

# The 2019 ozone hole is the smallest ever recorded

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Credit: NOAA Headquarters

Abnormally warm temperatures in the stratosphere over Antarctica dramatically limited ozone loss in September and October, resulting in the smallest ozone hole observed since 1982, NOAA and NASA scientists reported today.

The annual [ozone](#) hole reached its peak extent of 6.3 million square miles (16.4 million square kilometers) on September 8 and then shrank to less than 3.9 million square miles (10 million square kilometers)

during the remainder of September and October.

During years with normal weather conditions, the ozone hole typically grows to a maximum of about 8 million square miles.

## **Uncommon, but not unprecedented**

This is the third time in 40 years that weather systems have caused warm temperatures that limit ozone depletion. Similar weather patterns in the Antarctic stratosphere in September 1988 and 2002 also produced atypically small ozone holes.

"It's important to recognize that what we're seeing this year is due to warmer stratospheric temperatures," said Paul Newman, chief scientist for Earth Sciences at NASA's Goddard Space Flight Center. "It's not a sign that atmospheric ozone is suddenly on a fast track to recovery."

As of October 16, the ozone hole above Antarctica was still small but stable, and it should gradually close over the next six weeks. Scientists expect the ozone hole to shrink back to the size it was in 1980 by approximately 2070, as ozone-depleting chemicals banned by the Montreal Protocol but still in the atmosphere continue to decline.

There is no identified connection between these weather patterns and climate change.

## **What is ozone, and why does it matter?**

Ozone, comprised of three oxygen atoms, occurs naturally in exceedingly small amounts. If compressed into its pure form, all of the ozone in a column of atmosphere extending from the ground to space would be about as thick as two pennies stacked one on top of the other.

High in the stratosphere, the ozone layer is a sunscreen that shields the planet from potentially harmful ultraviolet radiation that can cause skin cancer and cataracts, suppress immune systems and also damage plants.

Ozone created as a byproduct of pollution close to the Earth's surface, however, can trigger a variety of health problems such as asthma, bronchitis and difficulty breathing.

## How do you measure the ozone hole?

NASA and NOAA monitor the ozone hole by using three complementary instrumental methods.

Satellites, including NASA's Aura satellite and NASA-NOAA Suomi National Polar-orbiting Partnership satellite, measure the size of the [ozone hole](#) from space. The Aura satellite's Microwave Limb Sounder estimates levels of ozone-destroying chlorine.

NOAA staff at the South Pole also launch weather balloons carrying ozone-measuring sondes that directly sample ozone levels vertically through the atmosphere.

Most years, at least some portion of the stratosphere is found to be completely devoid of ozone. This year, ozone sonde measurements did not show any portions of the atmosphere where ozone was absent, according to NOAA scientist Bryan Johnson.

**More information:** Want to know more about the ozone hole? See this helpful explainer, [20 Questions About the Ozone](#).

Provided by NOAA Headquarters

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