



Ozone Layer Hole Over Arctic Closed

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Why in News

Recently, the **European Union's Copernicus Atmosphere Monitoring Service (CAMS)** announced that a hole in the Arctic ozone layer, believed to be the biggest reported over the Arctic, has closed.

- The ozone hole's closing was because of a phenomenon called the **polar vortex, and not because of reduced pollution levels** due to **Covid-19 lockdowns around the world.**
- CAMS is one of **six services that form Copernicus**, the European Union's Earth observation programme.
It provides consistent and quality-controlled information related to **air pollution and health, solar energy, greenhouse gases and climate forcing**, everywhere in the world.

Key Points

- **Ozone Hole:**
 - It refers to a region in the **stratosphere where the concentration of ozone becomes extremely low in certain months.**
 - Ozone (chemically, a molecule of three oxygen atoms) is found mainly in the upper atmosphere, an area called the **stratosphere, between 10 and 50 km from the earth's surface.**
 - Ozone **absorbs the harmful UltraViolet (UV) radiations** from the sun eliminating a big threat to life forms on earth. UV rays can cause skin cancer and other diseases and deformities in plants and animals.

- **Reasons Behind the Biggest Ozone Hole over the Arctic:**

- In 2020, the ozone depletion over the Arctic was much larger. Before this year, the last sizable Arctic ozone hole was reported in 2011.
- The hole in the North Pole's ozone layer was **first detected in February, 2020** had since reached a **maximum extension of around 1 million sq km**.
- Scientists believe that **unusual atmospheric conditions, including freezing temperatures in the stratosphere**, were responsible.
- As per a European Space Agency report, **cold temperatures (below -80°C), sunlight, wind fields and substances such as chlorofluorocarbons (CFCs)** were responsible for the degradation of the Arctic ozone layer.
- Although Arctic temperatures do not usually fall as low as in Antarctica, this year, **powerful winds flowing around the North Pole trapped cold air within what is known as the polar vortex**— a circling whirlpool of stratospheric winds.
- However, the size of hole was still small compared to that usually observed in the southern hemisphere.

- **Closing of the hole and Ozone recovery:**

- Scientists believe that the closing of the hole is because of the same **polar vortex and not because of the lower pollution levels during the Covid-19 lockdown**.
- As per the Scientific Assessment of Ozone Depletion data of 2018:
 - The ozone layer in parts of the stratosphere has recovered at a rate of **1-3% per decade since 2000**.
 - At these projected rates, the **Northern Hemisphere and mid-latitude ozone is predicted to recover by around 2030**, followed by the **Southern Hemisphere around 2050, and polar regions by 2060**.

Ozone holes over Antarctica

- The ozone holes most commonly refer to the depletions over Antarctica, forming each year in the months of **September, October and November**, due to a set of **special meteorological and chemical conditions that arise at the South Pole**, and can reach sizes of around 20 to 25 million sq km.
- **Formation:**
 - Polar vortex leads to the most depletion of stratospheric ozone. As winter arrives, a vortex of winds develops around the pole and isolates the polar stratosphere.
 - When temperatures drop below -78°C (-109°F), thin clouds **form ice, nitric acid, and sulphuric acid mixtures**.
 - **Chemical reactions on the surfaces of ice crystals** in the clouds **release active forms of CFCs** and ozone depletion begins.
 - In spring, **temperatures begin to rise, the ice evaporates**, and the ozone layer starts to recover.

- Such holes are much **smaller in size in the North Pole** due to the warmer temperatures than the South Pole.

Polar vortex

- A polar vortex is a **large area of low pressure and cold air** that surrounds **both of Earth's poles**.
- Polar vortexes always exist, but they typically **weaken during the summer and strengthen in the winter**.
- The polar vortex in the **Arctic is typically weaker** due to the presence of nearby **land as well as mountain ranges that disturb the weather** more so than its counterpart to the south.

Source: IE