

Antarctic ozone: The plot thickens

As scientists around the world struggle to determine the mechanism that creates the ozone hole in the stratosphere above Antarctica each year, one group says it has found important evidence that chlorine — a by-product of human use of chlorofluorocarbons — is partially responsible for these seasonal depletions of Antarctic ozone.

Researchers from the State University of New York (SUNY) at Stony Brook report measuring levels of chlorine monoxide that were 100 times the amount normally present in the Antarctic stratosphere. Chlorine monoxide figures prominently in many theories that blame chemical reactions for the decrease of ozone between 12 and 20 kilometers above the South Pole each Antarctic spring (SN: 3/1/86, p. 133). These results strongly confirm other reports of high chlorine monoxide levels and “show that chlorine chemistry is almost certainly involved in the Antarctic ozone depletion,” says SUNY researcher Philip M. Solomon. The group reported its findings in Baltimore this week at the American Geophysical Union’s spring meeting.

The group, which compiled its data last year on the U.S. National Ozone Expedition (NOZE) at McMurdo Station in Antarctica (SN: 10/25/86, p.261), also announced finding surprisingly low levels of nitrous oxide in the atmosphere above Antarctica. Nitrous oxide was so scarce that for most of September and October of 1986 the researchers were unable to detect it in the polar stratosphere.

Scientists are unsure whether these low levels are related to the ozone hole — ozone depletions that begin each September when the sun reappears over the Antarctic. Since these are the first spring measurements of stratospheric nitrous

oxide, it is possible that they represent a normal situation for Antarctica, says SUNY researcher Robert de Zafrá.

Whether or not the levels are abnormal, they will certainly cause atmospheric scientists who are striving to develop accurate models of the Antarctic atmosphere to revise their thoughts, say SUNY researchers. Since all models of the Antarctic atmosphere assume normal levels of nitrous oxide and other chemicals, “none of the models of Antarctica are really correct,” says Solomon.

Ever since British researchers alerted the world to the existence of the ozone hole in 1985, scientists have proposed scores of possible atmospheric mechanisms to explain the disappearance of Antarctic ozone. Much debate has focused on whether the ozone depletion results from chemical causes or from dynamic processes involving mass movement of air (SN: 11/29/86, p.344).

Most scientists feel the SUNY results do not settle this debate. The chlorine

monoxide results are “a good indication that nonstandard chemistry is very active in Antarctica,” says Ka-Kit Tung, from Clarkson University in Potsdam, N.Y. “However, there is still a gap between knowing that nonstandard chemistry exists and saying that this chemistry is responsible for the ozone depletions.”

Atmospheric researchers require much more data — from laboratories, models and observations in Antarctica — in order to decipher which mechanism or class of mechanisms is responsible for the ozone changes.

The SUNY group plans to gather more refined measurements of nitrous oxide and chlorine monoxide through ground-based millimeter-wave spectroscopy when they return to Antarctica in August for NOZE 2. Other scientists will be tracking different chemicals as well as detailing the temperature and cloud structure of the Antarctic atmosphere.

In a separate experiment, NASA will use two planes to collect measurements and samples as they fly through the ozone hole during this Antarctic spring.

— R. Monastersky

Getting into orbit — the non-NASA way

The idea of sending payloads into orbit as a privately financed, commercial enterprise was a topic of conversation even in the early years of the space program, yet only recently has it seemed to be approaching reality. A major factor has been NASA’s decision, following the Challenger explosion, that the only non-NASA payloads eligible to use the space shuttle will be those either specifically requiring the shuttle’s capabilities or with national security implications. This month has seen a number of signs of the turning tide.

On May 1, the National Oceanic and Atmospheric Administration, whose satellites have heretofore been launched by NASA, announced that for the first time it is now seeking commercial launch services. Responses to its solicitation notice, covering rockets and services to launch five geosynchronous weather satellites (called GOES) beginning in late 1989, are due by June 15, with the winning company or consortium to be selected by early September. The satellites’ manufacturer, Ford Aerospace and Communications Corp., was told months ago to modify the devices’ design to allow launching by either shuttle or “expendable launch vehicles.”

Last week, a small private concern called Starfind, Inc., in Laguna Niguel, Calif., announced a plan for its proposed series of position-and-navigation satellites (the company’s entire *raison d’être*) to be launched by another private firm,

Space Services, Inc. (SSI), of Houston. SSI has conducted only a single, suborbital test launching, and that was back in 1982 (SN: 9/18/82, p.180). However, its plan has never been to develop a new rocket design, but rather, in the words of one SSI official, “to combine existing stuff in a way that makes money.”

Starfind’s goal is to enable extremely accurate positional “fixes” from a single satellite (with several in use for round-the-world coverage) for tasks ranging from rescue operations to monitoring the positions of whole fleets of civilian or military vehicles. Like SSI, Starfind avoids exotic new technology, and bypassing vast expenditures for research and development may become significant if more private firms are to discover that they have business in space.

Meanwhile, established launch-vehicle builders such as Martin Marietta and General Dynamics are also pursuing non-NASA customers, but NASA still has launch problems of its own.

Last week, the Senate Commerce Committee approved its own version of a NASA authorization bill for fiscal year 1988, with one key difference from the Reagan administration’s bill being the addition of \$100 million for NASA to begin buying some nonshuttle launchers. NASA has advocated such a “mixed fleet,” but has yet to seek the necessary funds. Perhaps they are leaving it up to Congress, suggests one committee staffer, so as not to display lack of confidence in the shuttle.

— J. Eberhart

AIDS infects health workers

Three health care workers, whose skin was exposed to the blood of AIDS patients last year, have become infected with the AIDS virus, the Centers for Disease Control reported this week.

Unlike the six previously reported AIDS infections in health workers, the new cases apparently did not involve inadvertent injections of infected blood. While they do not know the exact route of transmission, CDC officials say the virus may have passed through chapped or inflamed areas of unprotected skin, or through the mucous membrane in the mouth of one worker whose face was splashed with blood. They stress that there is no evidence that the AIDS virus can pass through intact skin or spread by casual contact, and reiterate the need for rigorous adherence to existing infection control procedures. □