Ozone hole to reach record levels: Cold air and old pollutants could combine to produce giant gap in Earth's protective layer

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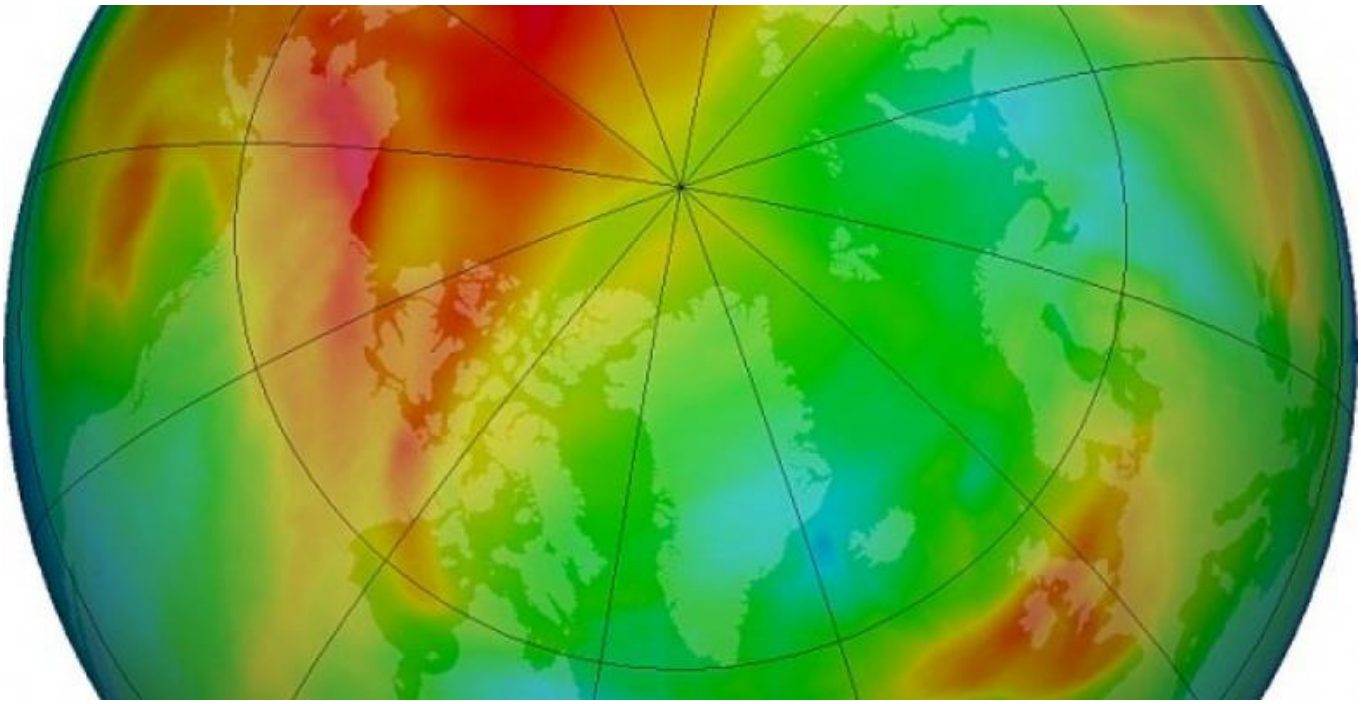

The hole over the Canadian Arctic is already thought to be around 770,000 square miles (two million square kilometres) or around the size of Greenland.

But environmental scientists are predicting the gap in the Earth's protective atmospheric layer could grow even larger this spring when the sunshine returns to the region after the long, dark winter.

According to Science magazine, a record low temperature in the Earth's upper atmosphere could release chemicals which destroy the layer.

Ozone is a gas composed of three oxygen molecules which can be hazardous to our health on the ground, but in the upper atmosphere it protects us by soaking up ultraviolet radiation from the sun.

Without it, the planet's surface would be exposed to dangerous levels of UV-B rays which can shred DNA, leading to mutations that cause cancers.

Towards the end of the 20th Century, the ozone was found to have been depleted by the now banned chlorofluorocarbons (CFCs), which react with the ozone as they break down.

Environmental scientists are predicting a hole in the ozone layer over the Arctic could grow even larger this spring when the sunshine returns to the region after the long, dark winter. As a cold air current persists for longer in the upper atmosphere (pictured), it is creating the perfect conditions for destruction of the gas.
The extent of the hole above Canada was revealed in 2011. In extended cold periods, like the Arctic winter, the hole can become enlarged.

Colder temperatures enable clouds of nitric acid, from natural sources, to condense in the atmosphere where they react with chlorine in the atmosphere and destroy ozone.
Ozone is constantly replenished in the atmosphere but if the rate of destruction outstrips this then the hole can enlarge.
Scientists warn that if this year's polar vortex – the wintry weather pattern which traps circulating cold air in the upper atmosphere – continues longer than usual into the spring, the returning sunlight could set off a chemical chain reaction widening the hole even further.

Dr Markus Rex, an atmospheric chemist at the Alfred Wegener Institute (AWI) in Potsdam, Germany explained that by next week as much as a quarter of the Arctic's ozone could be destroyed.

'Should the vortex persist until well into March, the formation of a deep ozone minimum over the Arctic has to be expected,' said Dr Rex.

He added: 'However, if the vortex breaks up before then, the air masses will sufficiently mix with fresh air from lower latitudes and the Arctic will narrowly avoid a new record of ozone depletion.'

The team at the AWI say that the while they are unable to accurately predict the fate of the vortex, and if it will break up before spring returns, the researchers say that there is a chance that a hole in the layer – or 'ozone minimum' – could even drift over central Europe.

The scientists are continuing to monitor the atmosphere closely and releasing weather balloons from a number of stations dotted throughout the Arctic (pictured)
The scientists are continuing to monitor the atmosphere closely and releasing weather balloons from a number of stations dotted throughout the Arctic.

Dr Rex explained: 'We are expecting a general cooling of the stratosphere as a result of global climate change.

'The mechanisms that regulate the temperatures of the Arctic stratosphere, however, are complicated and not fully understood.

'Whether the record low temperatures in the past weeks are linked to climate change is therefore the subject of active research.'

DEPLETING OZONE SET TO CONTINUE

At the end of the 1980s the world became wise to ozone damage after chemicals used in aerosols were found to be reacting with the gas, destroying it at an alarming rate.

This led to the Montreal protocol in 1987, which banned the use of chlorofluorocarbons (CFCs) from products such as deodorants and fridge freezers.

While the currents study focuses on the Northern hemisphere, the same issue is occurring in the South, with a hole opening over the Antarctic.

However, the ban of CFCs has led to a slight recovery in the ozone.

The team at AWI explain: 'Unfortunately, the CFCs already released cannot be removed from the atmosphere and their natural breakdown in the atmosphere is very slow.

'During the next one to two decades, following unusual cold spells, the Arctic stratosphere will therefore remain susceptible to severe ozone losses.'