

# *Earth Temperature in 1998 Is Reported at Record High*

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The earth's average surface temperature in 1998 is the highest by far since people first began to measure it with thermometers in the mid-19th century, the World Meteorological Organization reported yesterday.

The organization, an agency of the United Nations, said 1998 would be the 20th year in a row that the globe's surface has been warmer than its recent long-term average, which is the average for 1961 through 1990. Seven of the 10 warmest years on record have occurred since 1990 and the other three occurred after 1983. Most recently, new monthly high-temperature records were set in each of the 18 consecutive months ending in October 1998.

The results, based on data through mid-December and reported in Geneva, will change slightly when final data are calculated. But experts say it is certain that 1998 will turn out to be the warmest year on record, and almost as certainly by an easy margin over the the previous warmest, 1997.

According to the new figures, the average global temperature this year will turn out to be about 58 degrees, a full degree warmer than the 1961-1990 average.

"This number's amazing," said Dr. Philip D. Jones, a climatologist at the University of East Anglia in England, speaking of a field in which records are normally set in fractions. Dr. Jones provided much of the information on which yesterday's announcement was based.

While there are dissenters who believe the warmer climate can be explained by normal variation, the dominant view among climate scientists is that at least some of the warming trend is a result of emissions of heat-trapping waste industrial gases like carbon dioxide, which is produced by the burning of coal, oil, natural gas and wood.

Despite the 1998 record, a number of scientists said they believed the world was likely to be cooler in 1999 and possibly 2000 as well. The reason, they said, is that a

fair measure of the warming in 1998 can be attributed to the effects earlier in the year of El Nino, the extensive pool of warm water that develops from time to time in the tropical Pacific. It both warms the global atmosphere and disrupts worldwide weather patterns.

But even though a dissipating El Nino may allow some cooling next year, several experts said they expected the underlying global warming trend to continue and temperatures to remain above average in the immediate future. The findings about 1998 were not a surprise, since highly publicized analyses by Federal scientists had made it clear since midyear that 1998 was shaping up as the warmest year on record.

Among other contributors to the United Nations agency's report were the NASA Goddard Institute for Space Studies in New York, the British Meteorological Office, the National Climatic Data Center in Asheville, N.C., the NASA Marshall Space Flight Center and University of Alabama in Huntsville, Ala., the International Research Institute in New York and the Climatic Prediction Center in Washington.

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Based on studies of indirect evidence like the annual rings of trees, Dr. Jones has been saying for some time that he believes 1998 to be not only the warmest year in the thermometer record, but also the warmest year of this millennium.

As new global high-temperature records have been established in the 1990's, they have usually exceeded old ones by mere hundredths of a degree at a time. But if the new estimate holds up, 1998 will top the 1997 record by about a quarter of a degree. The difference may appear small, but the world is only 5 to 9 degrees warmer now than in the depths of the last ice age. According to the numbers announced yesterday, the globe is about 1.25 degrees warmer than at the beginning of this century.

The actual average surface temperature of the earth this year will come in at about 58 degrees, according to the British data sets. Other data sets vary slightly.

Mainstream scientists project that the surface will warm by an additional 2 to 6 degrees over the next century if carbon dioxide emissions are not reduced, with the largest increases in temperate and sub-Arctic latitudes. Among other things, they say, this will make hot weather, droughts and floods more likely while reducing the number of extremely cold days, raise the level of the seas, cause climatic zones to shift and produce widespread environmental and economic dislocations.

Not all regions of the world have warmed in recent years, and each year there are some cool spots; in 1998, Eurasia was one of these. One place that has often lagged in the warming trend is the United States. But this year, according to an analysis by the Goddard center in New York, North America led the warming trend, experiencing its warmest year in the last four decades.

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