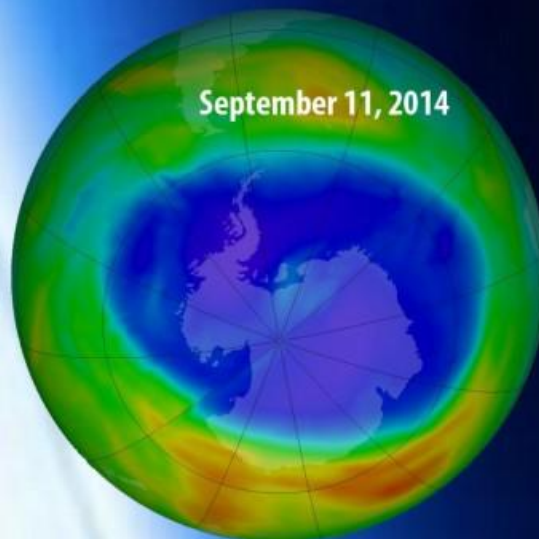


ENVIS-IITM NEWSLETTER
Indian Institute of Tropical Meteorology, Pune
Acid Rain and Atmospheric Pollution
(The project of Ministry of Environment & Forest, Govt. of India)



WORLD OZONE DAY



**Latest image of ozone depletion
over Antarctica**

EDITORIAL TEAM

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"The more clearly we can focus our attention on the wonders and realities of the universe about us, the less taste we shall have for destruction" -Rachel Carson

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EDITORIAL

The ENVIS - IITM centre deals with acid rain and atmospheric pollution and it is well known fact that our atmosphere is being polluted to an extreme level by human interference. This alteration in the natural atmosphere is due to emissions of various air pollutants as a consequence of burning of fossil fuels, industrial activity, transportation, power generation, agricultural production, waste disposal and so on. When dealing with atmosphere it is important to mention here that the atmospheric Ozone is categorized into two types; we have already discussed in our previous newsletters about ozone which is a pollutant present in troposphere. Our present issue is focused on good ozone which is present in stratosphere 15-50 km above the earth's surface. This issue is also significant as it deals with the UNEP/WMO "Scientific Assessment of Ozone Depletion: 2014" report released on 10 September 2014, which is released every four years. This year is significant as it announced the first signs of recovery of the ozone layer. I was honored to be one of the members of review panel representing India to this scientific assessment report. We hope our attempt to convey scientific information in simple language will help to create awareness amongst the common public which is the first step towards safeguarding our environment.

— Dr. Gufran Beig

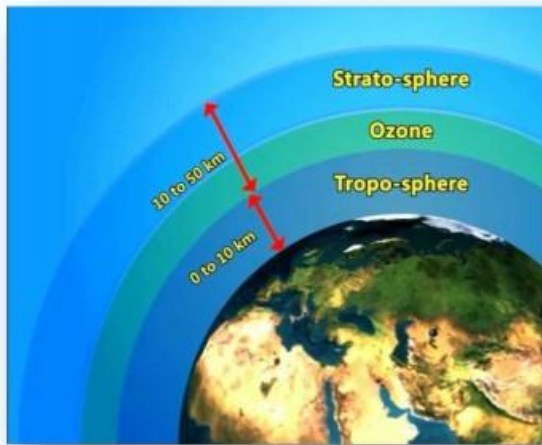
Ozone and the Ozone Layer

OZONE OR TRIOXYGEN O₃, IS AN INORGANIC MOLECULE WITH THREE OXYGEN ATOMS BOUND TOGETHER. IT IS UNSTABLE AND HIGHLY REACTIVE. IT PLAYS A VITAL ROLE IN THE ATMOSPHERE.

Ozone is mainly found in two regions of the Earth's Atmosphere:

Troposphere: 10-15% of ozone resides in this region (15 km above the surface) and comes in direct contact with life forms, which proves to be toxic to living systems, harmful to crop production, forest growth and human health and thus known as "**BAD OZONE**".

Stratosphere: Most of the atmospheric ozone (85 - 90%) is concentrated in this layer between 15 to 30 km above the earth's surface. Ozone in this layer absorbs the

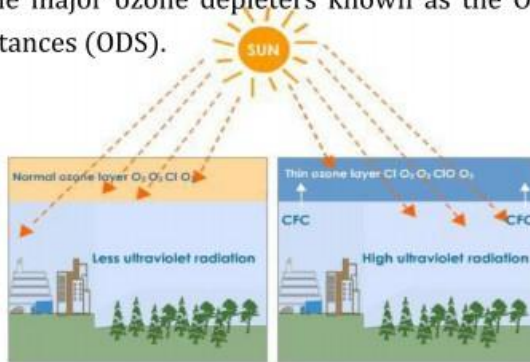


harmful ultraviolet rays (UV) coming from the sun and thus known as "**GOOD OZONE**".

Ozone Depletion

A number of commonly used chemicals halocarbons, methyl bromide, methyl chloroform, carbon tetrachloride, chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs) are the major ozone depleters known as the Ozone Depleting Substances (ODS).

The scientific confirmation of the depletion of the ozone layer prompted



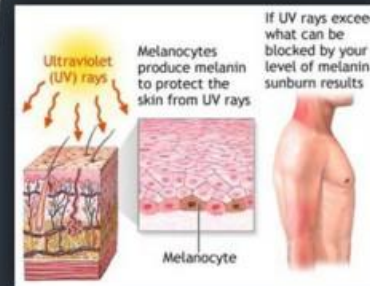
the international community to establish a mechanism for cooperation to take action to protect

Ozone layer the Life Saver

The stratospheric ozone layer, a fragile shield of gas protects the Earth from the harmful UV rays of the sun. The UV radiations are known to cause skin cancer, eye irritation, eye cataract, adverse effects on plants, crops, and ocean planktons.



Effects of Ozone Depletion

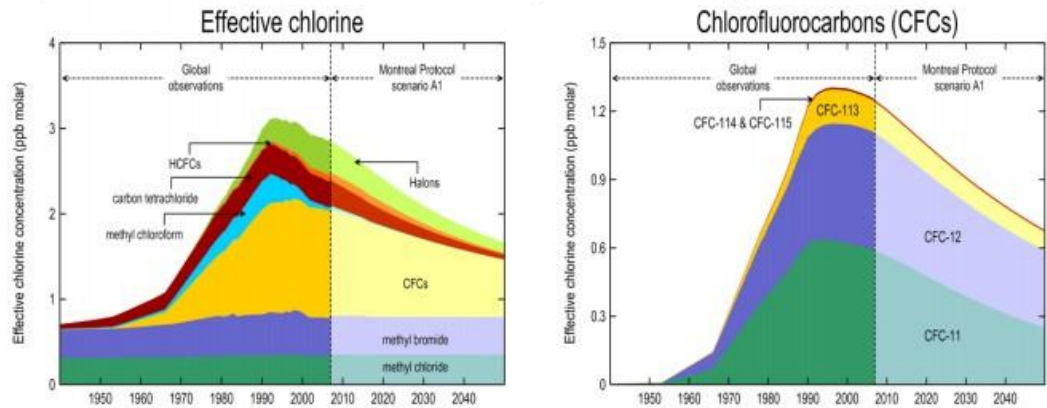


"The major problems in the world are the result of the difference between how nature works and the way people think." - Gregory Bateson

the ozone layer. This led to international treaties; The Vienna Convention for the Protection of Ozone Layer and the Montreal Protocol on Substances that Deplete the ozone layer.

The Montreal Protocol on Substance that Deplete the Ozone Layer

The protocol agreed on 16 September 1987 and entered into force on 1 January 1989. It stipulates that the production and consumption of the compounds that deplete the



Source: CSIRO Marine and Atmosphere Research

ozone in the stratosphere are to be phased out. It requires the control of nearly 100 chemicals in several categories with attention focused initially on chemicals with higher Ozone Depleting Potentials (CFC, Halons). One of the first international environmental agreements that include trade sanctions to achieve the stated goals of a treaty. Offers major incentives for non-signatory nations to sign the agreement. It has significantly contributed to fight against climate change, as many ODS are powerful Green House Gases (GHGs).

Current Status of Ozone Layer

UNEP/WMO Report on "Scientific Assessment of Ozone Depletion: 2014"

The Earth's protective ozone layer is well on the track to recovery in the next few decades thanks to concerted international action against ODS, according to the "Scientific Assessment of Ozone Depletion : 2014" released on 10 September 2014. This report is the latest in a series of twelve scientific Assessments prepared by the world's leading experts in the atmospheric sciences and under the international auspices of the World Meteorological Organization (WMO) and/or the United Nations Environment Programme (UNEP). This report is the eighth in the set of major Assessments that have been prepared by the Scientific Assessment Panel directly as input to the Montreal Protocol process.

Highlights of the Executive Summary of the Scientific Assessment of Ozone Depletion: 2014

ACTIONS TAKEN UNDER THE MONTREAL PROTOCOL HAVE LED TO DECREASES IN THE ATMOSPHERIC ABUNDANCE OF CONTROLLED OZONE-DEPLETING SUBSTANCES (ODSS), AND ARE ENABLING THE RETURN OF THE OZONE LAYER TOWARD 1980 LEVELS.

- The sum of the measured tropospheric abundances of substances controlled under the Montreal Protocol continues to decrease.
- Measured stratospheric abundances of chlorine- and bromine- containing substances originating from the degradation of ODSs are decreasing.
- Total column ozone declined over most of the globe during the 1980s and early 1990s (by about 2.5% averaged over 60°S to 60°N). It has remained relatively unchanged since 2000, with indications of a small increase in total column ozone in recent years, as expected.
- The Antarctic ozone hole continues to occur each spring, as expected for the current ODS abundances. The Arctic stratosphere in winter/spring 2011 was particularly cold, which led to large ozone depletion as expected under these conditions.
- Total column ozone will recover toward the 1980 benchmark levels over most of the globe under full compliance with the Montreal Protocol. This recovery is expected to occur before midcentury in midlatitudes and the Arctic, and somewhat later for the Antarctic ozone hole.

The Antarctic ozone hole has caused significant changes in Southern Hemisphere surface climate in the summer.

Antarctic lower stratospheric cooling due to ozone depletion is very likely the dominant cause of observed changes in Southern Hemisphere tropospheric summertime circulation over recent decades, with associated impacts on surface temperature, precipitation, and the oceans. In the Northern Hemisphere, no robust link has been found between stratospheric ozone depletion and tropospheric climate.



Changes in CO₂, N₂O and CH₄ will have an increasing influence on the ozone layer as ODSs decline.

As controlled ozone-depleting substances decline, the evolution of the ozone layer in the second half of the 21st century will largely depend on the atmospheric abundances of CO₂, N₂O, and CH₄.

In the tropics, significant decreases in column ozone are projected during the 21st century.

Tropical ozone levels are only weakly affected by ODS decline; they are sensitive to circulation changes driven by CO₂, N₂O and CH₄ increases.

"Each and every one of us can make changes in the way we live our lives and become part of the solution." - Al Gore

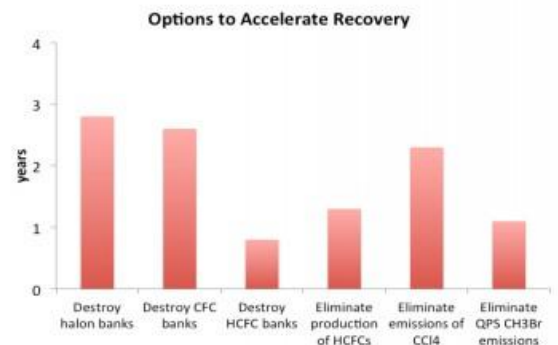
The climate benefits of the Montreal Protocol could be significantly offset by projected emissions of HFCs used to replace ODSs.

The Montreal Protocol and its Amendments and adjustments have made large contributions toward reducing global greenhouse gas emissions. In 2010, the decrease of annual ODS emissions under the Montreal Protocol is estimated to be about 10 gigatonnes of avoided CO₂-equivalent emissions per year, which is about five times larger than the annual emissions reduction target for the first commitment period (2008–2012) of the Kyoto Protocol (from the Executive Summary of the Scientific Assessment of Ozone Depletion: 2010).

While past actions taken under the Montreal Protocol have substantially reduced ODS production and consumption, additional, but limited, options are available to reduce future ozone depletion.

Emissions from the current banks are projected to contribute more to future ozone depletion than those caused by future ODS production, assuming compliance with the Protocol. Possible options to advance the return of the ozone layer to the 1980 level (analyses based on midlatitude EESC) are shown graphically.

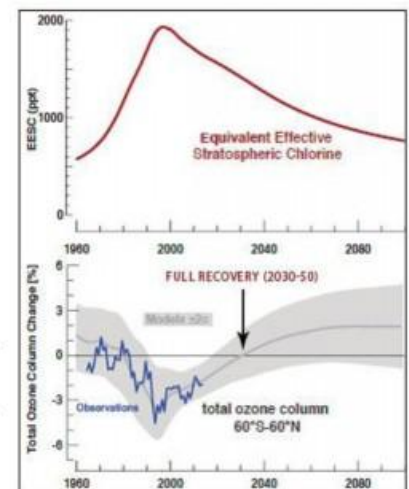
The cumulative effect of elimination of emissions from all banks and production advances this return by 11 years.



Total column ozone will recover toward the 1980 benchmark levels over most of the globe under continued compliance with the Montreal Protocol

Model simulations that take into account the effects on ozone from ODSs and GHGs provide estimates for return dates of total column ozone abundances to 1980 levels. These calculated ranges of dates within which we expect the return of ozone to 1980 values are:

- 2025 to 2040 for global mean annually averaged ozone
- 2030 to 2040 for annually averaged Southern Hemisphere midlatitude ozone
- 2015 to 2030 for annually averaged Northern Hemisphere midlatitude ozone
- 2025 to 2035 for springtime Arctic ozone
- 2045 to 2060 for springtime Antarctic ozone



International Ozone Day

In 1994, The United Nations General Assembly proclaimed 16 September the "International Day for the Preservation of the Ozone Layer", commemorating the date of the signing, in 1987, of the Montreal Protocol on Substances that deplete the ozone layer. This day is celebrated in various institutes, universities, schools, colleges etc. to disseminate the information and spread awareness regarding issues related to ozone.

World Ozone Day – “Environment Awareness Event” at IITM

The world Ozone day was commemorated on Tuesday, 16 September 2014. The event was hosted by ENVIS centre at IITM. The day's celebration included presentations, screening of documentaries and competitions for school students. Pamphlets and registrations forms were circulated in schools in Pune. Entries were invited in two categories in the age group from 10-14 years and 14-18 years for three competitions: drawing, elocution and best out of waste. There were entries from 8 schools with 55 student participants for the Environment awareness event. Dr. Gufran Beig (ENVIS coordinator) formally welcomed the audience. Ms. Neha Parkhi (Senior Program Officer ENVIS center, IITM) briefed about the World Ozone Day and introduced the ENVIS website to the audience.

Two public lectures were organized to enlighten the audience on environmental issues.

The first lecture was presented by Dr. Gufran Beig (ENVIS coordinator) on "Ozone Hole: Discover to Recovery & Recovery to worry", the main highlights were Ozone hole- a challenge for the scientific community, UNEP-WMO Ozone assessment report September 2014 and global atmospheric problems.

The second lecture was delivered by Dr. R. R. Kelkar (Ex-DGM of Indian Meteorological Department) he guided on the monsoon delay, El Nino, reasons behind floods in Orissa, Bihar, Assam, Jammu & Kashmir and the Malin disaster.

Two documentaries were screened one related to "What is Ozone layer" and the other on "SAFAR Project" the first air quality forecasting project in India.

The students actively participated in the drawing and elocution competitions. The students displayed their best out of waste entries. All the participants were felicitated by Green Gift and participation certificate. The winners were felicitated by trophies, green gift and certificates. All the students, teachers, guest & team members were gifted a plant sampling to encourage tree plantation. Dr. Omkar Shukla (Hindi Officer, IITM) presented the vote of thanks and concluded the function.



Drawing Competition



Elocution Competition



Best out of Waste Competition



ENVIS Coordinator with participants



"The threat to the planet is us. It's actually not a threat to the planet- it's a threat to us."

- Margaret Atwood

RECENT INTERNATIONAL DEVELOPMENTS UNDER THE MONTREAL PROTOCOL

The United States, Canada, and Mexico together submitted a proposal to phase-down consumption and production of hydrofluorocarbons (HFCs) under the Montreal Protocol on Substances that Deplete the Ozone Layer in May 2014. Global benefits of the proposal can yield significant reductions of over 90 gigatons of carbon dioxide equivalent (CO₂eq) through 2050.

DO YOU KNOW?

- ✚ Many ODS have high Global Warming Potentials (GWP). For example, CFC-12 has a GWP around 10,000 and HCFC-22 has a GWP around 1,800.
- ✚ In absence of Protocol and associated agreements, atmospheric levels of ODS could have increased TEN fold by 2050.
- ✚ According to global models, the Montreal Protocol will have prevented 2 million cases of skin cancer annually by 2030, averted damage to human eyes and immune systems and protected wildlife and agriculture according to UNEP.

"Every year the International Ozone Day reminds us of what we can achieve through unity of purpose, and provides us with renewed impetus and confidence that through committed global partnerships we can achieve our goals – however ambitious." - Ibrahim Thiaw (UNEP Deputy Executive Director)

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