OZONE HOLE

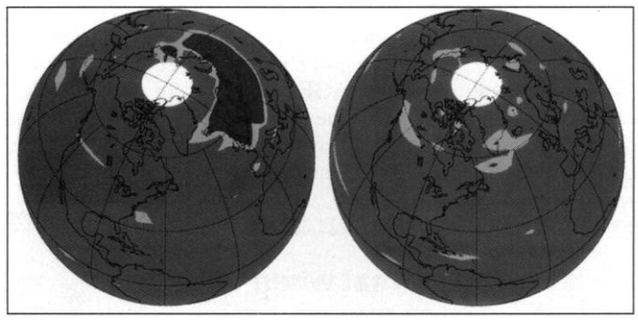
Not Over the Arctic–for Now

Everyone knows about the drastic thinning of the ozone layer over the Antarctic that appears there every austral spring when three factors—extreme cold, sunshine, and manmade ozone-eaters—combine. But since early this year, all eyes in the atmospheric chemistry community have been not on the Antarctic but far to the north, on the Arctic. The reason is that in February National Aeronautics and Space Administration (NASA) researchers announced that conditions were ripe for destruction of Arctic ozone this year on a scale unknown outside of far southern latitudes. Those researchers, and everyone else, breathed a bit easier last month when NASA and the National Oceanic and Atmospheric Administration announced that the planet dodged a chemical bullet this year when one member of the destructive trio—extreme cold—didn't last. Indeed, a sudden warming in late January caused Arctic ozone losses to peak at less than 10%, rather than the 50% that is typical of the Antarctic in a bad year.

But that doesn't mean the all-clear can be sounded for the Northern Hemisphere. In fact, ozone researchers are quick to point out that residents of northern and mid-latitudes are not likely to be so lucky in the coming years, because the destructive combination will almost certainly return in force. One essential ingredient—manmade chemicals containing chlorine—is already present at high levels and will increase during the next decade, even if emissions are reined in faster than currently planned. The second ingredient, cold below -78°C (which triggers the formation of clouds of nitric acid that convert chlorine into its ozone-destroying form), returns to the North Pole stratosphere every winter. And the longer the temperature stays low, the more time the third factor—sunshine—has to work.

This year's January warming in the Arctic meant atmospheric temperatures were below the danger point on only 39 days. That's far less than the yearly average of 68 days, notes physicist Mark Schoeberl of NASA's Goddard Space Flight Center in Greenbelt, Maryland. Even now, in some years the cold lasts for 100 days or more—and the forecast for the next decade or two is for even more cold. Schoeberl notes that, in an ironic twist, as the greenhouse warms the lower atmosphere, the stratosphere will cool. And the very loss of ozone—which absorbs solar radiation, warming the stratosphere—will lead to further cooling.

And even if the Arctic escaped dramatic ozone loss this year, over the Northern Hemisphere as a whole ozone hit a record low for January and February. Apparently, the circulation of the stratosphere, which exerts a strong natural control on ozone concentrations from year to year, has combined with chemical destruction of ozone, both in and outside the Arctic, to produce the new low. With some relief, NASA researchers noted that Mount Pinatubo's atmospheric debris played a minor role in ozone destruction. Schoeberl compares this weather-modulation, which is akin to the modulation of temperature over the Arctic, to the year-to-year ups and downs of the Antarctic hole in the early to mid-1980s. Since then, ozone-destroying chemicals have become so abundant that stratospheric weather has been able to moderate losses over the Antarctic only 1 year of the past 5. As chlorine increases, global warming progresses, and more ozone disappears, Schoeberl sees the Arctic and much of the rest of the hemisphere going in the same direction. So, in spite of the reprieve, the global sirens can't be turned off yet.



JPL/NASA

A happy ending. A warming in late January knocked down high concentrations of ozone-destroying chlorine *(red)*.

–Richard A. Kerr

SCIENCE BUDGET

Press Urges Doubling for Research

As the cold war recedes into memory, virtually every claimant on the federal budget is eyeing the nearly $300 billion the Pentagon is still spending on military programs. Last week, in a speech at the National Academy of Sciences' 129th annual meeting, academy president Frank Press made a pitch for civilian R&D to receive a substantial chunk of any savings in the military budget. Arguing that increasing economic competition requires a new commitment by the federal government to support research, Press called for a doubling over the next decade of government spending on "fundamental research and training"—currently running at almost $15 billion a year. The source of the new funds? The $70 billion the government now spends on "other kinds of R&D," including the $43.1 billion proposed in the 1993 budget for defense R&D.

Frank Press

Press concedes that spending on research and development has grown at about the same pace as the economy as a whole in recent years, but he chalks up overall funding growth to "a vague sense of political leaders that science is good for the country." The problem, he argues, is that "our current system lacks an articulated policy or long-term strategy for science and technology"—especially R&D with potential economic payoffs. Says Press, sounding like the Sigmund Freud of science policy: "There's a reluctance on the part of political leaders to address anything that smacks of industrial policy. I heard someone describe the phobia to address industrial policy this way: 'Like the notion of sex in the Victorian period, suppress all thought of it, never discuss it in polite society, never plan it, better to do it on the spur of the moment in the dark.'"

Echoing the recommendations of a recent academy report on civilian technology (*Science*, 3 April, p. 23), Press called for greater emphasis on the "critical" or "emerging" technologies that numerous federal agencies have identified in the past 3 years. Among the fields that government needs to put more of its money into, he said, are hot areas such as artificial intelligence, high-performance computing, and biotechnology.

Press does, however, see some signs of movement in the federal government. "...Over in the executive branch," he said, "the recent vitality of the Federal Coordinating Council for Science and Technology [FCCSET] provides a glimmer of hope that a more coordinated, cross-cutting process may yet emerge." Some key science officials in the Bush Administration don't yet agree, though. At a recent hearing before the House Committee on Science, Space, and Technology, National Institutes of Health (NIH) Director Bernadine Healy criticized FCCSET as "not a policy-setting group. Its members don't have enough clout." And NIH, complained Healy, is often left out of FCCSET's deliberations.

–Richard Stone