

# Nitrous oxide most powerful threat to ozone layer: scientists

Nitrous oxide is in the same league as ozone depleting gases, that are currently regulated through international agreements, said A.R. Ravishankara, a NOAA scientist

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New Delhi: Nitrous oxide, or laughing gas, is now the most powerful threat to the ozone layer, scientists at the US National Oceanic and Atmospheric Administration (NOAA) said in a report in Friday's edition of *Science*, a leading peer-reviewed journal.

Currently, nitrous oxide levels are double that of chlorofluoro carbon-11, among a class of gases considered to be the most damaging to the ozone layer.

For the first time, the ozone depleting potential of nitrous oxide was calculated, and though at 0.017 units it is only one-sixtieth of chlorofluorocarbons, or CFCs, it is 10 times more pervasive in the atmosphere, said A.R. Ravishankara, the lead author of the study and NOAA scientist, in an audio press briefing.



Potential risk: Fertilizer bags being loaded in Haryana. Experts say that with 16% of its GDP coming from agriculture, and fertilizer use heavily subsidized, India could be a big contributor to the nitrous oxide burden. Ramesh Pathania / Mint  
Moreover, it's in the same league as several ozone depletors such as HCFC-123, used as a refrigerant, and methyl bromide, an insecticide and soil disinfectant, both of which are regulated under the Montreal Protocol.

Nitrous oxide is used in surgery and dentistry as an anaesthetic and analgesic and as an oxidiser in rocketry and motor racing to boost engine power. The euphoric effect of inhaling it has given it the name laughing gas and has led to its use as a recreational drug.

Although nitrous oxide is known to have been eroding the ozone layer—a sheath of ozone that protects the earth from the harmful ultraviolet rays of the sun—its global emissions have gone unchecked.

A gaping hole in the ozone layer in the Antarctic, discovered in 1985, triggered international awareness of the man-made threat to the ozone layer. This prompted several countries to sign the Montreal Protocol in 1987 to cap CFCs.

These gases, largely used in the production of refrigerants, air conditioners and fire extinguishers, were the single biggest threat to the ozone layer and their use is stringently regulated or banned in several countries.

Limiting CFCs has helped the ozone layer somewhat, but nitrous oxide emissions—a by-product of largely agriculture waste management practices, the use of organic as well as synthetic fertilizer, and fossil fuel combustion—are not capped under the protocol.

“To an extent, increased CFCs mask the effect of nitrous oxide and vice versa. So when CFC levels are down, the effects of nitrous oxide are magnified, as we are now seeing,” said Ravishankara.

Though scientists emphasize that current levels of nitrous oxide will continue to increase in the atmosphere, and over time increase in potency as a depletor of the ozone layer, they do not prescribe a safe limit, nor ways to cap emissions of the gas.

“All we say is that nitrous oxide is in the same league as ozone depleting gases, that are currently regulated through international agreements. Moreover, it’s also a potent greenhouse gas. So curbing it would have a dual benefit to the atmosphere,” said Ravishankara.

Over a third of nitrous oxide emissions come about because of human activity, the rest having accumulated gradually over the millennia. “Assuming that all of the increase in nitrous oxide is because of human activities, the rate of increase is about 1% a year,” Ravishankara added.

Plants need nitrogen to grow. Though the soil by itself is an abundant source of nitrogen, plants continually release the gas into the atmosphere. Manure and chemical fertilizers are used to offset this natural release of nitrogen.

With the world population expected to increase 50% by 2040, the need to ensure food security will keep humanity dependent on agriculture, and thereby keep nitrous oxide emissions up.

Two-thirds of the nitrous oxide emissions in the US, equivalent to 311 million tonnes of carbon dioxide, came from agriculture, according to the US Greenhouse Gas Inventory of 2007.

With 16% of its gross domestic product coming from agriculture, and fertilizer use heavily subsidized by government, India’s contribution to the nitrous oxide burden may be big, experts say.

“Nitrous oxide is not poisonous and given that natural processes by themselves substantially contribute to its production, it will be very hard to regulate its emissions,” said M. Sharma, an environment policy expert at the Indian Institute of Technology, Kanpur.