



Press Release

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WMO STATEMENT ON THE STATUS OF THE GLOBAL CLIMATE IN 2004:

GLOBAL TEMPERATURE IN 2004 FOURTH WARMEST

GENEVA, 15 December (WMO)—The global mean surface temperature in 2004 is expected to be $+0.44^{\circ}\text{C}$ above the 1961-1990 annual average (14°C), according to the records maintained by Members of the World Meteorological Organization (WMO). This value of 0.44°C places 2004 as the fourth warmest year in the temperature record since 1861 just behind 2003 ($+0.49^{\circ}\text{C}$). However, 1998 remains the warmest year, when surface temperatures averaged $+0.54^{\circ}\text{C}$ above the same 30-year mean. The last 10 years (1995-2004), with the exception of 1996, are among the warmest 10 years on record.

Calculated separately for both hemispheres, surface temperatures in 2004 for the northern hemisphere ($+0.60^{\circ}\text{C}$) are likely to be the fourth warmest and, for the southern hemisphere ($+0.27^{\circ}\text{C}$), the fifth warmest in the instrumental record from 1861 to the present.

Globally, the land-surface air temperature anomaly for October 2004 was the warmest on record for a month of October. The blended land and sea-surface temperature (SST) value for the Arctic (north of 70°N) in July and the land-surface air temperature value for Africa south of the Equator in July were the warmest on record for July. Significant positive annual regional temperature anomalies, notably across much of the land masses of central Asia, China, Alaska and western parts of the United States, as well as across major portions of the North Atlantic Ocean, contributed to the high global mean surface temperature ranking.

Over the 20th century, the global surface temperature increased by more than 0.6°C . The rate of change for the period since 1976 is roughly three times that for the past 100 years as a whole. In the northern hemisphere, the 1990s were the warmest decade with an average of 0.38°C . The surface temperatures averaged over the recent five years (2000-2004) were, however, much higher (0.58°C).

Strong regional temperature differences

During June and July, heatwaves with near-record temperatures affected southern Spain, Portugal, and Romania, with maximum temperatures reaching 40°C. In Japan, extreme hot conditions persisted during the summer with record-breaking maximum temperatures. An exceptional heatwave affected much of eastern Australia during February, as maximum temperatures soared to 45°C in many areas. The spatial and temporal extent of the heatwave was greater than that of any other February heatwave on record. A prolonged severe heatwave across northern parts of India during the last week of March caused more than 100 fatalities.

In July, abnormally cold conditions in the high-altitude areas of the Andes in southern Peru reportedly killed 92 people. Cold weather since late December 2003 was blamed for as many as 600 deaths across South Asia. During January 2004, maximum and minimum temperatures were below normal by 6-10°C across northern India and Bangladesh.

Prolonged drought in some regions

Drought conditions continued to affect parts of eastern South Africa, Mozambique, Lesotho and Swaziland in early 2004. However, enhanced precipitation in the last half of the rainy season provided some benefit to crops in southern Africa. The March-May rainy season was shorter and drier than normal across parts of the Greater Horn of Africa, resulting in a continuation of multi-season drought in this region. Isolated regions in the southern sector and portions of Uganda experienced driest conditions on record since 1961. In Kenya, a premature end to the 2004 long rains exacerbated the drought resulting from several years of poor rainfall in many areas. Food production in Kenya was projected at approximately 40% below normal. In spite of abundant rainfall in 2004, multi-year drought conditions also continued in Somalia, threatening agriculture and food security in the region. In Eritrea, which was struggling from nearly four years of drought, poor rains during the March-May rains exacerbated drinking-water shortages.

In India, the 2004 seasonal rainfall during the summer (south-west) monsoon season (June-September) over the country as a whole was 13% below normal with 18% of the country experiencing moderate drought conditions. In Pakistan, poor rains in July and August aggravated the long-term drought conditions, which had prevailed since the boreal spring. In Afghanistan, drought conditions that had plagued the country for the past four years continued in 2004 due to poor precipitation in the March-April season. In southern China, dry conditions persisted from August to October, resulting in the worst drought there in the last 54 years.

Long-term hydrological drought continued to affect much of southern and eastern Australia, as a result of rainfall deficits experienced since the major drought event of 2002/2003. Moderate-to-severe drought conditions continued in some areas of the western United States for the fifth year in a row. Some relief was experienced during September and October, though long-term drought remains entrenched across much of the region. Due to above-normal summer temperatures and dry conditions, a record area was burned by wildfires in Alaska.

Abundant rainfall and flooding in many other regions

Precipitation in 2004 was above average for the globe and 2004 was the wettest year since 2000. Wetter-than-average conditions prevailed in the southern and eastern United States, eastern Europe and parts of western Asia, Bangladesh, Japan and coastal Brazil.

The Asian summer monsoon during June-September brought heavy rain and flooding to parts of northern India, Nepal and Bangladesh, leaving millions stranded. Throughout India, Nepal and Bangladesh, some 1 800 deaths were blamed on flooding brought by heavy monsoon rains. Flooding in north-east India (the states of Assam and Bihar in particular) and Bangladesh was the

worst in over a decade. In eastern and southern China, heavy rains during June and July produced severe flooding and landslides that affected more than 100 million people and were blamed for more than 1 000 deaths nationwide. Heavy monsoon rainfall during July and August produced flooding along several rivers in north-eastern and central Thailand. A significant low-pressure system brought record-breaking snowfalls in the Republic of Korea on 5 March, resulting in damage to agriculture worth more than US\$ 500 million. In October, two typhoons and active frontal systems brought record-breaking heavy rainfall to Japan. Tokyo received a total amount of 780 mm precipitation in October, which is the largest monthly amount on record since 1876.

Mudslides and floods due to heavy rains across areas of Brazil during January and early February left tens of thousands of people homeless and resulted in 161 deaths. In January, Peru and Bolivia also experienced hailstorms, heavy rainfall and flooding, which killed at least 50 people.

In Haiti, torrential rainfall due to the passage of Hurricane *Jeanne* produced disastrous flooding that claimed some 3 000 lives. This disaster came in the wake of flooding and landslides that affected Haiti and the Dominican Republic in late May 2004, in which more than 2 000 people were killed and several thousand others were affected.

In the second half of November and beginning of December, three tropical storms and a tropical depression passed over southern and central parts of the Philippines, drenching the islands with several days of torrential rainfall and triggering catastrophic flash floods and landslides, which killed, according to reports, more than 1 100 people.

Heavy rains from mid-January to March in areas of Angola produced flooding along the river system, which flows into neighbouring Zambia, Botswana and Namibia. Extensive flooding along the Zambezi River, the worst flooding since 1958, threatened more than 20 000 people in north-eastern Namibia and caused extensive damage to crops.

In Australia, parts of Tasmania, Queensland and New South Wales received unusually heavy rainfall in mid-January, which produced flooding and damage. Parts of the Northern Territory received the wettest rainy season on record. A series of strong storms during February produced heavy rainfall and damaging floods in southern parts of New Zealand's North Island.

Development of Weak El Niño conditions

Sea-surface temperature and sea-level atmospheric pressure patterns in the tropical Pacific at the beginning of 2004 reflected near-neutral El Niño conditions. However, the increase and eastward expansion of anomalous warmth in the central and east-central equatorial Pacific during July-November indicated the early stages of a warm (El Niño) episode. By early November, positive equatorial SST anomalies greater than $+1^{\circ}\text{C}$ were observed from the central to eastern Pacific. SSTs in the far eastern tropical Pacific also warmed to slightly above-average levels. The Tahiti-Darwin Southern Oscillation Index has been negative since June 2003, but has fluctuated considerably. The tropical Pacific atmospheric conditions have continued to show only some weak characteristics of El Niño.

Above-average number of hurricanes and deadly typhoons

During the Atlantic hurricane season, 15 named tropical storms developed: the average is around ten. During August, eight tropical storms formed, which is a record for the most named storms for any month of August. Since 1995, there has been a marked increase in the annual number of tropical storms in the Atlantic Basin. Nine of the named storms were classified as hurricanes. Six of those were "major" hurricanes (category three or higher on the Saffir-Simpson scale). Hurricane *Charley* was the strongest and most destructive hurricane to strike the United States since *Andrew* in 1992. In all, nine named storms impacted the United States, causing extensive damage estimated at more than US\$ 43 billion.

In the South Atlantic Ocean, sea-surface and atmospheric conditions do not favour the formation of hurricanes. During March 2004, however, the first documented hurricane since geostationary satellite records began in 1966 developed. Named *Catarina*, it made landfall along the southern coast of Brazil (in the state of Santa Catarina) on 28 March 2004, causing great damage to property and some loss of life.

Conversely, in the eastern North Pacific, activity was slightly depressed. Only 12 named storms developed during the year, compared to the average of 16.4. Out of those 12 storms, six reached hurricane strength and three reached "major" status. In the North-west Pacific, 27 named storms developed, which is close to the 1971-2000 average of 26.7. Nineteen of them reached typhoon intensity. Ten tropical cyclones made landfall in Japan (breaking the previous record of six), which were blamed for 209 fatalities and extensive damage to property.

Smaller Antarctic ozone hole

This year, the maximum size of the Antarctic Ozone hole (19.6 million km²) was reached in late September. Except for the year 2002, when the ozone hole split into two in late September, the October ozone hole this year was the smallest observed in more than a decade. The ozone hole in 2004 dissipated earlier than usual, in mid-November.

Low Arctic sea-ice extent

Sea-ice extent in the Arctic remains well below the long-term average. In September 2004, it was about 13% less than the 1973-2003 average. Satellite information suggests a general decline in Arctic sea-ice extent of about 8% over the last two and half decades.

Information sources

This preliminary information for 2004 is based on observations up to the end of November from networks of land-based weather stations, ships and buoys. The data are collected and disseminated on a continuing basis by the National Meteorological and Hydrological Services of WMO Member countries.

It should be noted that, following established practice, WMO's global temperature analyses are based on two different datasets. One is the combined dataset maintained by the Hadley Centre of the Met Office, UK, and the Climatic Research Unit, University of East Anglia, UK and the other one is maintained by the USA Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Results from these two datasets are comparable: both indicate that 2004 is likely to be the fourth warmest year globally.

More extensive, updated information will be made available in the annual WMO statement on the status of the Global Climate in 2004, to be published in early March 2005.

(*A joint Press Release issued in collaboration with the Hadley Centre of the Met Office, UK, the Climatic Research Unit, University of East Anglia, UK and in the USA: NOAA's National Climatic Data Centre, National Environmental Satellite and Data Information Service and NOAA's National Weather Service. Other contributors are WMO Member countries: Argentina, Australia, France, Germany, India, Japan, Mauritius, New Zealand, Norway, Sweden, and the Drought Monitoring Centre in Nairobi).

***The World Meteorological Organization is the United Nations System Authoritative Voice
on Weather, Climate and Water***

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