

## Greater Heat, More Hurricanes Stir 2003 Weather

U.S. weather watchers release summary of the year's conditions

Sharp U.S. weather contrasts and hotter global temperatures are the hallmarks of 2003 weather, the National Oceanic and Atmospheric Administration (NOAA) reports. Drawing upon the world's largest storehouse of climatic data, NOAA scientists say that 2003 will turn out to be Earth's third warmest year on record.

In a December 16 report providing an overview on U.S. and international weather conditions for the year, NOAA said that 2003 was an above average year for hurricanes. Seven tropical storms grew up to be hurricanes in the 2003 season, contrasted with an annual average of five to six killer storms.

The data from 2003 place the year in the top ranks of record warmth years, behind 1998, the hottest year on record, and 2002. The historical data show a steadily rising temperature pattern over the last century, a trend that has accelerated since 1976. Examining data collected through November, NOAA found that temperatures for the year were as much as 1.7 Celsius degrees above average across large parts of Asia, Europe and the western United States.

The preliminary findings for 2003 are available at <http://www.ncdc.noaa.gov/oa/climate/research/2003/ann/global.html>

Following is an excerpt of NOAA's press release on the 2003 report. The document is available in full at <http://www.noaanews.noaa.gov/stories2003/s2141.htm>

### NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

#### NOAA REPORTS 2003 WAS MARKED BY CONTRASTING CONDITIONS ACROSS THE U.S. WHILE GLOBAL TEMPERATURES REMAIN HIGH

Dec. 16, 2003 - The 2003 climate in the United States was wetter and cooler-than-average in the East, warmer and drier-than-average in the West, while drought conditions persisted, or worsened, throughout much of the central and western regions, according to scientists at the NOAA Climatic Data Center in Asheville, N.C. Working from the world's largest statistical weather database, the scientists also estimate that 2003 will likely be the third warmest year on record for the globe.

#### U.S. Temperatures

The average temperature for the contiguous United States in 2003 is expected to be near 53.6 degrees F (12.0 degrees C). Much of 2003 was marked by near-average to cooler-than-average temperatures in the East and much higher-than-average temperatures in the western half of the nation.

#### U.S. Precipitation and Drought

The year was also marked by a sharp contrast in precipitation across the country. While drier-than-average conditions persisted throughout much of the West, all but four states east of the Mississippi were significantly wetter than average for the January-November period.

Conversely, 17 states along and west of the Mississippi River were significantly drier than average. The

combination of below-average precipitation and warmer-than-average temperatures contributed to persistent or worsening drought conditions.

## Atlantic Hurricane Season

Sixteen named storms formed in the Atlantic basin during 2003, including Hurricane Isabel, which was the first hurricane to make landfall along the East Coast since 1999. Tropical Storms Odette and Peter formed after the traditional end of the hurricane season. Odette was the first tropical storm to have developed in the Caribbean during December. Of the 16 named storms, seven became hurricanes and three were classified as major hurricanes (Category 3 or higher on the Saffir - Simpson hurricane scale). The annual average is five to six hurricanes and two to three major hurricanes.

According to the NOAA National Hurricane Center, several factors contributed to the very active season including the absence of El Niño conditions in the Pacific and the persistence of conditions associated with the continuation of a multi-decadal period of enhanced activity that began in 1995. With the exception of 2002 and 1997, years that were both affected by El Niño, at least three major hurricanes have developed in every season since 1995. However, no significant long-term trend in hurricane strength or frequency has been observed in the Atlantic Basin.

## Global Temperatures

Data collected from weather and climate stations, satellites, ships, buoys and floats indicate that the 2003 average global temperature will likely be the third-warmest on record, slightly lower than 2002 and cooler than the record warm year of 1998. The 10 warmest years have all occurred since 1990. The year began with a moderate El Niño in the equatorial Pacific, but the episode ended by April, and near neutral conditions persisted across the equatorial Pacific the remainder of the year.

During the past century, global surface temperatures have increased at a rate near 1.0 degree F/Century (0.6 degrees C/Century), but the trend has been three times larger since 1976, with some of the largest temperature increases occurring in the high latitudes. In 2003, warmer temperatures and shifts in atmospheric circulation patterns contributed to a second straight year of extremely low Arctic sea ice extent in September, according to the National Snow and Ice Data Center. However, Northern Hemisphere sea ice extent was more than that observed in September 2002.

Data collected by NOAA's polar orbiting satellites and analyzed for NOAA by the University of Alabama in Huntsville and Remote Sensing Systems in Santa Rosa, Calif., also indicate that temperatures centered in the middle troposphere at altitudes from two to six miles are on pace to make 2003 the third-warmest year for the globe. The average lower troposphere temperature (surface to about five miles) for 2003 will also likely be the third warmest since the beginning of annual satellite measurements in 1979.

## Global Events

Through the end of November, temperatures for the year were as much as 3 degrees F (1.7 degrees C) above average across large parts of Asia, Europe and the western United States. Warmer-than-average temperatures also covered much of South America, Australia, Canada and parts of Africa, while widespread areas of cooler-than-average temperatures occurred in the eastern United States, western Asia, and coastal areas of Australia.

A record summer heat wave contributed to the large year-to-date anomalies in Europe. The all-time maximum temperature record in the United Kingdom was broken on Aug. 10, when the mercury reached 100.6 degrees F (38.1 degrees C) at Gravesend-Broadness (Kent). France had its warmest summer on record, which killed thousands.

Temperatures also soared across southern Asia in late May and June. During a 20-day heat wave, maximum

temperatures reached as high as 113-122 degrees F (45-50 degrees C), and more than 1,500 deaths occurred in India, according to news reports.

Conversely, extremely cold winter temperatures occurred across Asia in January. Temperatures in northwestern Russia were as low as minus 50 degrees F (minus 45 degrees C), and thousands of deaths were attributed to extremely cold conditions in India and Bangladesh during the month, according to published reports. Moscow received snowfall in June for the first time since 1963. In the Peruvian highlands, temperatures dropped below minus 5 degrees F (minus 20 degrees C) during the Southern Hemisphere winter month of July, which led to the reported deaths of more than 200 people.

In Argentina, Santa Fe was reportedly hit by its worst flooding in centuries due to several days of heavy rainfall in April and May, which caused major rivers to overflow their banks. Heavy rains associated with Typhoon Maemi in September triggered landslides and flooding that were responsible for more than 130 deaths and the evacuation of more than 25,000 people from their homes in South Korea.

Normal-to-above-normal rainfall in the Sahel led to ideal growing conditions in much of this region of Africa. Rainfall in Zimbabwe and Mozambique brought some drought relief during the austral spring (September-November), but drought persisted in parts of those countries as well as South Africa and Botswana near year-end.

The NOAA Satellites and Information Service is the nation's primary source of space-based and surface-based meteorological and climate data. The NOAA Satellites and Information Service operates the nation's environmental satellites, which are used for weather forecasting, climate monitoring and other environmental applications such as fire detection, ozone monitoring and sea surface temperature measurements.

The NOAA Satellites and Information Service also operates three data centers, which house global data bases in climatology, oceanography, solid earth geophysics, marine geology and geophysics, solar-terrestrial physics, and paleoclimatology.

NOAA is dedicated to enhancing economic security and national safety through the prediction and research of weather and climate-related events and providing environmental stewardship of the nation's coastal and marine resources. NOAA is part of the U.S. Department of Commerce.

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