## 20 Frequently Asked Questions on the Protection of the OZONE LASSER







Multilateral Fund for the Implementation of the Montreal Protocol



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The image on the cover was painted by Brianne Zapatero Mallari (age 16) from Quirino General High School as an entry to the 2008 Poster Making Contest on Ozone Layer Protection organized by the Movement for the Integrated Development of the Youth (MIDY), Office of the Governor, Province of Quirino in cooperation with the Philippine Ozone Desk.

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WHAT is ozone?

**Constant** is a gas that is naturally present in our atmosphere. Because an ozone molecule contains three oxygen atoms, it has the chemical symbol 03. The word "ozone" is derived from the Greek word ozein, meaning "to smell." Ozone has a pungent odor that allows it to be detected even in very low amounts. Ozone have a relatively low abundance. For every ten million air molecules, there are only three ozone molecules.



... there are only three ozone molecules for every ten million air molecules...

Ozone is poisonous, and once inhaled, may be fatal. Fortunately, most ozone (about 90%) is found in the stratosphere, a region that begins about 10 to 16 kilometers above the earth's surface and extends up to about 50 kilometers. The large amount of ozone in the stratosphere (also known as stratospheric ozone) is considered "good ozone" because it protects the earth from harmful UV rays.

The remaining 10% of atmospheric ozone is in the troposphere, the region closest to earth. Ozone found in the earth's surface is formed from pollutants and is considered "bad ozone" because it is harmful to humans and plant and animal life.



## WHAT is the ozone layer and why is it important to all life forms on earth?

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**The** ozone layer is a thin, fragile shield that envelops the earth and effectively filters about 90% of the sun's harmful ultraviolet-B radiation (UV-B) and completely screens out lethal ultraviolet-C radiation (UV-C). It is located 20 to 40 kilometers above the earth's surface.

Damage to ozone layer will naturally mean the entry of harmful rays into the atmosphere. Without the ozone layer, there will be no life on earth.

Ozone molecules are dispersed in the stratosphere, and therefore, the physical thickness of the ozone layer is tens of kilometers. However, if all ozone molecules are brought together and uniformly distributed into a gas layer over the globe, the resulting layer of pure ozone would have a thickness of only three to five millimeters.

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## **WHAT is the "ozone hole" and where is it located?**

**The** ozone hole is not a literal hole in the atmosphere. It refers to the thinning of the ozone layer, or the loss of the blocking effect of ozone against ultraviolet rays. This allows the entry of greater concentrations of UV-B putting all life forms at risk.

The ozone hole was first observed over the Antarctic area in the early 1980s. Antarctic ozone depletion is seasonal, occurring primarily in late winter and spring (August-November). As of September 2008, the size of the ozone hole is about 27 million square kilometers which is almost as big as North America.



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Below is the table of geographic areas to be used as references in conceptualizing just how large the ozone hole can get.

Following are referable areas:					
Australia	8,923,000 Sq Km				
United States	9,363,130 Sq Km				
Europe	10,498,000 Sq Km				
Antarctic	13,340,000 Sq Km				
Russia	17,078,000 Sq Km				
North America	25,349,000 Sq Km				
Africa	30,335,000 Sq Km				
S. Pole to 70 S	15,300,000 Sq Km				

Source: NOAA Climate Prediction Center

Ozone Hole History (source: www.theozonehole.com) accessed 02 Feb 2009

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# WHAT are the effects of ozone depletion?

**Zone** depletion allows the entry of harmful ultraviolet-B (UV-B) radiation from the sun. The sun is the primary source of ultraviolet radiation.

There are three categories of UV:

- UV-A wavelengths (320-400 nm) are only slightly affected by ozone levels. Most UV-A radiation is able to reach the earth's surface and can contribute to tanning, skin aging, eye damage, and immune suppression.
- UV-B wavelengths (280-320 nm) are strongly affected by ozone levels. Decreases in stratospheric ozone mean that more UV-B radiation can reach the earth's surface, causing sunburns, snow blindness, immune suppression, and a variety of skin problems including skin cancer and premature aging. UV-B is harmful.
- UV-C wavelengths (100-280 nm) are very strongly affected by ozone levels, so that the levels of UV-C radiation reaching the earth's surface are relatively small. UV-C is lethal.

From the National Oceanic and Atmospheric Administration's Surface Radiation Research Branch http://www.srrb.noaa.gov/UV (access year: 2005)

In general, moderate exposure to UV radiation helps maintain an adequate level of vitamin D and is not detrimental. However, too much exposure to UV-B harms not just humans but all life forms.

On land, UV-B radiation endangers all life forms. The immune systems of humans exposed to high level of UV-B will deteriorate. Hence, they will become more prone to diseases and other disabilities such as skin cancer, eye cataract and blindness. Physically, they will age more rapidly. Further, their sources of food will become more limited since UV-B inhibits the growth of crops and trees.

Ultraviolet light also degrades polymers used in buildings, paints, packaging and countless other substances. Plastics used outdoors are almost likely to be affected. Countries in tropical regions will be severely affected by the degradation of these building materials and will cost billions of dollars in damage. On water, UV-B radiation penetrates the ocean floor damaging the propagation of phytoplankton organisms, the primary food source of most marine life. This affects the marine food chain which also involves humans at the end of the food chain. Many marine species are humans' main sources of food. Fish eggs and young plants with developing leaves are also particularly susceptible to damage from overexposure to UV.



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## **WHAT causes ozone** depletion?



**The** depletion of the ozone layer is caused by certain man-made chemicals called ozone-depleting substances or ODS.

## WHAT are ODS and what are their uses?

**ODS** are man-made compounds containing chlorine and bromine that have the potential to react with ozone molecules in the stratosphere.

### ODS and their uses

Classification	ODS	Use
Annex A, Group I	CFC 11	<ul> <li>&gt;Refrigerant: domestic, commercial and transport refrigerators; air-conditioning and heat pump systems; motor-vehicle air-conditioners</li> <li>&gt;For flushing</li> <li>&gt;Blowing agent: foam blowing agent for manufacture of polyurethane, phenolic, polysterene and poly- olefin foam plastics</li> </ul>
	CFC 12	>Refrigerant >For flushing
	CFC 113	>Cleaning solvent: for electronic assembly production processes, precision cleaning and general metal de- greasing >For dry cleaning and spot cleaning textile industry
	Mixtures of CFC 12 and ethylene oxide	>For medical sterilization
Annex A, Group II	Halon	>Fire extinguishing agent
Annex B, Group II	Carbon tetrachloride	>Feedstock for chemical synthesis and laboratory testing
Annex B, Group III	1, 1, 1 trichloroethane or methyl chloroform	>Cleaning solvent >For dry cleaning and spot cleaning textile industry
Annex C, Group I	HCFC 22	>Refrigerant >For flushing
	HCFC 123	>Refrigerant >For flushing >Fire extinguishing agent
Annex C, Group II	HBFC	>Fire extinguishing agent
Annex E, Group I	Methyl bromide	>Fumigant: pesticide for soil fumigation, pre-shipment and quarantine applications, structural facilities, buildings, golf courses and stored commodities

Among all ODS, the most widely used are chlorofluorocarbons or CFCs. Discovered in 1928 by Thomas Midgely and considered as "miracle compounds" in the 1930's, CFCs had all the qualities of an ideal chemical: seemingly harmless to humans and the environment, inert and immensely stable, odorless, nonflammable, non-corrosive and nontoxic, inexpensive to produce and easy to store.

CFC is the most widely used ODS in the country because of its widespread applications in homes, industries and

the servicing sector. They are used as cooling agent in refrigerators, freezers and air-conditioners, as propellant in spray cans, aerosols and metered-dose inhalers, solvents in computer and electronic circuits, blowing agents for making foam and other industrial applications.

Halon, on the other hand, is a chemical used in fire extinguishers. Methyl bromide is a broad spectrum pesticide used for the control of various insect pests, nematodes, weeds, pathogens and rodents.

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## HOW do Ozone-Depleting Substances (ODS) destroy ozone molecules?

**DDS** released to the atmosphere set off a complex chain reaction that leads to the destruction of ozone molecules.

The process sets into motion a continuing cycle that results in the destruction of ozone. One chlorine atom from a CFC molecule can destroy up to a hundred thousand ozone molecules.



**TES** By stopping the production and use, and by proper handling of CFCs, methyl bromide, and other ODS, the ozone layer can be saved.

The ozone molecules making up the ozone layer are created and destroyed in a natural cycle. A balance in the cycle has been maintained for millions of years and was only disturbed by the release of ODS in the atmosphere beginning 1930s.

It is important to know that once ODS are phased out, the ozone layer will slowly repair itself.

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## HOW can ordinary citizens help in saving the ozone layer?

**People** can help save the ozone layer by patronizing products and services that do not use ODS. Here are some tips on how individuals can be ozone-friendly:



a. Stop using ODS! Patronize ODS alternatives or substitutes.

### **ODS Alternatives/Substitutes**

USE	ODS	ALTERNATIVES
Refrigerants	CFC HCFC*	Ammonia Hydrocarbon (HC) Hydrofluorocarbon (HFC) HFC blends
Blowing Agents	CFC HCFC 141b*	Carbon dioxide HC Methylene chloride Water-blown technology
Cleaning Solvents	CFC Carbon tetrachloride HCFC 141b* HCFC 225* Methyl chloroform	Alcohol Methylene chloride No-clean techniques Trichloroethylene Turpine Water
Propellants	CFC	HC HFC Mechanical pump Water
Fire Extinguishers	Halon HBFC HCFC 123*	Carbon dioxide Dry powder FE 36 Fire-resistant materials Foam Good fire prevention techniques HFC 227ea or FM200 Nitrogen Water
Fumigants	Methyl bromide	Basamid Dried bean plant material Heat treatment Hydrocyanide Integrated commodity management Integrated pest management Natural pesticides like neem Phosphine Rice hull embers Sulfuryl fluoride

\*HCFC is used as a transitional substance, necessary as an available replacement for CFC. For most developing countries, total CFC phaseout is in the year 2010, while total HCFC phaseout is in 2040.

b. Check the labels of consumer goods, and make sure that you buy products that are CFC-free or ozone-friendly.

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- c. For those with asthma, choose CFC-free metered-dose inhalers (MDI).
- d. Have your home and car air-conditioner and refrigerators serviced at shops accredited by the Department of Trade and Industry (DTI). This ensures that they have the tools, equipment and certified technician for environment-friendly servicing.
- e. If your air-conditioner or refrigerator still runs on CFC-12 as a refrigerant, have it retrofitted or converted to an ODS-free system in a DTI-accredited shop.

# WHAT has been done by the international community to save the ozone layer?

The alarming rate of ozone depletion has led developed and developing countries to draw up an agreement known as the Montreal Protocol on Substances that Deplete the Ozone Layer on 16 September 1987. As of March 2009, this agreement binds 194 member countries to take immediate steps towards ODS phaseout.

Parties to the Montreal Protocol have agreed to gradually reduce and eventually phase out their production and consumption of ODS, following a phase out schedule:



## PHILIPPINES AND OTHER DEVELOPING COUNTRIES MAIN OBLIGATION TO THE MONTREAL PROTOCOL IS TO PHASE OUT ODS FOLLOWING AN AGREED SCHEDULE

Name of ODS	Base Level	1999	2002	2003	2005	2007	2010	2013	2015	2020	2025	2030	2040
CFC (Annex A)	1995-1997	freeze			50%	85%	100%						
CFC (Annex B)	1998-2000			20%		85%	100%						
Halon	1995-1997		freeze				100%						
Methyl Bromide (Non-QPS only)	1995-1998		freeze		20%				100%				
Methyl Chloroform (1, 1, 1 TCA)	1998-2000				30%				100%				
Carbon Tetrachloride	1998-2000				85%		100%						
HCFC	2009-2010							freeze	10%	35%	67.5%	97.5%	100%

\*Developed countries are required to phase out 10 years ahead of developing countries

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## **IS the Philippines a party to the Montreal Protocol? What are its commitments as a party?**

The Philippines signed the Montreal Protocol on September 14, 1988 and ratified it on March 21, 1993. The Philippine Ozone Desk (POD) of the Department of Environment and Natural Resources (DENR) – Environmental Management Bureau (EMB) is the national coordinator of programs for the implementation of the Montreal Protocol. It is also known as the country's National Ozone Unit (NOU).

As of 2006, there have been four amendments and five adjustments to the Protocol. All signatory states to the agreement are automatically bound by adjustments. For amendments, states must first ratify the amendments in chronological order. To date, the Philippine Senate has ratified the following amendments: the London Amendment in 1993; the Copenhagen Amendment in 2001; and the Montreal and Beijing Amendments in 2006.



The Philippines' commitment to the Montreal Protocol is to phase out its consumption of all ODS. The Montreal Protocol defines consumption as production plus import minus export. Since the Philippines is neither a producer nor an exporter of ODS, its consumption is equal to its importation. As part of its monitoring and regulatory function, it has been charged with the issuance of clearances for all ODS importations. The pesticide methyl bromide is monitored/controlled by the Fertilizer and Pesticide Authority (FPA) of the Department of Agriculture (DA).

## WHAT is the national strategy of the Philippines to facilitate an orderly and sustainable phaseout of ODS?

**Th** cooperation with other government agencies, the POD prepared the Philippine Country Program for ODS Phaseout. This specified the schedules and laid out the plans, programs and activities expected to facilitate the phaseout of ODS. Knowing the importance and usefulness of ODS in our daily lives, the national strategy to phase out ODS is by managing importation and usage or simply striking a balance between the supply and demand of ODS in the country.

POD specifically monitors the following industrial sectors: mobile air-conditioning (MAC) sector, refrigeration and air-conditioning (RAC) sector, fire extinguishers sector, solvent sector, chiller sector, foam blowing sector, aerosol manufacturing sector and fumigation sector.



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## WHAT are the on-going projects and activities of the POD? Who are involved?

**There** are currently three projects under the Philippine Ozone Desk: the Institutional Strengthening Project, the National Methyl Bromide Phase-out Strategy, and the National Chlorofluorocarbon Phase-out Plan. These projects are funded by the Multilateral Fund (MLF) for the Implementation of the Montreal Protocol with the World Bank as the implementing agency.

### Institutional Strengthening Project (ISP)

This project is the backbone of all projects under the POD because it supports the EMB in implementing its mandates. ISP has assisted the Philippine government to comply with its commitments to the Montreal Protocol.

In general, the objectives of the ISP are: a) to provide continuing support to the operations and functions of the Philippine Ozone Desk; and b) to further enhance and broaden its capabilities to perform greater task in achieving the ODS phase-out schedule.

More specifically, ISP performs the following tasks:

- Licensing and regulatory functions including coordination with the Bureau of Customs on illegal trade concerns
- Monitoring of ODS importation and usage
- Monitoring of ODS Technical Assistance projects
- Conduct of public awareness campaigns
- Coordination with the MLF, Ozone Secretariat, the World Bank, and other international organizations concerned with Protocol matters

The MLF has provided funds for the project since 1993.

#### National Methyl Bromide Phase-out Strategy (NMBPS)

This project aims to gradually reduce and eliminate a total of 10.3 ODP tons of methyl bromide (non-Quarantine and Pre-Shipment use only). It also aims to ensure that there are viable and permanent alternatives and alternative approaches to maintain this phaseout. However, uses of MB for quarantine and pre-shipment (QPS) are currently exempt from the reduction and phaseout. The project is being implemented by the Fertilizer and Pesticide Authority (FPA) of the Department of Agriculture (DA) in coordination with the POD.

#### QPS versus non-QPS

Quarantine applications are MB treatments to prevent the introduction, establishment and spread of quarantine pests and diseases, to ensure official control, that is performed or authorized by a national plant, animal, environmental protection or health authority.

Pre-shipment applications are treatments other than quarantine applications applied within 21 days prior to export to meet the official requirement of the importing country or existing official requirements of the exporting country. Official requirements are those performed or authorized by a national plant, animal, environmental, health or stored product authority.

Non-QPS applications are MB treatments other than those stated under the QPS applications, such as soil sterilization, stored commodities and structural uses.

Other agencies involved in the implementation of the project:

- **Bureau of Plant Industry (BPI)** coordinates with the FPA in the implementation of the accreditation system for fumigators and in upholding fumigation standards. It also validates and furnishes additional data/information on certificates issued to accredited Quarantine Treatment Providers.
- National Food Authority (NFA) coordinates with FPA through reports on fumigation conducted at NFA warehouses nationwide and mobilize the agency in availing information and attendance to meetings/training conducted by FPA in like with the phase-out strategy and in the use and application of alternatives and substitutes.
- Bureau of Post Harvest Research and Extension (BPHRE) provides information/technology based on the studies and research conducted on fumigation and pest management in stored grains.

### National CFC Phase-out Plan (NCPP)

This is the biggest project under the POD so far. The National CFC Phase-out Plan (NCPP) is a strategy to phase out the

remaining consumption of CFCs in the Philippines following the Montreal Protocol phase-out schedule. It combines policy and regulatory interventions to phase-out the use and importation of CFC so as not to adversely affect the economic functions of society.

Since 1992, there has been a steady decline in the total consumption of ODS. Serious efforts have led to the total phaseout of Methyl Chloroform as of 1997 and CFC 113, 114 and 115 as well as Halon 1301 and 1211 as of 1999. The POD, through the NCPP Project, has aimed to phase out the remaining consumption of CFCs available locally. Importation of CFC-11 has been banned in 2005. The importation of CFC-12 is likewise set to be totally phased-out by 2010 (zero importation of CFCs).

The sectors affected by the phaseout of CFC are the manufacturers of products using CFC, those servicing car air-conditioners, household air-conditioners and refrigerators, and those who own buildings with chillers that use CFC. The project aims to encourage these sectors to shift to alternatives by providing technical and financial assistance for said end-users.

Eligible small and medium-size companies engaged in foam, tear gas and refrigeration equipment manufacturing are provided technical and financial assistance by the NCPP for the conversion of their production technologies to non-CFC based technologies.

The refrigeration and air-conditioning servicing sectors have the largest demand for CFCs in the Philippines. This sector on car air-conditioning (MAC), domestic refrigeration and domestic air-conditioning (RAC) accounted for 75% of total CFC usage at the beginning of the project. The Voucher System is a financial mechanism for providing partial grant assistance to service enterprises in order to manage the use and handling of CFCs. Through this project component, the DENR was able to issue about 2,600 vouchers to eligible service shops/providers to purchase tools and equipment for proper servicing, maintenance, and installation of refrigeration and air-conditioning systems. These tools and equipment is a requirement in securing accreditation of service shops from DTI. With the NCPP, Technical Education and Skills Development Authority (TESDA) also conducts training, assessment and certification of service technicians under competency-based training programs on recovery and recycling of refrigerants and retrofitting of RAC and MAC systems.

The Department of Transportation and Communication – Land Transportation Office (DOTC-LTO) is also part of the NCPP Project through the implementation of a regulation to inspect car aircon systems as a requirement for registration starting 2006 to determine the type of refrigerant used. The test result is used to build a database to determine the volume of vehicles with CFC-using MAC systems and will serve as the basis for LTO to improve policy/regulation to eliminate CFC usage in car air-conditioners.

To ensure the phase-out of CFC in metered-dose inhalers (MDIs), the Department of Health - Bureau of Food and Drugs (DOH-BFAD) issued an Administrative Order to implement the systematic transition from CFC-containing MDIs to CFC-free alternatives.

The investment assistance for an ozone-friendly technology in both servicing and manufacturing sectors as well as enabling policy should have direct and sustainable results in reducing CFC consumption in the Philippines.

The NCPP is being implemented by the Philippine Ozone Desk – NCPP Project Management Unit of the Department of Environment and Natural Resources - Environmental Management Bureau (EMB), with support of other partner agencies. It is funded by the MLF and administered by the World Bank and the Government of Sweden in a cooperative undertaking.

## WHAT are the laws of the country on ODS?

**Uppon** the Philippines' ratification of the Montreal Protocol through Senate Resolution No. 25, the state as party to the international agreement has committed to phase out ODS in the country.

Republic Act 6969, also known as the "Toxic Substances and

Hazardous and Nuclear Wastes Control Act of 1990" provided for the DENR Administrative Order No. 2004-08 or the Revised Chemical Control Order (CCO) for certain chemicals in the priority chemical list. The CCO for ODS covers the ban; limit; and/or regulate the use, manufacture, import, export, transport, processing, storage, possession, and sale

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of ODS. The CCO directs all ODS (except for methyl bromide) importers, dealers, re-sellers and retailers to register and apply for permits at EMB.

Presidential Decree 1464 as amended (Tariff and Customs Code of the Philippines) mandates the Bureau of Customs to enforce other allied regulations, such as the CCO for ODS.

DENR Memorandum Circular # 2005-21 mandates dealers, retailers and re-sellers of ODS, specifically HCFC and CFC, to register with the EMB. Only those registered with the DENR-EMB and the DTI are permitted to purchase, re-sell, distribute and utilize for allowable uses of ODS. The registration is a system of accreditation created to define the capability of any person in handling and using said substances.

The Fertilizer and Pesticide Authority (FPA) regulates methyl bromide. Presidential Decree 1144 mandates the FPA to regulate all pesticides which includes methyl bromide. All methyl bromide handlers must obtain license with the FPA pursuant to PD 1144 and Article III of FPA Rules and Regulations.

Pursuant to Section 6 of the PD 1144, the FPA issued Memorandum Circular No. 02 s. 2007 – Consolidated Guidelines for Handlers of Methyl Bromide in line with the implementation of the Philippine National Methyl Bromide Phase-out Strategy. It covers all handlers of MB to include importers, distributors, pest control operators, fumigators, in-house Certified Pest Applicators, importers/exporters engaging the services of fumigators for MB treatments and national plant, animal, environmental protection and health authorities.

## HAS the Philippines been able to comply with Montreal Protocol phase-out targets?

**The** major initiatives have enabled the Philippines to essentially comply with the schedule of the Montreal Protocol. The total consumption of ODS has steadily declined since 1992. Serious efforts had led to the total phaseout of Methyl Chloroform as of 1997 and CFC 113, 114 and 115 and Halon 1301 and 1211 as of 1999. Importation of CFC-11 has also been banned as of 2005.

Presently, the Philippines imports CFC-12, HCFC and

methyl bromide. The importation of these ODS is being regulated through the Chemical Control on ODS and FPA Administrative Order #1 (for methyl bromide only). According to the country's commitment to the Montreal Protocol, CFC-12 will be phased out by the year 2010, methyl bromide by the year 2015, and HCFC by the year 2040. However, the phaseout of methyl bromide has been accelerated to 2009 instead of 2015, based on the approved national strategy for the phaseout of the said substance.



#### **MB CONSUMPTION PATTERN (ODP MT)**



#### **CFC CONSUMPTION PATTERN (ODP MT)**

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# Other frequently asked questions

#### 16. Why has an "ozone hole" appeared over the Antarctica when ozone depleting gases are released mainly in the Northern Hemisphere?

The Earth's atmosphere is continuously stirred over the globe by winds, that is why ozone-depleting gases are present throughout the stratosphere, including Antarctica, regardless of where they are released.

South Pole is part of a very large land mass (Antarctica) completely surrounded by ocean. This symmetry affects the meteorological conditions that allow the formation of a very cold region in the stratosphere over the Antarctic during winter. The very low stratospheric temperature in Antarctic leads to the formation of polar stratospheric clouds responsible for chemical changes that promote production of chemically active chlorine and bromine. When sunlight comes in Antarctica in September and October of each year, the activation of chlorine and bromine leads to rapid ozone loss.

#### 17. Is there depletion of the Arctic ozone layer?

Yes, depletion of the ozone layer over the Arctic region can be observed in some years in the late winter and early spring period (January to March). But the reduction is much smaller than that of the Antarctic ozone hole due to the dissimilar weather patterns of the two polar regions.

## 18. Do changes in the Sun and volcanic eruptions affect the ozone layer?

Yes, factors such as changes in solar radiation and formation of stratospheric particles after volcanic eruptions affect the ozone layer. But neither factor can explain the average decreases observed in global total ozone over the last two decades.

#### 19. When is the ozone layer expected to recover?

The ozone layer is expected to recover by the middle of the 21st century, assuming global compliance with the Montreal Protocol. ODS will decrease in the coming years under the provisions of the Protocol. But volcanic eruptions in the future could delay ozone layer recovery and climate change may accelerate or delay ozone layer recovery.

#### 20. How is ozone depletion related to global warning?

When the Sun's energy heats the surface, the earth radiates energy back into space. Atmospheric greenhouse gases like water vapor, carbon dioxide, and other gases trap some of the outgoing energy, retaining heat in the earth. This phenomenon is called the "greenhouse effect." Global warming is the increase in the earth's temperature caused by excessive greenhouse gases.

Global warming causes changes in climate which may lead to changes in rainfall patterns, a rise in sea level and a wide range of impacts on plants, wildlife and humans.

Ozone depletion, on the other hand, allows the entry of the sun's UV-B to reach the earth's surface. Ozone depletion is not the principal cause of global warming. The heat generated from ozone depletion and global warming are different.

CFC and HCFC are examples of Ozone Depleting Substances(ODS) which are also greenhouse gases at the same time. Thus, CFC and HCFC cause ozone depletion and global warming.

Other greenhouse gases include: water vapor, carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>), tropospheric ozone (O<sub>3</sub>), perfluorinated carbons (PFCs) and hydrofluorocarbons (HFCs).



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