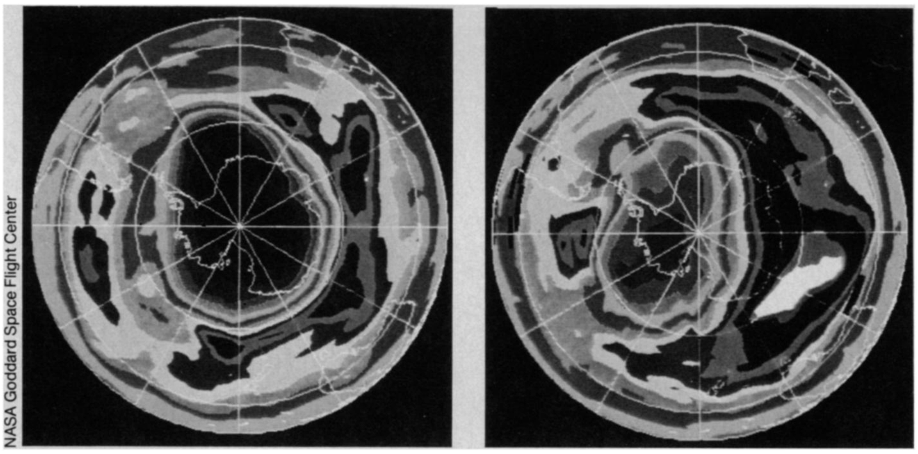
SCIENCE NEWS of the week

Ozone Hole of 1988: Weak and Eccentric

This year's Antarctic ozone hole — a seasonal thinning in stratospheric ozone —appeared in late August, right on schedule. But the amount of ozone depletion was only about half what had been expected, NASA scientists reported last week. Moreover, the hole reached its lowest ozone levels earlier than expected, and — in sharp contrast to recent years — has not been stably centered over the South Pole, but instead has wobbled erratically about the Antarctic skies.

Data from the Total Ozone Mapping Spectrometer (TOMS), aboard the Nimbus-7 satellite, showed the maximum loss of stratospheric ozone was about 10 to 15 percent below winter levels. Though last year's losses reached roughly 50 percent — the lowest level ever recorded (SN: 10/10/87, p.230) — more moderate declines were expected this year.



NASA Goddard Space Flight Center

Concentric rings over Antarctica on TOMS map made Oct. 3, 1987 (left) show a hole centered over the pole. On Oct. 3, 1988 (right), the center of an elliptical hole hovers far left of the pole.

Ozone depletion in the Antarctic appears to vary in a two-year cycle that corresponds with the quasi-biennial oscillation — a 26-month cycle during which tropical winds reverse their direction, explains Mark Schoeberl, an atmospheric scientist at NASA's Goddard Space Flight Center in Greenbelt, Md. When the oscillation sends out westerlies, the Antarctic ozone hole is at its worst. Since 1988 is an easterly year, Schoeberl says, researchers expected ozone losses of about 25 to 30 percent. While scientists are unable to fully explain why this year's ozone losses were smaller, they say unusually dynamic weather patterns in the stratosphere may have played a major role.

Factors necessary to maximize polar ozone losses include: a strong, stratospheric vortex of circumpolar winds that continue through the polar spring, centered over the pole; very cold temperatures in the lower stratosphere; and the formation of polar stratospheric clouds, or PSCs (SN: 10/15/88, p.249). Active upper-atmosphere weather systems can affect all three. First, strong "dynamical" stratospheric weather can push the polar vortex off the South Pole and into regions with more sun, as it did this spring (see maps). This will warm ozone in the vortex, making it less likely PSCs will form, and permit more air from southern midlatitudes to be drawn into the vortex — degrading its ability to trap reactive pollutants well enough and long enough for significant ozone destruction to occur. Dynamical activity can even contribute to the early breakup of the vortex.

Data collected last year (SN: 10/10/87, p.230) essentially proved that chlorine chemistry can account for a large share of a hole's ozone loss, notes meteorologist Jerry Mahlman, director of the Geophysical Fluid Dynamics Laboratory at Princeton (N.J.) University. But he says these "very interesting" 1988 data demonstrate that "dynamics can essentially fight back, making it harder for the chemistry to operate." While there's no question chlorine catalysis is destroying ozone, he says, these data help show "the fundamental controlling parameter now is not chlorine but temperature." Since last year demonstrated there is enough chlorine in the atmosphere to foster large polar-ozone losses, he says the degree of loss in any year may depend on how quiet — and hence how cold — the polar upper atmosphere becomes.

Such a weather-mediated temperature trigger to ozone destruction also raises concerns about how impending climate changes may affect ozone, says climate modeler Donald J. Wuebbles at Lawrence Livermore (Calif.) National Laboratory. He notes that while the "greenhouse effect" will warm the lower atmosphere, it will dramatically cool the stratosphere. Mahlman speculates that one possible repercussion of such a carbon-dioxide-induced warming could be the ultimate development of annual ozone holes above the Arctic. *— J. Raloff*

Taking aim at high cholesterol in kids

Studies have shown that heart disease can begin very early in life (SN: 10/8/88, p.234), but medical experts are only beginning to establish prevention guidelines for children. The American Academy of Pediatrics recommended this week that physicians test for high blood levels of cholesterol and other lipids in children with a family history of heart disease. The American Heart Association had announced an almost identical recommendation last May.

The academy's Committee on Nutrition recommends cholesterol tests for all children older than 2 years with a parent, sibling, grandparent, uncle or aunt who has hyperlipidemia — excess blood lipids — or who had a heart attack before age 50 (men) or 60 (women).

The committee cautions against testing children with no family history of heart disease because the screening tests can yield inaccurate results, causing parents or doctors to put normal children on restrictive diets or drugs.

The committee recommends that high-risk children undergo a series of cholesterol tests in a laboratory under controlled conditions. Although expensive, these tests are more accurate than ones done in doctors' offices and are more likely, among those at high-risk, to uncover those who have truly dangerous levels, says committee member Edward F. Bell of the University of Iowa in Iowa City.

Although researchers do not yet know what cholesterol levels make children prone to heart disease, the committee suggests that children with levels exceeding 176 milligrams per deciliter might benefit from a reduction in dietary fat.

Whether cholesterol-reducing drugs work in children is not known. The committee warns against drug therapy unless a child's level exceeds 200 milligrams per deciliter — and then only if efforts to restrict the diet have failed to lower levels. *— I. Wickelgren*