

## Climate still reeling from Pinatubo blast

More than two years after the Philippine volcano Mt. Pinatubo blew its top in June 1991, debris from the eruption continues to warp Earth's climate, according to atmospheric measurements. Scientists studying records from 1993 say the Pinatubo blast caused temperatures in the stratosphere to plummet, reaching record lows at the end of the year.

"It's mighty cool up there. These are the lowest temperatures since 1958," says James K. Angell, an atmospheric researcher with the National Oceanic and Atmospheric Administration (NOAA) in Silver Spring, Md.

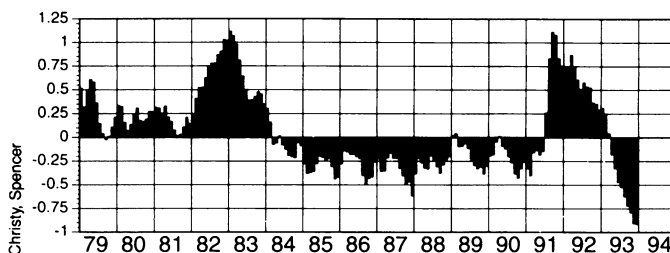
Angell analyzed air temperatures measured by balloons launched from 63 stations around the world. The balloon data indicate that the annual average temperature in the lower stratosphere last year sank 1.3°C below the average from 1958 to 1991. The stratosphere extends from 12 to 50 kilometers above Earth's surface.

Measurements made by satellites also show the strong cooling in the lower stratosphere, says John Christy of the University of Alabama in Huntsville. Temperatures at altitudes between 17 and 22 km dropped during 1993, ending the year almost a degree below the mean from 1982 to 1991. These temperatures were the lowest recorded by satellite since scientists began making such measurements from space in 1979.

Christy and colleague Roy Spencer of NASA's Marshall Space Flight Center in Huntsville analyzed data collected by a series of NOAA satellites that record microwave radiation emitted by oxygen molecules in the atmosphere. The amount of radiation released corresponds to the temperature of the air.

When Mt. Pinatubo erupted, it spewed 15 to 20 million tons of sulfur dioxide gas as high as 19 km, where the gas converted to tiny droplets of sulfuric acid. Immediately after the eruption, these droplets raised the stratosphere's temperature sharply by absorbing thermal radiation rising from Earth's surface and lower atmosphere. At the same time, the droplets cooled the planet's surface by reflecting sunlight, functioning as a giant umbrella covering the planet.

When the particles began dropping out of the stratosphere during the year after the eruption, temperatures in that region also started to decline. But instead of returning to normal, the stratosphere cooled far below the average temperature. Scientists saw a similar effect after the eruption of Mexico's El Chichón in 1982. In fact, stratospheric temperatures remained below average for seven years following that eruption; they only recovered when the Pinatubo



Stratospheric temperatures (in degrees Celsius) rise and then plummet after Pinatubo eruption in June 1991.

blast warmed the stratosphere, Christy says.

Ozone depletion may help explain the cooling trend because ozone molecules in the stratosphere normally heat this region by absorbing solar energy. When ozone concentrations drop, as they did dramatically after the Pinatubo eruption, temperatures in the stratosphere also decline. Although scientists believe human-made chlorofluorocarbons and other pollutants are causing long-term ozone loss, they suspect that volcanic sulfuric acid contributed to the large ozone drop in 1992 by accelerating the chemical assault.

Although stratospheric temperatures continued to decline late last year, Pinatubo's cooling influence on Earth's surface appears to be waning. Satellite and balloon data indicate that tropospheric temperatures increased slightly

in 1993 but have not yet recovered to pre-eruption levels.

Measurements made from Earth's surface, by land stations and by ships at sea, also show a slight warming — on the order of 0.1°C — from 1992 to 1993, says Phil Jones of the University of East Anglia in England. Despite the warming, the surface temperature in 1993 remained roughly 0.1°C below the average in 1990, which was the highest in over a century of measurements.

The Pinatubo eruption interrupted a dramatic rise in Earth's surface temperatures during the 1980s that had prompted concern about global warming. Now that its cooling effect on the troposphere appears to be dying out, researchers will be watching closely to see if the marked increase in global temperatures continues in coming years.

—R. Monastersky

## Implants linked to disorders in children

A preliminary study hints that children breast-fed by mothers with silicone gel breast implants may develop symptoms of an autoimmune attack.

Earlier research had indicated that women with these implants may face increased risk of a puzzling array of autoimmune disorders (SN: 12/12/92, p.414). In fact, evidence linking silicone implants to autoimmune disorders prompted the U.S. Food and Drug Administration to restrict access to the implants.

Jeremiah J. Levine and Norman T. Lowite of the Long Island Jewish Medical Center in New Hyde Park, N.Y., who conducted the study, knew that many women with implants suffer from a skin disorder called scleroderma. They also knew that scleroderma is often accompanied by problems with the esophagus, the muscular tube that leads to the stomach.

The pair evaluated 11 boys and girls who reported gastrointestinal problems such as abdominal pain, vomiting, and difficulty swallowing their food. All had been born to women with silicone implants. Eight of the mothers recalled nursing, and three had bottle-fed their children.

Levine and Lowite discovered that six of the eight breast-fed children had problems with esophageal peristalsis, the involuntary waves that push food down this digestive tube. Without such waves, gravity is the only force getting nourishment to the stomach, Levine says. Each of the three bottle-fed children had an

apparently healthy esophagus.

The team also studied 17 controls, children with stomach pain whose mothers did not have silicone implants. When compared to controls, the breast-fed children in the silicone group had abnormal esophageal function, the team reports in the Jan. 19 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

Although the study is small, the results appear significant, Levine says, noting that this esophageal disorder is rare in the general pediatric population. The researchers don't know whether children with the condition will outgrow their digestive problems; however, the digestive symptoms of three children in the study persisted.

Researchers have yet to uncover a mechanism by which silicone gel implants might cause disease, notes Jonathan A. Flick of Temple University School of Medicine in Philadelphia. Flick, who wrote an editorial accompanying the study, suggests that silicone may leach into breast milk and thus trigger the esophageal difficulties later in a child's life. Alternatively, the condition may result from antibodies that slip past the placenta.

Should women with silicone implants forgo nursing an infant? U.S. physicians remain cautious about such advice, noting that the advantages of breast-feeding are well established. Further research must confirm any hazards associated with milk from a silicone-enhanced breast, Levine points out.

—K.A. Fackelmann