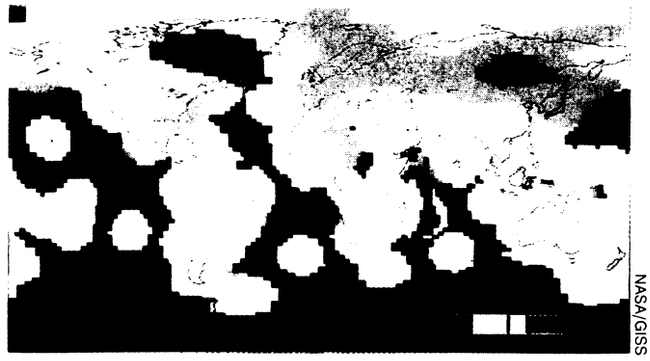
Hot Year Prompts Greenhouse Concern

Planet Earth steamed straight into the 1990s with record-setting temperatures that extended the warming trend of the last two decades. In separate statements released last week, two groups of researchers reported that the global average surface temperature during 1990 was the highest in more than a century of weather measurements.

While most climate experts say they cannot tell whether the warming trend results from the buildup of greenhouse gases, some display an increasing willingness to draw suggestive connections. "Although it is still too early to confirm whether the recent exceptional warmth is related to the greenhouse effect, international scientific opinion strongly supports the reality of this enhanced greenhouse effect, and it is likely it has played some role in contributing to the recent warmth," asserts a group of British scientists who monitor global records of land and marine temperatures.



NASA/GISS

Measurements from 2,000 land stations show the pattern of global warmth during 1990. Colors represent temperature deviations from a reference period of 1951-1980. The 1990 global average was 0.45° C above the reference average.

"That's possibly stronger than what we've said in recent years," team member Phil Jones told SCIENCE NEWS.

Jones, of the University of East Anglia in Norwich, and his colleagues report that six of the seven warmest years in their 140-year-long record have occurred since 1980. And researchers who have analyzed land-station data at NASA's Goddard Institute for Space Studies in New York City say the seven warmest years on their century-plus record occurred since 1980. Both groups find a 0.5°C warming over the last century.

The scientists stress that the overall warming trend of the last decade holds much more significance than any single year's temperatures. Nonetheless, 1990 held a peculiarity that raised many eyebrows: Its record warmth received no boost from a temporary tropical warming known as El Niño. The exceptionally high temperatures of several years in the 1980s resulted in part from such warmings, but there was no El Niño in 1990.

Measurements from balloons indicate that the troposphere – the lowest part of the atmosphere – has also warmed recently, says James K. Angell of the National Oceanic and Atmospheric Administration in Silver Spring, Md. In the 23-year record of tropospheric temperatures, 1988 and 1990 share first place.

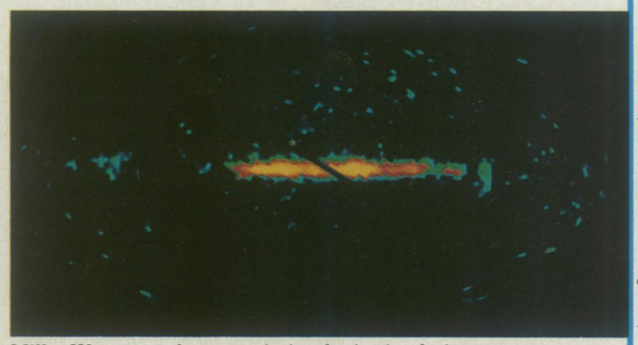
Angell also reports that the lower stratosphere – the layer above the troposphere – has cooled dramatically over the last two decades, with 1990 registering the lowest temperatures. This pattern corresponds roughly with the greenhouse theory, which predicts that the upper atmosphere will cool as the lower atmosphere warms.

Angell says he has been skeptical of colleagues who connected the warming trend with the greenhouse effect. "But I must say, I'm beginning to waver. The succession of warm years in the 1980s is pretty impressive," he adds.

What does last year's warmth indicate about the future? Perhaps nothing. But NASA's James Hansen says the record temperatures in recent years match the predictions of computer climate models, lending credence to model forecasts of a major warming by the middle of the next century. *– R. Monastersky*

COBE maps the interstellar medium

An unprecedented, panoramic survey of the Milky Way at microwave and far-infrared wavelengths has yielded new insights into the heating and cooling processes that drive starbirth in our galaxy. Astronomers created the galactic map using a detector aboard the Cosmic Background Explorer (COBE) spacecraft (SN: 11/10/90, p.301).



NASA/COBE Science Working Group

Milky Way map shows emission by ionized nitrogen at a wavelength of 205 microns. Yellow indicates highest intensity; blue indicates lowest.

The detector, called the Far-Infrared Absolute Spectrophotometer, recorded the location and intensity of interstellar ionized nitrogen at a wavelength of 205 microns, providing the first measurements ever of this spectral line. Researchers from NASA's Goddard Space Flight Center in Greenbelt, Md., and the University of California, Los Angeles, described the survey results at this week's meeting of the American Astronomical Society in Philadelphia.

The intensity of the radiation indicates that ionized nitrogen may be three times as abundant as expected, suggesting that the energy-absorbing ions play a key role in cooling interstellar gas, reports Charles L. Bennett of Goddard. He adds that measurements of another nitrogen emission line indicate a relatively low ionic density, equivalent to five ions in a cubic-inch box.

The strength and pervasiveness of the 205-micron emission supports the notion that "warm" regions of gas and dust lie between the cold, collapsing cores of starbirth clouds and the clouds' outer layers of hot gas, Bennett says. In addition, says David J. Hollenbach of NASA's Ames Research Center in Mountain View, Calif., it suggests that our galaxy forms stars more rapidly than predicted.

The COBE detector also measured the total luminosity of galactic dust and recorded the far-infrared emissions from neutral carbon atoms and carbon monoxide in the interstellar gas. In comparing these measurements with those for 20 other spiral galaxies, COBE investigators conclude that the Milky Way behaves like a typical spiral galaxy. *– R. Cowen*