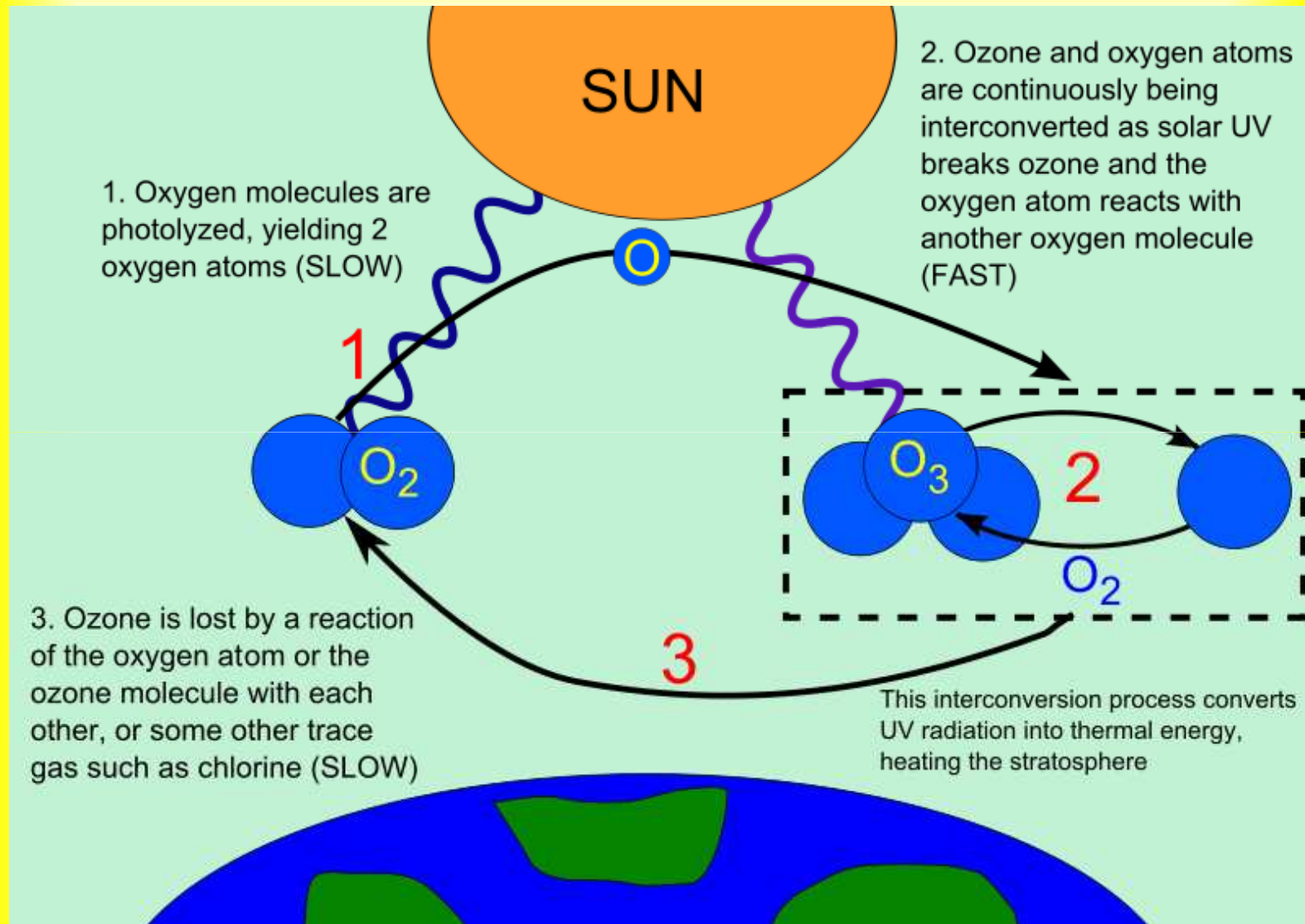
# The Layers of the Atmosphere



# FORMATION OF OZONE LAYER



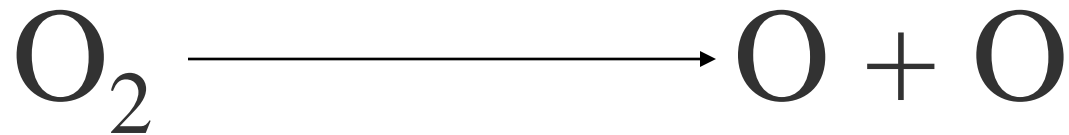
# Ozone molecule formation



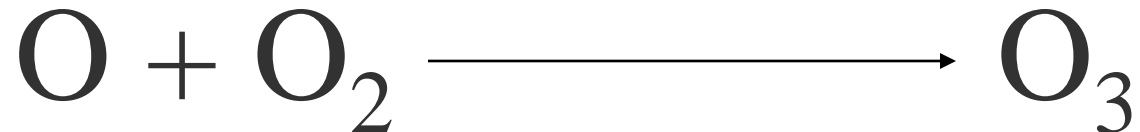


## Ozone (O<sub>3</sub>)

Chemically forms when UV hits on stratosphere  
Oxygen molecules dissociate into atomic oxygen



Atomic oxygen quickly combines with other oxygen molecules to form ozone



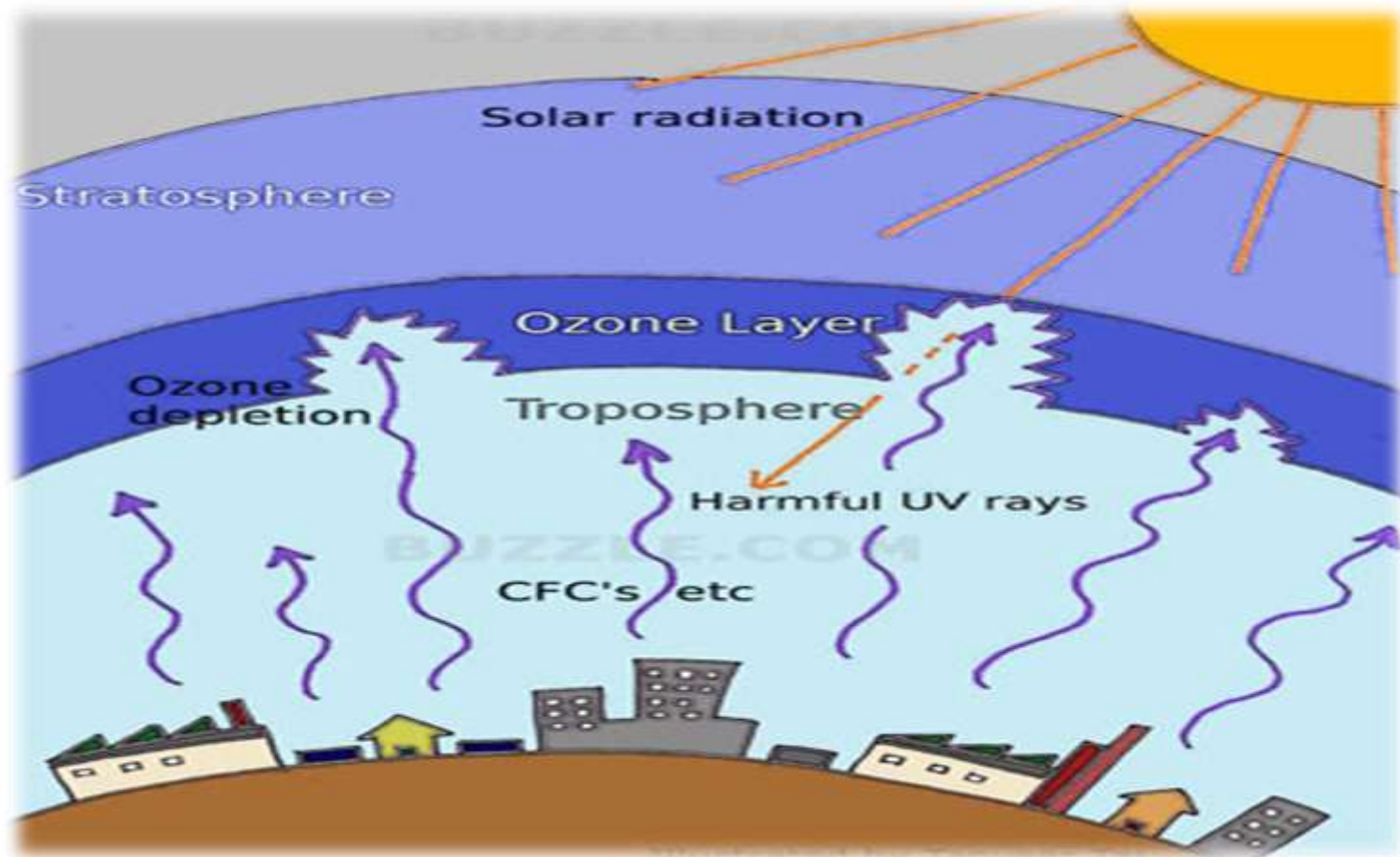


# OZONE DEPLETION

Ozone layer depletion, is simply the wearing out (reduction) of the amount of ozone in the stratosphere. Unlike pollution, which has many types and causes, Ozone depletion has been pinned down to one major human activity.

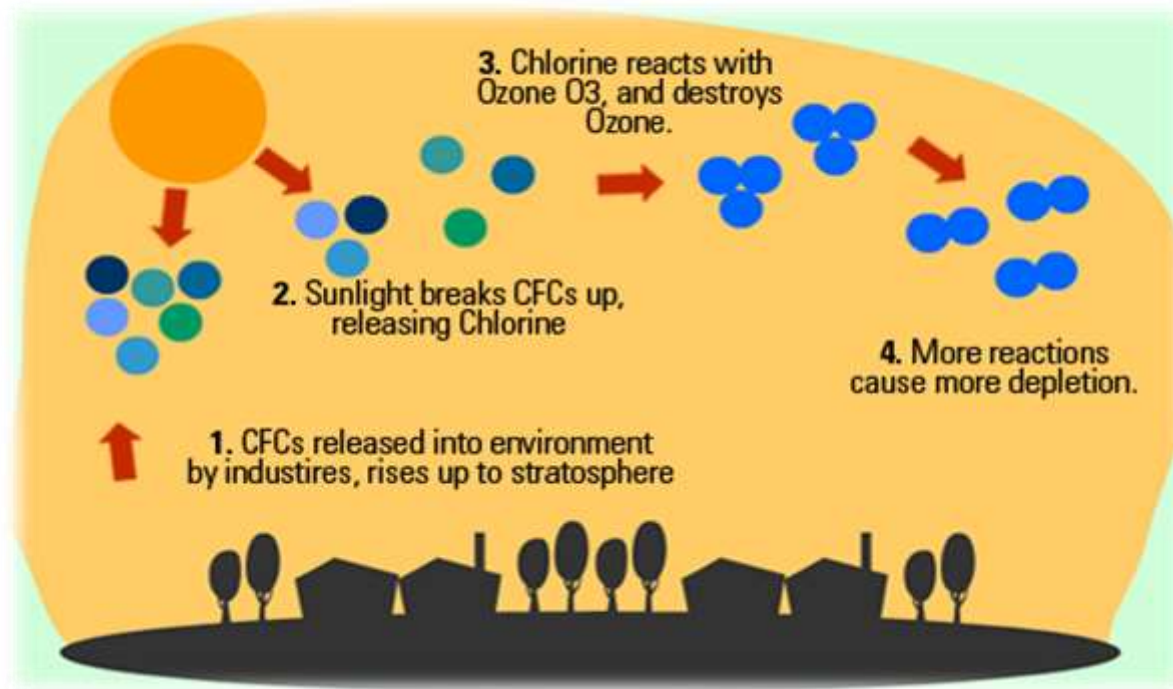
Industries that manufacture things like insulating foams, solvents, soaps, cooling things like Air Conditioners, Refrigerators and 'Take-Away' containers use something called chlorofluorocarbons (CFCs).

Depletion begins when CFC's get into the stratosphere. Ultra violet radiation from the sun breaks up these CFCs.



The breaking up action releases Chlorine atoms. Chlorine atoms react with Ozone, starting a chemical cycle that destroys the good ozone in that area.

One chlorine atom can break apart more than 100,000 ozone molecules.

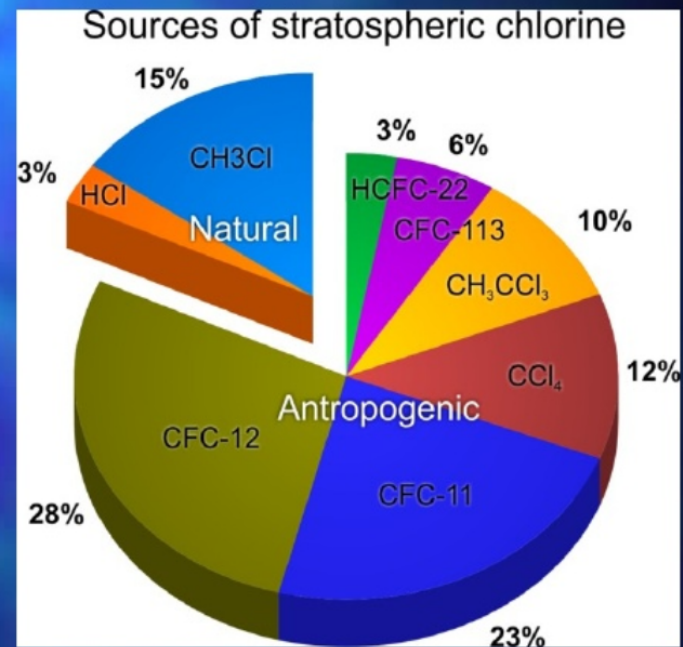


# CAUSES OF OZONE DEPLETION

- Man-made Causes
  - 1) Chlorofluorocarbons (CFCs)
  - 2) Halons
  - 3) Methyl Chloroform
  - 4) Hydrofluorocarbons (HCFCs)
- Natural Causes



# Ozone Depleting Substance



# IMPACTS OF OZONE DEPLETION

## **1) HARM TO HUMAN HEALTH:**

- (a) More skin cancers, sunburns and premature aging of the skin.
- (b) More cataracts, blindness and other eye diseases.

## **2) ADVERSE IMPACTS ON AGRICULTURE:**

- (a) Plant growth, especially in seedlings, is harmed by more intense UV radiation.
- (b) Major crop species are particularly vulnerable to increased UV, resulting in reduced growth, photosynthesis and flowering.

### 3) **EFFECTS ON PLANTS:**

Physiological and developmental processes of plants are affected by UVB radiation, even by the amount of UVB in present-day sunlight.



Ozone injury to yellow-popular



Ozone injury to milkweed

1999

#### **4) EFFECT ON ANIMALS:**

- (a) In domestic animals, UV overexposure may cause eye and skin cancers.
- (b) Species of marine animals in their developmental stage (e.g. young fish, shrimp larvae and crab larvae) have been threatened in recent years by the increased UV radiation under the Antarctic ozone hole.

#### **5) EFFECT ON MATERIALS:**

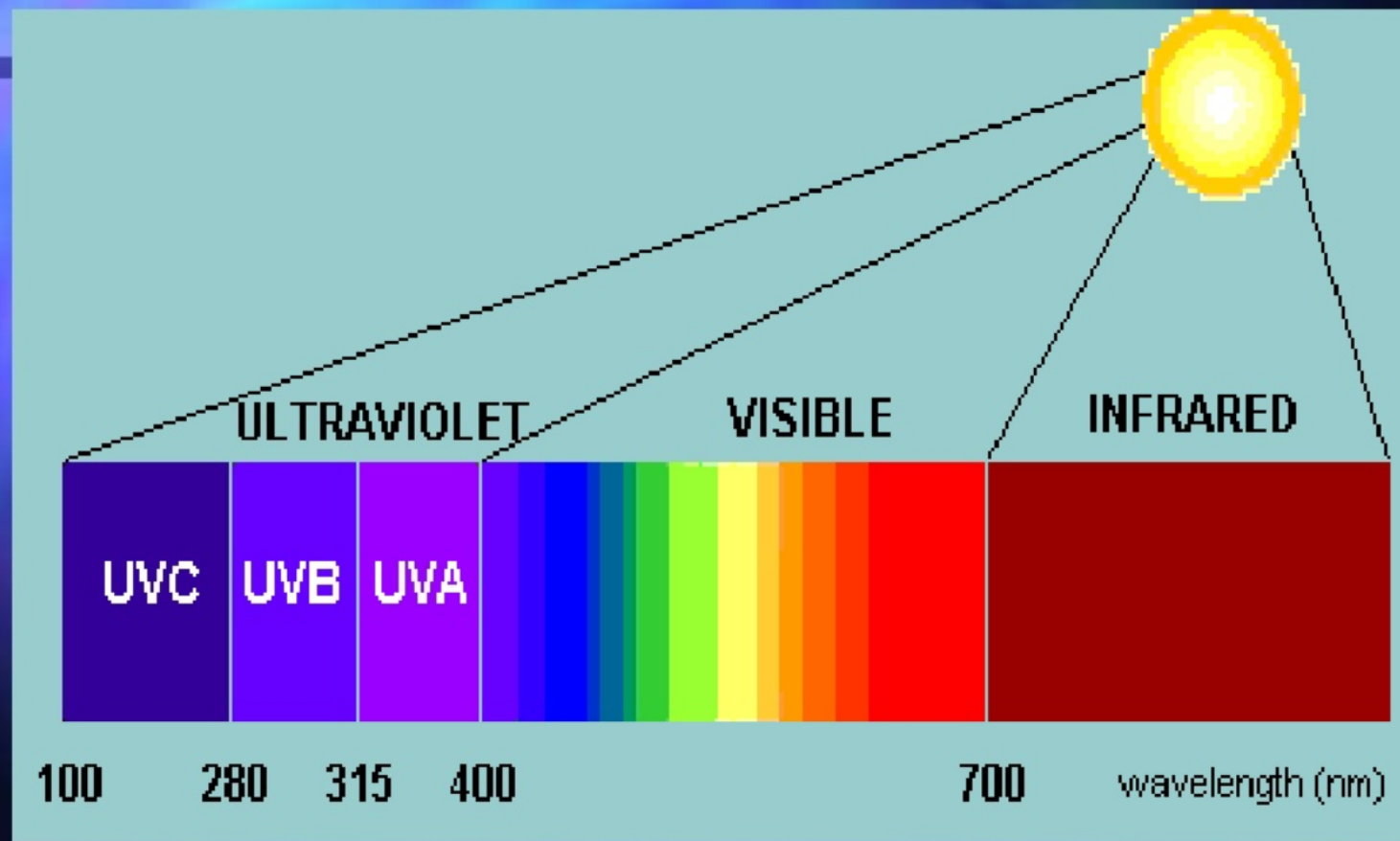
- (a) Wood, plastic, rubber, fabrics and many construction materials are degraded by UV radiation.  
The economic impact of replacing and/or protecting materials could be significant.

# IMPORTANCE OF OZONE LAYER

Ozone is concentrated in the lower stratosphere between 15 and 30 km above the earth's surface – the so-called 'ozone layer'. Ozone can be produced by numerous chemical reactions, but the main mechanism in the atmosphere for its production and removal is absorption of ultra-violet (UV) radiant energy from the sun.

The maintenance of enough stratospheric ozone to absorb harmful UV sunlight is therefore vitally important to all life forms on earth.

## Stratospheric Ozone and Ultraviolet Radiation (UVR)





## EFFECTS ON HUMAN HEALTH

- Skin Cancer (melanoma and nonmelanoma)
- Premature aging of the skin and other skin problems
- Cataracts and other eye damage
- Immune system suppression

# SKIN CANCER

**Malignant melanoma** - Fastest growing type of cancer in the united states. Risk of malignant melanoma has increased 10%

**Nonmalignant melanoma**- less deadly than malignant melanoma

Risk of nonmalignant melanoma has increased 26%

**Basal carcinomas** –small tumors, fleshy bumps or nodules .penetrate into bones.

**Squamous Cell Carcinomas** -unlike basal cell carcinoma it can spread to other parts of the body.



- Other skin damages

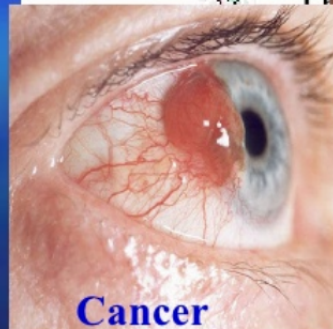


**Actinic keratoses and premature aging of the skin**

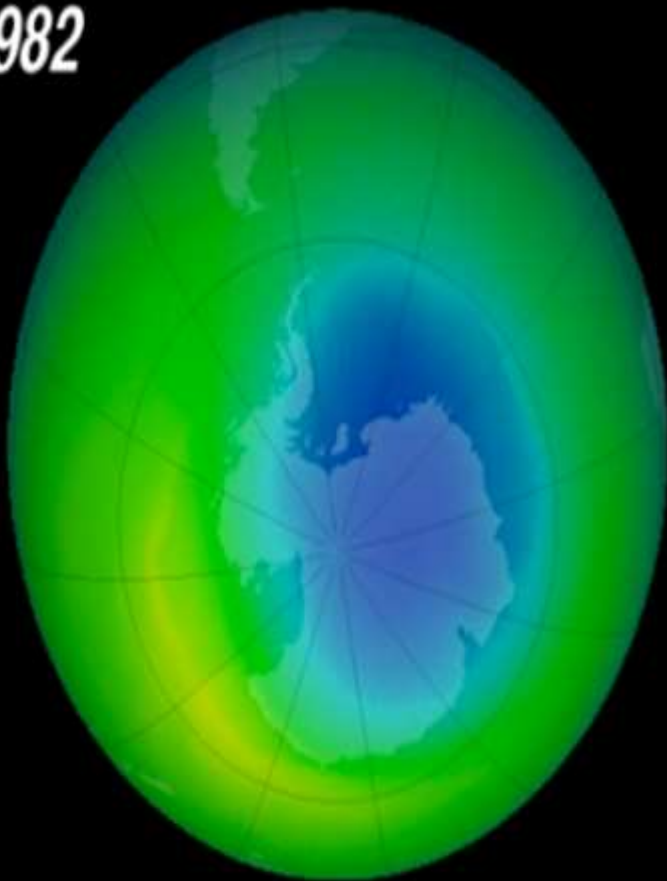
# Cataracts and other Eye damage

Over Exposure to UV-B....

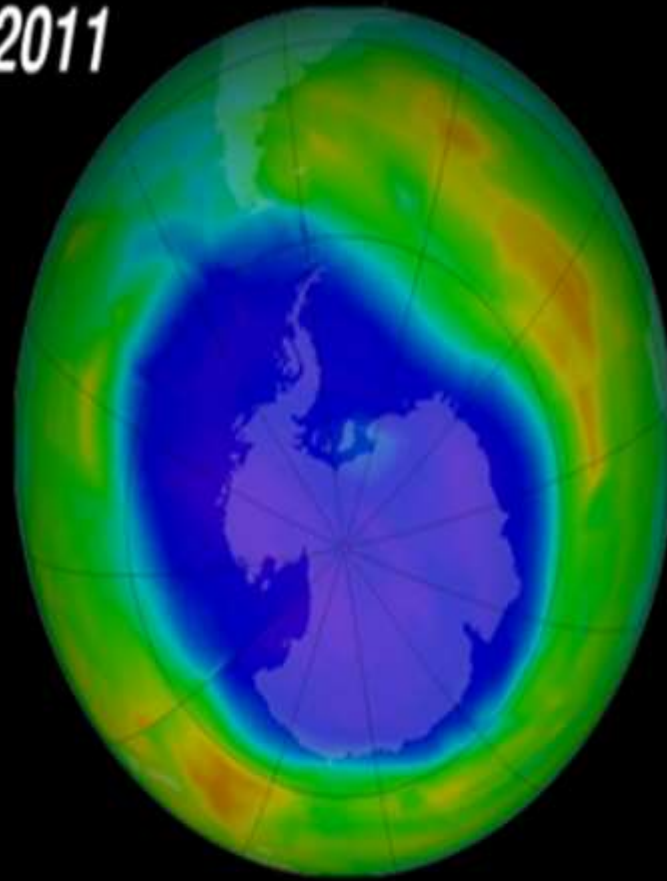
- ❑ Increases the risk of cataracts
  - Induces type of protein that provokes cleaving (splitting) in the lens
  - Leading cause of blindness
  - The prevalence of cataract after age 30 is doubling each decade
- ❑ Causes pterygium
  - A wedge-shaped growth



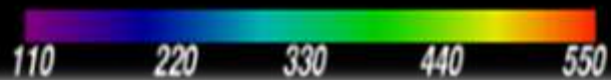
1982



2011



*Ozone (Dobson Units)*





# MEASURES TO PREVENT THE OZONE DEPLETION

- 1) Limit private vehicle driving
- 2) Use eco-friendly household cleaning products
- 3) Avoid using pesticides
- 4) Developing stringent regulations for rocket launches
- 5) Banning the use of dangerous nitrous oxide

# INTERNATIONAL MEASURES

1. Montreal protocol signed in 1987.
2. Comprise of 189 countries now.
3. To reduce CFC substances.



सत्यमेव जयते

# NATIONAL LEVEL MEASURES

1. Singapore banned use of CFC products in 1991D.
2. Countries can control the import and manufacture of CFC product.

# Prevention of Ozone Depletion

- Use unleaded gasoline in vehicles
- Equip vehicles with catalytic converter
- Avoid smoking
- Replace CFC's with HCFC's
- Enforcement of Montreal Protocol
- Gain a better overall understanding on just how ozone depletion is affecting our planet

# Protection

- Sunglasses with 100% UV block
- Wrap around
- Eye protection



# GLOBAL WARMING

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- ✓ Increase of the average temperature on Earth.
- ✓ Ten warmest years since global temperatures measured all occur within the last 12-year period 1997-2008.
- ✓ Green houses gases trapping heat.

# EFFECTS OF GLOBAL WARMING

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- FLOODING
- DROUGHT
- EXTREME HEAT WAVES
- RISING SEA LEVELS
- MELTING OF GLACIERS
- RISK OF SEVERE ACNE
- SPREADING OF INFECTIOUS DISEASES
- ECOLOGICAL IMBALANCE
- AGRICULTURAL CHANGES

# FLOODING



Louisiana, US, 2006

# DROUGHT



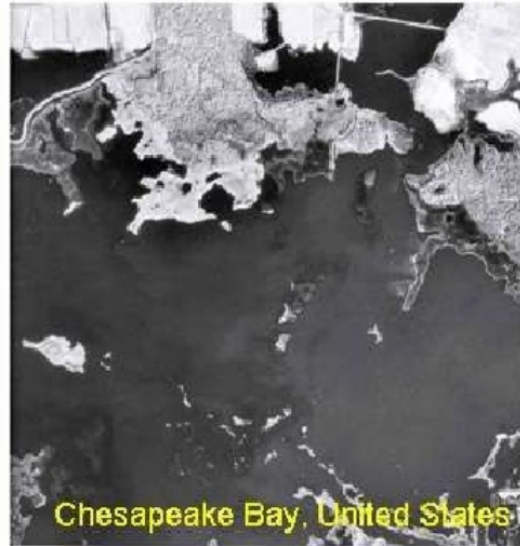
Amazonas October 2005

# EXTREAM HEAT WAVES



Munich Zoo, Germany, August 2003.

# RISING SEA LEVELS



# MELTING OF GLACIERS

Arti

2007



Zugspitze, Germany, 2007

July 27, 2007

Sea Ice Concentration (percent)



# HEALTH HAZARDS

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- Risk of Severe Acne.
- Likely Infectious Diseases – Malaria, Dengue fever.
- Respiratory Problems – Asthma, bronchitis.
- Chest pain, Severe infection in Lungs.

# ECOLOGICAL IMBALANCE



Hurricane Katrina over US



1.Clean or replace filters on your furnace and air conditioner.

2.Choose energy efficient apparatus.

3.Do not leave appliances stand by.

4.Recycle your organic waste.

5.Plant a tree.

6.Switch to green power.

7.Encourage the switch up to renewable energy.

8.Protect and conserve forest worldwide

9.Buy Organic food as much as possible.

10.Recycle and Reuse.

11.Steps from the Government