

## 50 times more gas than predicted

# Scientists warn of threat to Arctic ozone

By Charles Clover and Roger Highfield

A POTENTIAL threat to life in large parts of the northern hemisphere was disclosed yesterday by scientists who have been studying the concentration of gases capable of depleting the protective ozone layer in the stratosphere over the Arctic.

Six weeks of high-level samplings, gathered by a modified American U2 spy-plane, show that levels over the Arctic of ozone-depleting gases are 50 times higher than scientists had thought.

These preliminary findings suggest they are primed to attack the Earth's protective layers under the effects of the spring sunshine.

The ozone layers protect humans, biological organisms and man-made materials from harmful ultraviolet radiation from the sun. If the protection is reduced, effects on human health in the regions immediately below—such as increased cancers and eye cataracts, along with reduced crop yields and damage to marine life—cannot be ruled out, according to the Meteorological Office, which took part in the study.

The areas covered by the build-up of polar clouds which interact with ozone-depleting gases are larger than the continental United States and include populated parts of Scandinavia, Russia and Canada.

These chlorine-based gases, known as chlorofluorocarbons (CFCs), are used in refrigerators, air conditioning, foam packaging and aerosols, and the findings lend new urgency to calls for further international action to ban them.

The £7 million study by the Arctic Airborne Stratospheric Experiment, led by the US National Aeronautics and Space Administration, indicate that a seasonal "hole" in the ozone layer, such as the one first observed by British scientists over Antarctica in 1985, may be developing in the Arctic, though more slowly than in the Antarctic.

Nevertheless, the ozone layer was likely to be thinning faster than scientists had thought, though no ozone loss had occurred by the end of the mission.

The experiment was conducted by 200 scientists from Britain, America, Norway and Germany, operating from the Sola air base near Stavanger, Norway.

Two aircraft were used—a modified U2 spyplane, the ER-2, a high-flying, single-engine, single-pilot aircraft, and a converted DC8 manned by 20 scientists who monitored ozone levels in the lower atmosphere.

Both aircraft flew 14 times during the mission from Dec 27 to Feb 14, scanning in arcs from Greenland and Scandinavia to the North Pole.

Last year scientists discovered destruction of the ozone layer of up to 95 per cent above Antarctica. And the ozone "hole" was found for the first time to have drifted over populated areas of Australia and New Zealand.

The Met Office emphasised yesterday that the Arctic region, unlike the Antarctic, appears to have its own protective mechanism—for the present at least.

The warmer, more active northern hemisphere in spring makes the ozone-destroying chemistry in the stratosphere, less effective.

Ozone loss will depend on the amount of sunlight that reaches the polar stratospheric cloud in which chemical reactions involving ozone-depleting chemicals can take place.

of the clouds returns to normal, usually a matter of weeks.

Researchers found that chemical reactions on the surfaces of the winter polar stratospheric clouds converted inactive forms of chlorine into highly-reactive ozone-destroying chlorine monoxide.

Dr Rod Jones, of the Met Office and a senior investigator in the research team, said yesterday: "The high levels of ozone-depleting chlorine gas are highly significant. Much of this chlorine is released from CFCs."

He said that the new evidence about the ozone-depleting properties of polar stratospheric clouds were not included in the assessments that were used as the basis for the international Montreal agreement to limit substances that deplete the ozone layer. The agreement was ratified earlier this year.

Even if the Montreal Protocol was fully implemented by all nations, it would still allow atmospheric chlorine and bromine to double from present levels by the middle of the next century, said Dr Jones.

After presenting his findings in Washington, Dr Robert Watson, British-born leader of Nasa's atmospheric research team, had lunch with the Prince of Wales at the British Embassy.

Commenting for the Government yesterday, Lord Caithness, Environment Minister, said that the results were timely for the Government's "Saving the Ozone Layer" conference to be opened by Mrs Thatcher next month.

"They will present world governments with firm evidence that further global action must be taken.

"The expedition's findings will add impetus to the strong message that we will be putting across," he said.

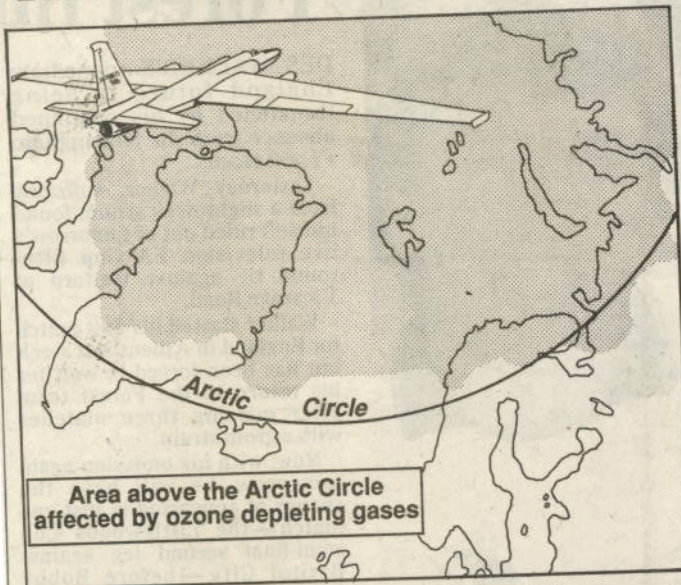
Mr Malcolm Bruce, Democrat spokesman, said that the scientists' discovery was "deeply worrying" and showed the need for urgent Government action.

He will be publishing a private member's Bill in the next week aimed at outlawing the total use of CFCs from 1995 and banning the production of non-essential CFCs from 1990.

According to a paper prepared by Dr Lester Grant, of the US Environment Protection Agency, ozone depletion has three basic effects:

- **Human:** Increased skin cancer, cataracts and blindness, immune system effects contributing to skin cancer and possible increases in certain types of infectious diseases;
- **Environment:** Cuts in rice

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commercially-important trees; deleterious effect on aquatic life; contribution to the global warming caused by the greenhouse effect; and possible contribution to the formation of acid smogs;

- **Other:** Increased weathering of some plastics and other man-made materials. Dr Grant said that studies showed that ozone depletion "has the potential to exert very substantial effects on human health and the environment."

With a one per cent decrease in stratospheric ozone, the incidence of ultraviolet radiation will increase by two per cent and in turn increase the incidence of skin cancers by between four and six per cent.

For a five per cent decrease, the incidence of cancers could be up to one third, he said.

The actual incidence will depend on the distance of a population from the equator to the poles since higher amounts of ultraviolet radiation will reach the Earth's surface near the poles.

"The lighter-skinned white populations of the world are expected to be most affected, with 70,000 new cases of non-melanoma skin cancer per year (worldwide) projected with one per cent stratospheric ozone depletion and 360,000 cases annually with five per cent ozone depletion," the paper said.

Dr Grant said lifestyles would probably change if the ozone were depleted. For instance, popular outdoor sports may move indoors in the case of football, but may be seriously curtailed in some cases such as cycling and cross-country running.

It is not fully understood what effects increased ultraviolet levels will have on the human immune system, but Dr Grant said that increased susceptibility to some diseases could "be of very major significance".

The Nasa team's findings are only preliminary. The rest of their findings will be analysed and made available to other scientists in July.

A call for more funding for British research to study the effect of mankind on the global climate will be made in a report to the Government that will be published next month.

The report on global environment research for the Advisory Committee on Science and Technology, which advises on science policy, will be published at the time of the international conference on the ozone layer planned by the Government.

The report, which is now being edited for publication, was commissioned from the Natural Environment Research Council last year.

The council and the Science and Engineering Research Council have set up a joint committee to discuss how to organise their research on the global environment and help lobby for more funding.