

Let's cover up the ozone

Ever heard of blanket protection? Imagine if all of us were covered uniformly, cosily drawn away from the harmful and powerful radiation around us. The ozone layer in the atmosphere is our very own warrior that protects earth from the sun's powerful ultraviolet radiation. However, over the last three decades this buffer is being bombarded by pollution and has resulted in the breaking down of this protective layer. Scientists have discovered that chemical compounds called CFCs (chlorofluorocarbons), found in aerosol sprays and refrigerants are the main reason for the depletion of this protective shield. The layer above the Antarctic has been the most impacted, due to multiple factors. One is that the industrialised nations in the northern hemisphere like the U.S. and those in Europe are responsible for having emitted a lot of CFCs into the atmosphere. The other reason is the conducive temperature of the region. The scale of the damage here has been measured to be as much as 65 per cent.

Effects of depletion

The ozone depletion has led to

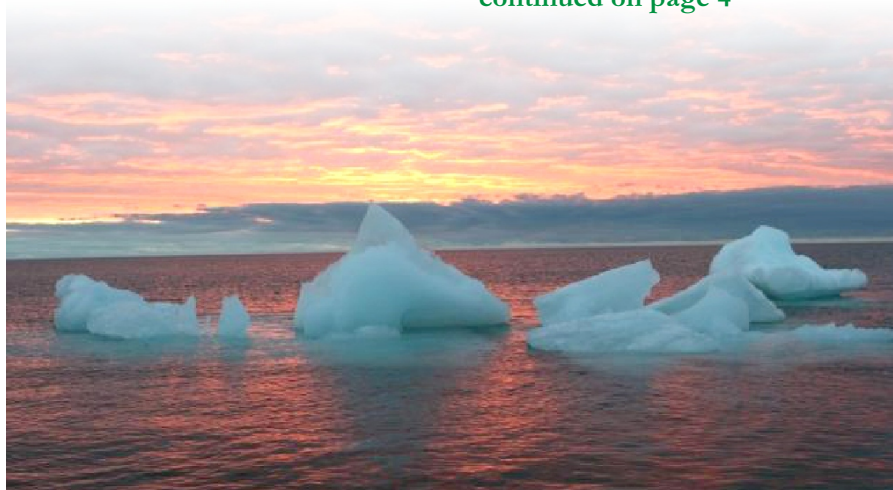
a worldwide concern as the thinning down of this protective coat is allowing harmful ultraviolet light to pass through, which in turn is impacting the environment and has led to many health hazards in humans. Some research also shows that further shrinking of the ozone layer will result in an increase in the number of cases of malaria, cataracts and other infectious disease.

The depletion of the layer impacts the lifecycle of plants, leading to a disruption in the food chain. Animals and water bodies are also affected.

Even the most basic microscopic organisms such as plankton may die out. And this only means that all other animals that are above plankton in the food chain will be wiped out in time, along with other ecosystems such as forests and deserts.

With every one per cent depletion of the ozone layer, an additional two per cent of the ultraviolet rays can reach the surface of the planet. Governments across the world are taking proactive steps to make sure we don't wipe away the ozone layer

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Guest column

International Day for the Preservation of the Ozone Layer



16th Sept 2013 : Extraordinary challenges require extraordinary responses. A generation ago, the world's nations agreed to act definitively to protect the ozone layer, initiating an inter governmental process that blazed new trails.

As we implement the outcomes of the 2012 Rio+20 Conference on Sustainable Development, the remarkable success story of the Montreal Protocol on Substances that Deplete the Ozone Layer provides a beacon of hope. It provides protection for the ozone layer, significantly contributes to climate mitigation and reminds us that, faced with existential threats, the nations of the world are capable of cooperation for the common good. My hope is that this success will inform and inspire the international community in charting a new vision and responsive framework for the period beyond 2015, the deadline for achieving the Millennium Development Goals. Sustainable development -- enabled by the integration of economic growth, social justice and environmental stewardship -- must become our global guiding principle and operational standard.

- Ban Ki-Moon
UN Secretary General

Chairman's Desk

Interview with NASA Scientist : Paul Newman



Paul Newman
Senior Scientist, NASA

14th Sept. 2013, Chincoteague, Virginia, USA: on hurricane aircraft field mission at the Wallops Island Flight Facility, Rajendra Shende, Chairman TERRE and former Director UNEP, on the occasion of International Ozone Day -2013 had chat with Paul Newman of NASA. Question-Answers follow:

1. How do you compare the present status of the Stratospheric Ozone Layer with last two decades?

The ozone layer continued to decline and threaten life on the earth till the late 1990s, but that decline stopped about 10 years ago thanks to the world wide actions to phase out ODS, which resulted in a decline in chlorine loading in the stratosphere. However, the evidence of the start of a return of the Ozone layer to the pre-1980 state is a bit thin at present. There is a lot of year-to-year variability of ozone, and this variability masks the expected slow upward ozone trend.

2. When MP came into effect there was famous graphical curve presented by the Scientific Assessment Panel of WMO and UNEP which depicted 'peaking and then tapering off' the chlorine loading and hence ozone depletion. Do you consider that curve is being traced well by the humanity action?

ODSs are clearly declining in our atmosphere. Ground stations show that nearly all ODSs are falling. We have satellite measurements that also show that chlorine levels in the stratosphere are decreasing. There are still a few odds and ends about these declines. For example, a chlorocarbon (carbon tetrachloride) is declining at a slower rate than scientists expect, but even this gas is decreasing in our atmosphere.

The observations generally follow that famous graphical curve of peaking and tapering off. The observations show that the peak occurred around 1996, and now tapering off. The slow decline of ODSs is because these chlorofluorocarbons (CFCs) have very long atmospheric lifetimes. For example, the lifetime of a CFC-12 molecule in the atmosphere is about 100 years.

3. Have we peaked in Ozone layer depletion and chlorine loading?

Yes. We're clearly "over-the-hump". Hard to say if ozone layer is getting better yet. There is some evidence, but not

conclusive. In short, while chlorine loading observed is as per the predicted model, but corresponding Ozone recovery is not yet evident.

4. Is there a good and high probability that inaction on climate change is resulting into slow recovery of Ozone Layer?

Carbon dioxide increases will cause the upper stratosphere to substantially cool, and this will lead to a stronger ozone recovery in the upper stratosphere.

In the lower stratosphere, the problem breaks into two parts: the tropics and the mid-latitudes. In the tropics, climate change will slow ozone recovery due to a changing circulation, and possibly causing ozone to decrease. In the mid latitudes, climate will cause ozone to increase beyond its natural level.

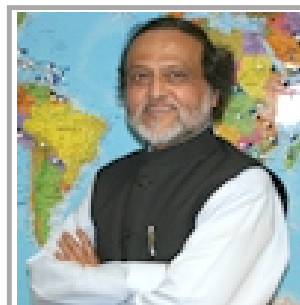
However, over all we can say that inaction to address climate change will result in a different stratosphere and ozone layer.

5. What is your key message as key ozone scientist to policy makers at this juncture?

Don't lose focus.

First, we need to continue to watch the stratosphere to understand if our policies are working. Second, we need to maintain the provisions of the Montreal Protocol in order to insure the recovery. Third, we need to start looking at the individual impacts of climate compounds,

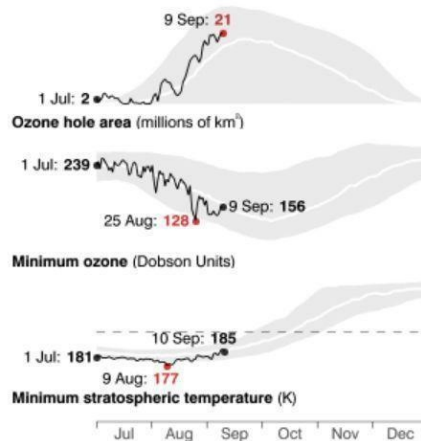
including HFCs. They may not affect ozone directly, but they will change the stratosphere, and therefore the ozone layer.



Rajendra Shende
Chairman, TERRE

See Graph below :

2013 Season



WHAT YOUR CAR WILL USE TO RUN ITS AC

In early August, France banned import of German Mercedes cars, throwing the market in a tizzy. The reason was that Mercedes declined to switch to new, climate-friendly substance in its air-conditioners because it said it was inflammable. It went back to using HFC-134a, which had been banned by the EU. In 2007, the EU issued the Mobile Air-Conditioning (MAC) directive that required all new cars by 2017 to have air coolant with a GWP equal to or lower than 150. The law became effective from 2011. HFC-134a, which was the substitute for CFC has a high GWP of 1,430 and so the French were right.

Compared to home and factory refrigerators, air-conditioners in cars' cooling system seem somewhat trivial. But mobile air-conditioners account for 25 per cent of the total HFC consumption worldwide. Also, in a world that is crazy about its cars and wants them better and cheaper, everything about them is serious business.

In 2012, DuPont and Honeywell produced HFC-1234yf, which became the preferred choice to replace HFC-134a. This new substance has a GWP of 4, which makes it climate-friendly. In the EU, the US and Japan more than 10 car models moved to this product. But then came the hitch: it is mildly inflammable.

Initially this was a non-issue, but German manufacturer Daimler did real-life tests and found that when mixed with lubricants it proved inflammable in a hot engine compartment. Based on the new finding, Daimler concluded that HFC-1234yf should and will not be used in its



products. Following this, the Society of Automotive Engineers (SAE), a US-based automobile association reviewed the findings and found such risk "exceptionally remote" and Daimler's tests "unrealistic".

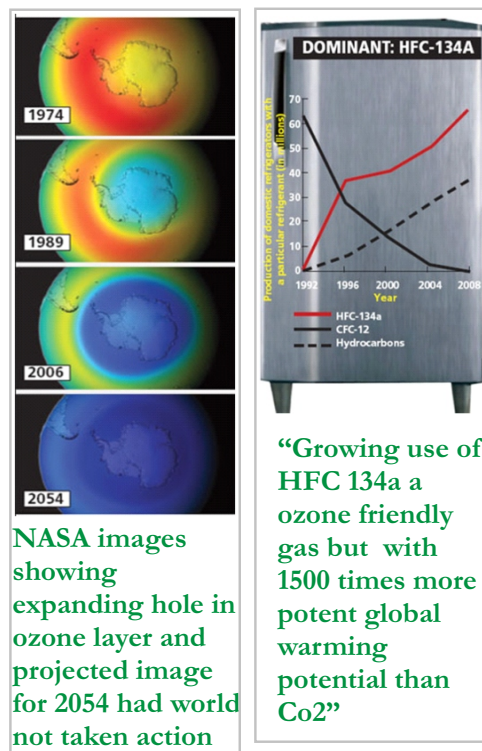
But the European car majors remain unconvinced by the US pitch. Now, four more German car manufacturers have said they will not use HFC-1234yf but will develop CO2 as an alternative refrigerant. Trade wars are on.

India has both domestic players and multinationals on its roads. Most companies use HFC-134a and seem unsure what they will do next. They know that India does not need to take action in a rush. However, companies that export to Europe know they will be hit by the MAC directive and will not be able to use any substance with GWP more than 150. The last time the automobile world did a transition from CFCs to HFCs, the transition happened in less than five years. Car firms all over the world decided to phase-in HFC-134a to replace CFCs. Automobile manufacturers were said to be ahead of the curve, having jumped from CFC to HFC, bypassing HCFCs. The fact that HFC was a greenhouse gas was known but ignored. For now, it is the Germans (Daimler and the rest) against the US's Honeywell and DuPont. The fight has only just started. (Source: *Down to Earth*)

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## DID YOU KNOW?

- ◆ Mobile air-conditioners, like the one used in cars, account for 25 per cent of the total HFC consumption worldwide!
- ◆ According to a study published in the August issue of Environmental Health Perspectives reveals that continued exposure to high ground-level ozone concentrations can lead to perforated appendicitis, a condition in which the appendix bursts due to inflammation. The organ is a vestigial part of human intestine, located near the junction of the small and the large intestines.
- ◆ HFCs (Hydrochlorofluorocarbons) are a part of pollutants called short-lived climate forcers (SLCFs), which warm the climate but have a relatively short lifetime in the atmosphere. Other major SLCFs include methane from oil and gas wells, rice cultivation and enteric fermentation in animals, black carbon (or soot) emitted from diesel vehicles and burning of biomass.



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Let's cover up the ozone

From Page 1... entirely and to prevent earth from becoming a barren land with just traces of life in it. If proper steps are not taken, the southern hemisphere could be in grave danger as an additional 20 per cent depletion could result in natural calamities like tornadoes and tsunamis.

Agreeing for a cause

It was not a very good morning when one fine day scientists discovered an actual ozone hole. They knew stronger steps needed to be taken to protect the ozone layer. In 1987 an international agreement called the Montreal Protocol was made between 180 nations to stop making and using the ozone-depleting gases. If these countries

keep their promise, the ozone layer will recover over time. Some scientists estimate that it will take about 50 years.

What you can do

1. Reduce the use of vehicles as vehicular emissions are harmful to the ozone layer. Car pool, take the public transport, walk or cycle instead.
2. Use eco-friendly household cleaning products. Toxic chemicals in cleaning agents harm the ozone.
3. Encourage growth of plants in your house/ neighbourhood.
4. Tell elders to keep the CFCs from the refrigerators and air-conditioners in check. If they're being discarded, do so responsibly.

5. Create awareness by talking about this environmental issue with your friends, at school and at home.

(Source: *The HinDU*, 17 Sept 2013)

- Archana Subramanian



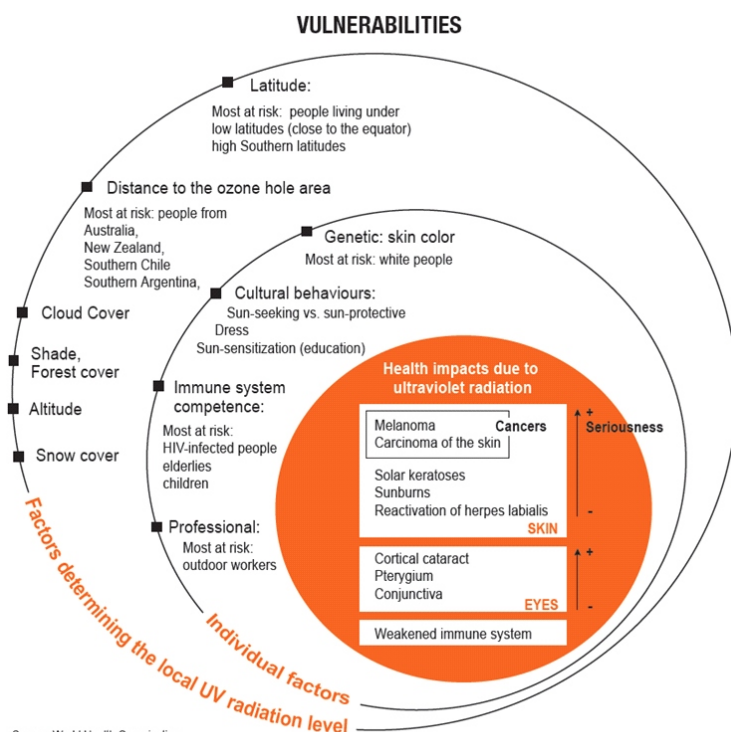
● Reaction ●

Wonderful reading the newleTERRE. I appreciate the efforts to make the e newsletter interesting.

Pooja Palnitkar
Sydney

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GLOBAL BURDEN OF DISEASE FROM SOLAR ULTRAVIOLET RADIATION



Quick Question

Which one of the chemicals is responsible for the reduction of ozone content of the atmosphere?

- ☐ SO₂
- ☐ Chlorofluoro carbon
- ☐ HCl
- ☐ Photochemical smog

Last Issue's Answer



Total organic matter present in an ecosystem is called Biomass

Quick Answer
Mr. H. V. Paranjape

If you know the answer, send in your entry to us at :

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