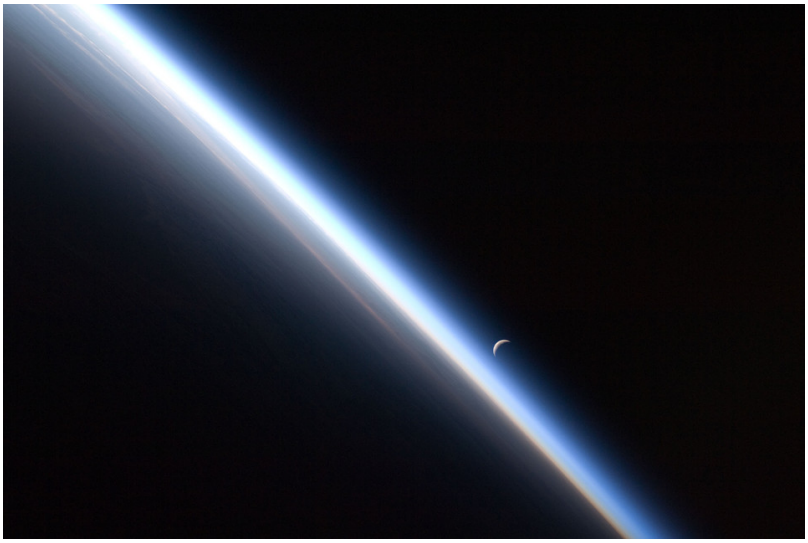
GENERAL NEWS

Ozone Layer May Be Thinning Over Earth's Heavily Populated Areas

In new analysis, scientists detect shrinking of the planet's protective shield at lower levels of the stratosphere



This view from space shows the thin layer of atmosphere that envelopes Earth. Part of the protective ozone shield may be thinning over heavily populated areas, new research suggests, even as it recovers over Antarctica. PHOTO: KATY MERSMANN/NASA OZONE WATCH/NASA

By Robert Lee Hotz

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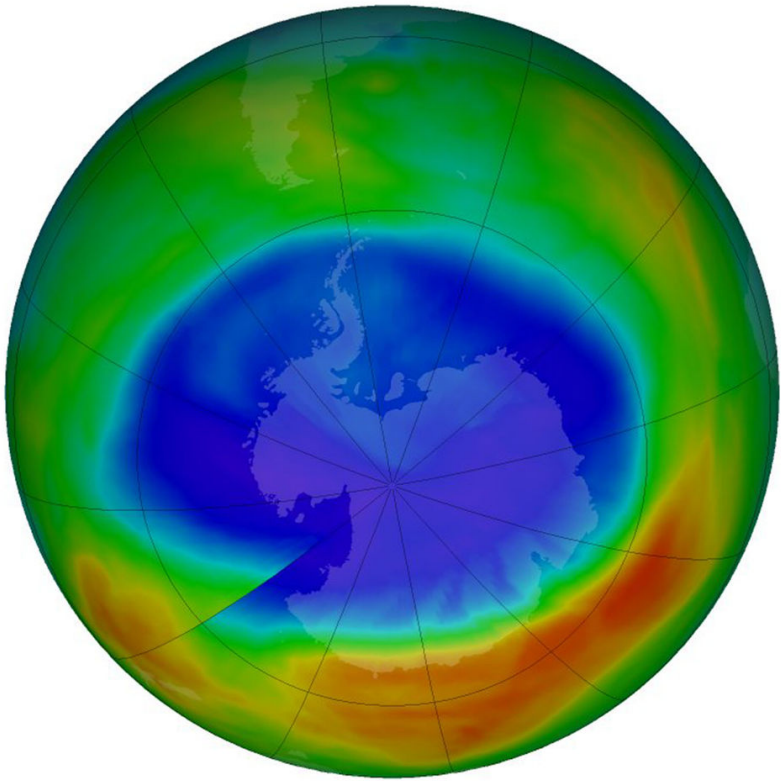
Part of Earth's protective ozone shield may be thinning over the most heavily populated regions of the globe, even as an ozone hole over Antarctica continues to mend, international researchers said Tuesday.

The global ozone layer, protected by an international treaty, absorbs hazardous ultraviolet radiation from the sun that can damage DNA and heighten the risk of cancer and other health problems.

Since 1987, the treaty has banned production of known ozone-destroying chemicals, and in January NASA scientists reported concrete signs that, as a result, the ozone layer in the stratosphere over the polar region is recovering.

In the new analysis, however, scientists detected a drop in the amount of ozone in recent years at lower levels of the stratosphere over the Earth's nonpolar regions, where most of the population lives. Moreover, the decline is larger than the rise measured at higher altitudes over Antarctica, they said. By their calculation, the total amount of ozone in the entire stratosphere hasn't improved since the 1990s.



The purple and blue colors, covering Antarctica, indicate areas with the least ozone—an area that recently appeared to be recovering. Other colors cover nonpolar regions that are more heavily populated, and where new research shows the ozone shield is thinning. At its peak, the ozone hole extended across an area nearly 2½ times the size of the continental U.S. PHOTO: KATY MERSMANN/NASA OZONE WATCH/NASA

"It means that overall we are not seeing a recovery," said data scientist Justin Alsing at the Center for Computational Astrophysics at the Flatiron Institute in New York, who was one of 22 scientists at research centers in the U.S. and Europe involved in the study. "The ozone layer at mid-latitudes is at least as bad as it has ever been."

The scientists, led by physicist William Ball at the Davos World Radiation Center and ETH Zurich in Switzerland, reported their research Tuesday in the journal Atmospheric Chemistry and Physics, which is published by the European Geosciences Union.

"The results are pretty convincing," said Rolando Garcia, a senior scientist at the National Center for Atmospheric Research in Boulder, Colo., who wasn't involved in the project.

Even so, the trend could be just a temporary variation within the broader band of ozone in the stratosphere, where changes are unusually difficult to measure and may take decades to unfold, said Sophie Godin-Beekmann, at the French National Center for Scientific Research and president of the International Ozone Commission.

“We may have a gap in our knowledge,” said atmospheric scientist Daan Hubert at the Royal Belgian Institute for Space Aeronomy in Brussels, who studies ozone trends. “Our expectation from simulations is that ozone in the lower stratosphere should have gone up or at least remained stable since the end of the 1990s. This work suggests there has been a decline.“

Scientists have sought for decades to understand the chemistry of the colorless gas in the thinning air between around 6 miles and 32 miles above the surface of the Earth. Variables include seasonal changes in global winds and temperatures, as well as periodic outbursts of gases from volcanic eruptions, the effects of El Niño ocean currents, and the subtle influence of solar cycles.

“Detecting an ozone response at middle latitudes, where the chemical changes were small to begin with and the dynamic variability is much larger, remains challenging,” said Anne R. Douglass, an atmospheric scientist at NASA’s Goddard Space Flight Center in Greenbelt, Md., who was part of a team that last month reported rising levels of protective ozone over Antarctica.

They attribute the recovery to the ban on ozone-destroying chemicals imposed under an environmental treaty called the Montreal Protocol on Substances that Deplete the Ozone Layer, which has been ratified by 197 countries.

To assess ozone in the lower stratosphere, Dr. Ball and his colleagues combined data from around 20 satellite sensors to create a record of ozone levels world-wide from 1985 to 2016. The sensors, however, were different, rarely overlapped in coverage, and each had its own built-in biases. The researchers developed new algorithms to merge the data and account for the individual variations.

“The new statistical techniques allow us to tie together data from the various disparate satellite instruments in a way that we can now analyze these longer term trends,” said Joanna Haigh, co-director of the Grantham Institute for Climate Change & Environment at Imperial College in London.

They don’t know why this protective layer is weakening at lower altitudes.

Among their suspects are unregulated chemicals used in paint thinner and solvents, and in production of a safer substitute for the ozone-destroying chemicals banned decades ago. Global

changes in high-altitude winds due to climate change could also be at fault by altering the distribution of ozone throughout the atmosphere, the scientists said.

“This was really a surprise,” said Dr. Ball. “This is a warning sign that there is something going on that we don’t understand.”

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