

Ozone layer most fragile on record

Fears over increase in skin cancer as scientists report that climate change continues to destroy the earth's protection

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The protective ozone layer over the Arctic has thinned this winter to the lowest levels since records began, alarming scientists who believed it had begun to heal.

The increased loss of ozone allows more harmful ultraviolet light to reach the earth's surface, making children and outdoor enthusiasts such as skiers more vulnerable to skin cancer - a disease which is already dramatically increasing.

Scientists yesterday reinforced the warning that people going out in the sun this summer should protect themselves with creams and hats.

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Research by Cambridge University shows that it is not increased pollution but a side effect of climate change that is making ozone depletion worse. At high altitudes, 50% of the protective layer had been destroyed.

The research has dashed hopes that the ozone layer was on the mend. Since the winter of 1999-2000, when depletion was almost as bad, scientists had believed an improvement was under way as pollution was reduced. But they now believe it could be another 50 years before the problem is solved.

What appears to have caused the further loss of ozone is the increasing number of stratospheric clouds in the winter, 15 miles above the earth. These clouds, in the middle of the ozone layer, provide a platform which makes it easier for rapid chemical reactions which destroy ozone to take place. This year, for three months from the end of November, there were more clouds for longer periods than ever previously recorded.

Cambridge University scientists said yesterday that, in late March, when ozone depletion was at its worst, Arctic air masses drifted over the UK and the rest of Europe as far south as northern Italy, giving significantly higher doses of ultraviolet radiation and sunburn risk.

The results, which were announced at a Geophysical Union meeting in Vienna yesterday, are part of a European venture coordinated by Cambridge University's chemistry department, which has been studying the relationship between the ozone layer and climate change since May 2004.

Yesterday, Professor John Pyle, from the university, said: "These were the lowest levels of ozone recorded since measurements began 40 years ago. We thought things would start to get better because of the phasing out of CFCs and other chemicals because of the Montreal protocol, but this has not happened.

"The pollution levels have levelled off but changes in the atmosphere have made it easier for the chemical reactions to take place that allow pollutants to destroy ozone. With these changes likely to continue and get worse as global warming increases, then ozone will be further depleted even if the level of pollution is going down."

The relationship between the depletion of the ozone layer and climate change is so complex that the EU is investing £11m in a five-year project to try to understand and predict what is happening. Reporting the results of the first year, the scientists told the meeting in Vienna yesterday that "the atmospheric lifetime of these [ozone depleting] compounds is extremely long and the concentrations will remain at dangerously high levels for another half century."

Increased greenhouse gases in the air trap more heat in the lower atmosphere, but the stratosphere far above the earth is getting colder. As a result, ice clouds form between 14 and 26 kilometres above the earth, exactly in the region where the protective ozone is found.

The European scientists reported the first signs of ozone loss in January. As sunlight returned to northern latitudes, the rate of ozone depletion increased and rapid destruction of ozone occurred throughout February and March. In the altitude range where the ozone layer usually reaches its maximum concentration, more than half of the ozone was lost. In the lower atmosphere losses were not so great.

"Overall, about 30% of the ozone layer was destroyed," said Dr Markus Rex, from the Alfred Wegener Institute in Potsdam, Germany, another member of the team. He said the cold conditions which created polar stratospheric clouds were four times more extensive in 2005 than in the 1960s and 70s.

Professor Pyle said overall the mixing of the air in the northern hemisphere was far more rapid than in the Antarctic so a "hole" in the ozone layer did not occur. Instead, as the air mixed in spring, there was a general thinning of the protective ozone over the whole of the northern hemisphere.

"It just means we have less natural protection than we should have and we are used to. It means that we should be careful about exposing ourselves to the sun, but that is already the case, this just makes things slightly worse," he said.

The UV danger Ecology altered as Earth burns

- The thinning of the ozone layer allows more ultraviolet light - or UV radiation - to reach the Earth's surface
- UV light stimulates the production of vitamin D in the skin, which strengthens bones, but it also burns and causes skin cancer, particularly in fair-skinned people. The UN environment programme estimates that for every 1% thinning of the ozone layer there is a 2% to 3% rise in skin cancer
- It also causes eye problems even if dark glasses are worn - mainly cataracts and snow

blindness -and can suppress the immune response to the herpes virus and damage the spleen

- Excess UV radiation cuts photosynthesis in plants, reducing the size and yield of winter wheat

- Plankton which are constantly exposed suffer damaged DNA. As some species are more vulnerable than others, an increase in UV exposure has the potential to cause a shift in species composition and reduce diversity in ecosystems

- Reducing the world's populations of phytoplankton would significantly impact the world's carbon cycle, because phytoplankton store huge amounts of carbon in the ocean