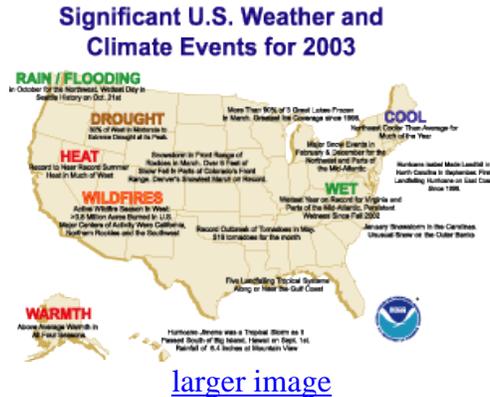


Climate of 2003 Annual Review Significant U.S. and Global Events



Review of U.S. Events

*Compiled from both NOAA and non-NOAA sources, including U.S. and international news media reports

January 2003

A winter storm affected the Northeast U.S. during January 2-4, bringing heavy snows to much of central New York and northeast Pennsylvania and into parts of New England. A mix of rain and snow fell along the immediate coastal areas.

A winter storm brought significant accumulations of snow to parts of the U.S. Deep South, including the Carolinas, on the 23rd. Snowfall accumulations of 10-30 cm (4 to 12 inches) were common across areas of western and central North Carolina, as well as the Outer Banks.

February 2003

A Pacific storm system moved into the Southwest U.S. during February 11-13th, dumping heavy rains on parts of southern California eastward into adjacent areas of Nevada and Arizona. After a 6-week dry spell, up to 178 mm (7 inches) of rain fell on parts of southern California; which broke some daily rainfall records and caused localized flooding. At Las Vegas, Nevada, 19 mm (0.74 in) of rain fell on the 12th, which was the 3rd wettest calendar day since November 21, 1996.

A powerful winter storm that affected much of the eastern half of the United States during February 15-17 dumped heavy accumulations of snow across much of the Ohio Valley eastward through the Mid-Atlantic and Northeast. Snowfall accumulations of 30-61 cm (1-2 feet) were common, with snowfall amounts exceeding 89 cm (35 inches) in parts of northeastern West Virginia. Numerous all-time snowfall records were broken, including Baltimore and Boston. The storm system brought the heaviest snow accumulations to the East Coast since the Blizzard of

1996. Farther to the south, subfreezing temperatures extending into the Carolinas brought sleet and freezing rain to the parts of the region. The storm closed numerous airports in the Northeast and Mid-Atlantic and severely hampered transportation.

Heavy rainfall associated with the same storm system that brought very heavy snowfall to the eastern seaboard of the United States during February 15-17 also caused severe flooding in eastern Kentucky. Numerous rivers rose above flood stage, causing flooding in many communities.

A winter storm swept across the U.S. southern plains during the 24th-25th, with ice and snow across north Texas and from Oklahoma eastward into Arkansas and southern Missouri. At least 15 people were killed in the region due to adverse winter weather (Reuters).

March 2003

Cold winter temperatures across the Great Lakes resulted in an unusually high ice concentration. More than 90 percent of lakes Superior, Erie and Huron were frozen by March 10, which is the most ice cover on the Great Lakes since February 1994 (Duluth News Tribune).

Colorado's biggest winter storm of the season dumped several feet of snow on the Front Range of the Rocky Mountains during March 17-19. Snowfall was heaviest in Gilpin county, located west of Denver, where up to 222 cm (87.5 inches) of snow fell. The Denver International Airport was closed on the 19th, and the main terminal was temporarily evacuated due to the possibility of a roof collapse from the weight of heavy snow (TheDenverChannel.com). This (80.8 cm or 31.8 inches) was Denver's second biggest snowstorm ever recorded, and resulted in the snowiest March on record for the city. (The most snow ever recorded in a single Denver snowstorm was 116 cm or 45.7 inches. The amount was measured during the blizzard of December 1-6 of 1913.) Preliminary damage estimates from the storm were near \$34 million (Associated Press).

Severe thunderstorms, which affected southern Georgia early on the 20th, produced a tornado that resulted in severe damage and loss of life in Mitchell and Worth counties. The storm claimed 6 lives and resulted in 25 injuries (Associated Press).

April 2003

A late season winter storm dumped up to 22 inches (56 cm) of snow across the higher elevations of the western North Carolina Mountains on April 10.

A strong frontal system which swept across New Mexico on the 15th [produced strong winds gusting as high as 210 km/hr \(130 mph\)](#) at the White Sands Missile Range. Sustained winds over 55 km/hr (35 mph) produced significant amounts of blowing dust which was responsible for a 10-car pileup near the town of Deming that killed 2 people (CNN). Farther east, [severe thunderstorms developed late on the 15th and produced 11 tornadoes in Texas and Oklahoma](#), along with numerous reports of damaging hail and strong winds.

May 2003

The [deadliest outbreak of severe weather since May 1999](#) produced 84 tornadoes, large hail and damaging winds across 8 states during May 4-5th. Tornadoes affected the metropolitan Kansas City area, producing F4 damage to parts of the city. Other cities including Pierce City, Missouri and Jackson, Tennessee sustained heavy damage and loss of life. At least 38 people were killed from the outbreak in Kansas, Missouri and Tennessee (USA Today). The exceptional period of severe weather in the United States continued during May 6-10. In Oklahoma City, damaging tornadoes occurred on both the 8th and 9th, prompting President Bush to declare all of Oklahoma a federal disaster area (Associated Press). A total of 42 storm-related deaths were reported during the 1st-10th (USA Today, Associated Press). May 1-10 had more reported tornadoes (412) than any other ten-day period since records began in 1950 (NOAA/SPC).

Heavy rains in the southeast United States brought significant flooding to south Florida on the 27th, with over 254 mm (10 inches) reported at Fort Lauderdale. In [central North Carolina](#), four earthen dams burst when as much as 150-200 mm (6-8 inches) rain fell over parts of the area (Associated Press).

June 2003

An unusually strong storm system affected the Northeastern United States on June 1st, with heavy rainfall, strong gusty winds and cool temperatures. Winds at Nantucket, Massachusetts gusted over 95 km/hr (50 knots or 60 mph).

[Heavy rainfall occurred in areas of the central and southern Appalachians](#), with 7 deaths attributed to flooding in Kentucky, West Virginia and North Carolina (Associated Press). Rainfall during June 13-19 locally exceeded 125 mm (5 inches).

Very large hail was observed near Aurora, Nebraska on the 22nd. A hailstone measuring 7.0 inches (17.8 cm) in diameter with a circumference of 18.75 inches (47.6 cm) was discovered by the National Weather Service. This was the largest hailstone ever recorded in the state of Nebraska, and was the largest hailstone ever documented in the U.S. and globally when measuring by circumference. The previous record was held by the Coffeyville, Kansas hailstone (September 3, 1970) which weighed 1.67 pounds (0.76 kg) and had a circumference of 17.5 inches (44.5cm). Additional severe weather occurred in southeastern Nebraska and northern Kansas on the 22nd. A tornado was responsible for one fatality near Deshler, Nebraska. This was the first tornado death in Nebraska since 1988 (Associated Press).

[Tropical Storm Bill](#) developed in the central Gulf of Mexico on the 29th. Bill made landfall along the coast of Louisiana on the 30th in Terrebonne Bay about 50 km (30 miles) east of Morgan City with maximum sustained winds at the time of landfall near 95 km/hr (60 mph). The storm caused power outages to around 220,000 homes and businesses in southeastern Louisiana (Associated Press).

July 2003

[Hurricane Claudette](#) developed in the Caribbean Sea on the 9th and moved across the northern tip of Mexico's Yucatan Peninsula on the 11th with maximum sustained winds near 90 km/hr (50 knots or 55 mph). Claudette then tracked northwestward into the Gulf of Mexico, attaining category-1 hurricane status. Claudette made landfall along the Texas Gulf Coast near Port O'Connor on the 15th with maximum sustained winds near 120 km/hr (65 knots or 75 mph). The storm caused considerable damage, left tens of thousands without power, and was responsible for two deaths (AFP). Heavy rainfall and localized flooding occurred well inland. For additional information on tropical storms and hurricanes during 2003, please see the [Atlantic Hurricane Season summary page](#).

Severe thunderstorms brought strong winds to the Memphis, TN area early on the 22nd, and caused widespread power outages and 4 deaths (Associated Press). Winds in the metropolitan area gusted as high as 100 mph as the storms moved through (Associated Press). By early August, more than 15,000 people remained without power in the Memphis area from the late-July thunderstorms (Associated Press).

Drought conditions intensified throughout much of the West during July 2003.

August 2003

Thunderstorms on the 19th brought some of the heaviest rainfall and flooding to the Las Vegas, Nevada area since 1999. As much as 75 mm (3 inches) of rain fell in parts of the area in just 30 minutes, producing widespread flooding and prompting the mayor to declare a state of emergency (Las Vegas Sun).

[Numerous wildfires continued to burn across the western United States](#), although year-to-date wildfire activity was below the 10-year average. Smoke from wildfires in parts of Canada and Montana affected much of the Plains on the 21st.

A [derecho](#) associated with a cluster of severe thunderstorms [affected parts of the Ohio Valley](#) eastward through sections of the Mid-Atlantic. There were numerous reports of wind damage as the storms rolled through the region on the 26th.

September 2003

[Hurricane Jimena](#) formed as a tropical depression on August 28 and reached hurricane strength by the 29th. Jimena weakened into a tropical storm as it passed south of the Big Island of Hawaii on September 1st. Maximum sustained winds on the 1st were 34 kts (63 km/hr or 39 mph) with gusts to 46 kts (85 km/hr or 53 mph) at South Point. As many as 1,500 people lost electricity on the Big Island and rainfall amounts ranged from 3.7 inches (95mm) at the Hilo Airport to 6.4 inches (163 mm) at Mountain View (NWS/CPHC).

[Hurricane Isabel](#) developed in the tropical Atlantic Ocean as a tropical storm on September 6. Isabel reached hurricane intensity by the 7th, and strengthened to Category 5 intensity on the

Saffir-Simpson scale. Isabel was the first category-5 hurricane in the Atlantic since Mitch in 1998. Isabel tracked northwestward and made landfall along the Outer Banks of North Carolina as a category-2 hurricane with maximum sustained winds near 160 km/hr (85 knots or 100 mph). Heavy rain from the hurricane had spread well inland over much of the Mid-Atlantic region during the afternoon and evening of the 18th, along with a broad area of tropical storm to hurricane force wind gusts over eastern North Carolina, eastern Virginia and northward to the New Jersey shore. Isabel brought a storm surge of 6-8 feet (1.8-2.4 meters) to the Outer Banks, which cut a new inlet near Cape Hatteras Village. Strong winds well inland resulted in power outages for 1.8 million Dominion Power customers in Virginia and North Carolina, the largest outage in the company's history (Associated Press). Damage estimates are over \$2 billion for the storm, adding Isabel to the list of U.S. Billion Dollar Weather Disasters. There were at least 40 fatalities, with 25 of them in Virginia (Associated Press). For additional information on tropical storms and hurricanes during 2003, please see the [Atlantic Hurricane Season summary page](#).

[Severe thunderstorms, including several confirmed tornadoes](#), spread across portions of the U.S. Mid-Atlantic coastal plain during September 22-23, 2003. Parts of Richmond, Virginia were hit with 160 km/hr (100 mph) wind gusts as the storms moved through, with 40,000 customers losing power in the state (Associated Press). More power outages occurred in New Jersey and Pennsylvania, with an F-1 tornado causing damage in Delaware Township, New Jersey (New York Times).

October 2003

A strong low pressure system brought showers, thunderstorms and strong winds to much of the Northeast and Mid-Atlantic region of the United States on October 15. In Maine, gusty winds knocked down trees and power lines which left about 110,000 homes and businesses without power. Farther south, thousands of residents in Massachusetts, New Jersey and Pennsylvania also lost electricity. Wind gusts of 80-115 km/hr (50-70 mph) were reported in parts of the area. (Associated Press).

A storm system aided by a powerful Pacific jet stream brought heavy rains and flooding to areas of Washington and British Columbia during mid-October. Numerous daily rainfall records were broken across western Washington on October 20-21. The 21st was the wettest day in Seattle weather history (since 1891), with 128 mm / 5.02 inches. Washington governor Gary Locke declared a state of emergency for 7 counties as 10 rivers in the state went above the flood stage. In British Columbia, rainfall was described as the heaviest in 100 years, with around 500 mm (16 inches) of rain in the Pemberton and Squamish region. Flooding displaced hundreds of people and resulted in 2 deaths in British Columbia (AFP).

Very dry conditions along with Santa Ana winds created a deadly wildfire emergency across southern California by late in the month. More than 13,000 firefighters fought blazes across San Diego, Los Angeles, San Bernardino and Ventura counties (CNN). As of October 30, the fires had destroyed at least 2,400 homes, charred more than 475,000 acres (190,000 hectares) and killed 20 people (CNN). The California governor's office estimated that fire damage was approaching \$2 billion (USD). The Cedar Fire, located in San Diego county, grew to a size of

250,000 acres (101,000 hectares) by the 29th, making it the largest brush fire in the state since 1932 (California Dept. of Forestry).

November 2003

[Thunderstorms developed in southern California](#) on the afternoon/evening of the 12th and produced torrential downpours across parts of the Los Angeles area. More than 125 mm (5 inches) of rain fell in just 2 hours in southern Los Angeles, producing severe urban flooding. Small hail also accompanied the storms, accumulating several inches deep in some areas of the city. Nearly 115,000 electrical customers lost power as the storms affected the area (Associated Press).

A [strong storm system that moved across the U.S. Great Lakes](#) and into Quebec during the 12th-13th produced a variety of weather impacts, including severe thunderstorms, strong winds and heavy snows. Winds gusting to 80-95 km/hr (50-60 mph) across the Ohio Valley, Great Lakes, Northeast and Mid-Atlantic knocked out power to over 200,000 customers in the region (Associated Press). Heavy snows affected areas of southeastern Canada, including Quebec, while snow also fell downwind of the Great Lakes.

In the U.S. Pacific Northwest, strong winds on the 19th cut electricity service to around 67,000 homes and businesses in Washington and Oregon. The storm brought a rare November snowfall to the Seattle area, after 50mm (2 inches) of rain fell on the 18th (Reuters).

December 2003

A [major Nor'easter affected the Northeast United States during December 5-7](#) depositing one to two feet of snow across a large area from the Mid-Atlantic into New England. It was the greatest December snowstorm on record for Providence, RI, with 17.0 inches (43.2 cm) reported.

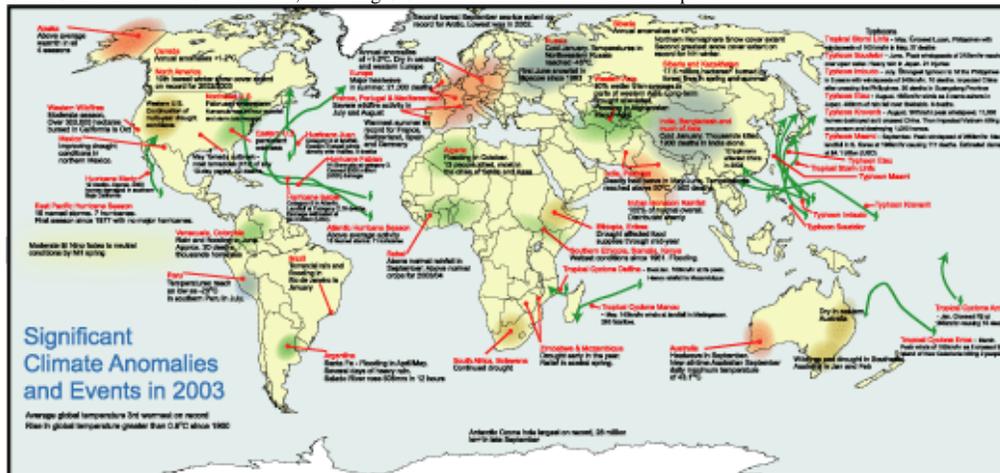
Heavy snowfall affected areas of northern California, Washington and Oregon during late December. Across the Intermountain West, heavy snow in Utah around the 26th was blamed for avalanches that claimed several lives (Reuters).

For more information on Weather and Climate Extremes, refer to ...

[The Climate of 2003](#)
[Extreme Weather and Climate Events](#)

Review of Global Events

*Compiled from both NOAA and non-NOAA sources, including U.S. and international news media reports



[larger image](#)

January 2003

[Drought continued throughout much of Australia](#) during early January 2003. Drought lowered milk production, the amount of cheese manufactured and the value of dairy exports (Sydney Morning Herald). Wool yields were down between 40-60 percent (ABC News) and the state of Victoria cancelled its 2003 duck-hunting season due to the severity of the nine-month long drought (Reuters). Dry conditions promoted wildfires across areas of Queensland and Victoria in southeast Australia in January.

In Africa, severe drought affected 900,000 people in Zimbabwe's southwestern province of Matabeleland. In one of Zimbabwe's worst droughts in the last 50 years, up to 20,000 head of cattle were in danger of dying (World Vision). Across the country, aid agencies estimated that almost 7 million people in the country would require food aid until the next harvest around March 2003. Across Ethiopia, drought was expected to cause up to a 30 percent reduction in coffee production, undermining the country's main cash crop (BBC News). In Mauritania, 420,000 people were in need of food aid due to one of the worst droughts in the last 20 years (CIP report, WFP).

The nearly stationary remnants of Tropical Cyclone Delfina brought flooding to Malawi during January 1-7 and displaced more than 30,000 people, washed away crops and roads, and was blamed for 7 deaths (Associated Press). The President of Malawi declared a state of disaster on the 11th, describing the flooding as "a disaster of the highest proportion." In neighboring Mozambique, floods washed away an estimated 400 homes and disrupted power supplies in one Northern Province (Reuters).

Across Bangladesh, unseasonably cold weather during the last week of December 2002 into late-January 2003 was responsible for the deaths of 530 people (Reuters). Most fatalities were reported from the country's northern regions where temperatures fell to between 2-4°C (36-39°F). Average minimum temperatures in this region are generally between 12-14°C (54-57°F)

in early January. Unseasonably cold temperatures also affected areas of Pakistan, northern India and Nepal. In northern India, a total of 670 deaths were reported in the northern state of Uttar Pradesh, with at least a dozen deaths in Nepal blamed on the cold outbreak. (Deutsche Presse Agentur, Bangkok Post, Reuters). In Mongolia, the State Emergency Commission reported that 24,000 animals were reported dead during the first two weeks of January 2003, due to extreme winter conditions.

Heavy snow affected parts of Europe during the first week of January. In the United Kingdom, London reported its largest snowfall since February 1991 with up to 12 cm (5 inches) of accumulation (The Sentinel/UK Met Office). Farther south, a rare significant snowfall fell in parts of southern France, resulting in the temporary closure of two airports in the region. To the east, heavy snow in Hungary and Croatia halted most transportation and prompted the closing of the border crossing between the two countries (ABC News).

Flooding rains brought mudslides to the mountainous Brazilian city of Petropolis, outside of Rio de Janeiro, on the 11th. Eleven people were killed as mudslides buried three houses and flooded the nearby Piabanaha River (Associated Press). Up to 180 mm (7 inches) of rain fell in only an hour, which produced flash flooding in the city. Additional mudslides produced 5 deaths in the greater Rio de Janeiro area on the 29th while 8 people died outside of Sao Paulo on the 28th.

[Tropical Cyclone Ami](#) developed in the South Pacific Ocean on the 11th, and crossed Fiji and surrounding islands during the 13th-14th with maximum sustained winds near 185 km/hr (100 knots or 115 mph). The storm produced wind damage and flooding to Fiji's Vanua Levu and surrounding islands, where a state of emergency was declared by government officials. The cyclone was blamed for 15 deaths on Fiji, and caused millions of dollars in damage (USD) (Reuters).

February 2003

Heavy [rainfall in portions of Mozambique](#) during early February produced flooding that left about 100,000 families homeless, destroyed crops and severely damaged roads and bridges (Associated Press). A period of above normal rainfall that began in late January from the remnants of Tropical Cyclone Delfina continued in February.

A tornado that was responsible for over 100 deaths struck remote areas of the central Democratic Republic of Congo on the 2nd, affecting 6 villages in the District of Yumbi, Bandundu province (Associated Press). The tornado injured another 1,700 people, more than 200 critically, as it impacted an area located about 250 km (150 miles) northeast of the capital of Kinshasa (Associated Press).

In eastern Canada, freezing rain that affected New Brunswick on the 2nd caused thousands of power outages, and cost the provincial electrical utility New Brunswick Power between \$3-4 million (USD) in damage repair (Canadian Press). A power company spokesman characterized the ice storm as the worst in the utility's history, eclipsing the cost of the 1998 ice storm in New Brunswick.

In the Indonesian capital of Jakarta, heavy rains on the 13th caused flooding that affected 10,000 homes and produced traffic chaos throughout the city. Flooding and landslides throughout the country killed around 60 people since December 2002 (Associated Press).

In Canada, cold temperatures in Newfoundland froze floodwaters which affected the town of Badger. The Exploits, Red Indian and Badger rivers flooded the town as ice jams gave way on the 15th. By the 17th, temperatures as low as -20°C (-4°F) froze much of the standing water, encasing cars, snowmobiles and some homes in ice. Most of Badger's 1,100 residents were evacuated during the 15-16th after a state of emergency was declared (Associated Press).

Drought conditions affected much of southern Africa, including Botswana, Zimbabwe and parts of South Africa. In Botswana, only 4 percent of available land for cultivation was ploughed this rainy season due to drought (UN IRIN).

March 2003

Heavy rain and snow which began in February 2003 continued in early March across areas of Afghanistan and Pakistan. The precipitation provided relief to this region, which has suffered through drought for the past four years. Afghanistan's head of the Hydrology and Water Control Department said that recent snow and rainfall had restored the country's water resources to 75 percent of their normal levels (ENS).

[Tropical Cyclone Erica](#) developed over the Coral Sea on the 4th and crossed New Caledonia on the 13th with maximum sustained winds near 185 km/hr (100 knots or 115 mph). Erica caused two deaths on the island along with 100 injuries and an estimated 1,000 homeless (OCHA). The storm made landfall near Kone and produced the most significant damage along the west coast, including the capital city of Noumea.

Severe thunderstorms affected eastern India on the 12th and resulted in 30 deaths and 500 injuries in the state of West Bengal (OCHA/Associated Press). Strong winds and hail uprooted trees, flattened hundreds of homes, killed thousands of cattle and poultry and damaged crops in the Howrah, Bankura and Hooghly districts of West Bengal state.

Thunderstorms which affected eastern India late on the 12th also affected adjacent areas of Bangladesh on the 14th. Winds gusting to 100 km/hr (~55 knots or 60 mph) leveled more than 500 mud-and-thatch huts leaving thousands homeless and 50 injured in the Magura district (Associated Press).

A powerful storm system moved across the Mediterranean Sea and affected Greece on March 17. The storm produced wind damage and power outages, with heavy snowfall in the southern Peloponnesian region (Associated Press). Hurricane-force winds also swept through parts of the Aegean Sea. This same weather system brought gusty winds and associated dust storms to areas of northern Saudi Arabia, Kuwait, and southern Iraq during the 18-19th. Yet another strong weather system crossed the eastern Mediterranean and [affected the Middle East during March 24-26](#), bringing a variety of precipitation types to the region. In Israel, Jerusalem reported a mix of rain and snow on the 25th, while strong winds produced severe sandstorms over large portions

of Saudi Arabia, Iraq and Kuwait during the 25th-26th. In addition to near-zero visibilities and strong winds gusting over 75 km/hr (40 knots or 45 mph), showers and thunderstorms preceded a strong cold front which swept across areas of eastern Iraq and Kuwait, severely affecting U.S. and coalition military operations in the area. Strong thunderstorms produced large hail that damaged some coalition aircraft flying missions in the Persian Gulf (CNN).

April 2003

The development of [Tropical Cyclone Inigo](#) near the Indonesian island of Sumba on April 1st brought torrential rainfall to Sumba and Flores during March 31-April 2. Mudslides on the island of Flores caused 32 deaths, with 29 of those fatalities occurring in the town of Ndonga (Disasterrelief.org).

In Kyrgyzstan, heavy precipitation caused a devastating landslide which hit the village of Karataryk, located about 100 km (60 miles) east of Osh City. The landslide was responsible for at least 38 fatalities (OCHA). Heavy precipitation that fell across the southwest Asia mountain region ameliorated long-term drought conditions that were present during 1998-2002.

In Southeast China's Guangdong province, severe thunderstorms on the 14th resulted in one death and 24 injuries (People's Daily News). Hail the size of eggs caused damage to homes and crops, and 120 mm (4.7 inches) of rain fell in the city of Nanxiong, producing severe flooding.

Santa Fe, Argentina was reportedly hit by the worst flooding since 1573 (BBC News). Several [days of heavy rainfall](#) caused some major rivers in the area, including the Salado River, to rise as much as 508 mm (20 inches) in 12 hours. At least 23 people were killed and over 45,000 people evacuated from the area (OCHA/GVA). By early May, the flooding was so severe that Santa Fe was characterized as an island (OCHA/GVA).

May 2003

Heavy rainfall during late April through mid-May resulted in significant flooding across parts of the Greater Horn of Africa, specifically southeastern Ethiopia, southern Somalia and much of Kenya. At least 55 people died in Kenya and 106 in Ethiopia with well over 100,000 people displaced due to the flooding (Associated Press/OCHA). Flooding also damaged the water treatment system in Nairobi, Kenya's capital (OCHA/GVA). While heavy rainfall is common across the Horn of Africa in the two annual rainy seasons (October-December and April-June), this reportedly was some of the worst flooding since 1997 (OCHA/GVA).

[Tropical Cyclone Manou](#) developed in the Indian Ocean on the 3rd and made landfall along the eastern coast of Madagascar on May 9 with maximum sustained winds of 140 km/hr (75 knots or 85 mph). Wind gusts along the coast were reportedly much higher, with speeds up to 200 km/hr (~110 knots or 125 mph) observed in the city of Vatomandry (IFRC/OCHA). There were 265 fatalities from Manou and subsequent heavy rainfall and flooding during the 2-week period following the storm's direct impact. Nearly 85 percent of the buildings were destroyed in the District of Vatomandry (OCHA/GVA).

Torrential rainfall associated with [Tropical Cyclone 01B](#) in the Bay of Bengal brought the worst flooding and landslides in over 50 years to Sri Lanka, killing at least 300 people (OCHA/GVA). Government officials reported that 350,000 people were left homeless during the flooding which occurred during the 16th-17th (Associated Press).

Temperatures in mid to late May soared across South Asia, with high temperatures in many areas of India and Pakistan well over 38°C (100°F). In the Indian state of Andhra Pradesh, over 1,200 people died in the heat wave which began in mid-May (BBC News/OCHA). Temperatures in India during the week of May 24th reached as high as 40°C (122°F) across the worst-affected areas near the Bay of Bengal coast.

June 2003

A 20-day heat wave in southern India continued into early June, with maximum temperatures reaching as high as 45-50°C (113-122°F). More than 1,500 deaths were reported in India, with the southeastern state of Andhra Pradesh the hardest hit (BBC News/Associated Press). In neighboring Pakistan, the city of [Jacobabad reached 52°C \(126°F\) on the 5th](#); normal highs in early June are near 44°C (111°F). Hot temperatures exacerbated drought conditions in the region, with a later-than-normal onset of summer monsoon rainfall.

A rare June snow fell in Moscow on the 4th, although warm ground temperatures prevented any accumulation. This was the first June snowfall in Moscow since 1963 (ROSHYDROMET). Unusually cool temperatures were observed throughout much of western Russia on the 4th.

[Tropical Depression #2](#) formed about 1,990 km (1,235 miles) east of the Windward Islands on the 10th. The depression dissipated over open Atlantic waters on the 12th. Climatologically, this was only the third tropical depression since 1967 to form east of the Lesser Antilles in June.

Flooding in Bangladesh affected the Khowai and Dhalai rivers, stranding nearly 50,000 people in the northeastern part of the country. The most severe flooding occurred in an area located 160 km (100 miles) northeast of the capital city of Dhaka (Associated Press). On June 27, a landslide in the Chittagong district of Bangladesh killed 65 people (Reuters/IFRC). The onset of monsoon rains by mid-month also produced flooding in the adjacent northeast Indian state of Assam. The Indian government deployed army units to the region as flooding left around 440,000 homeless (OCHA/Reuters.)

July 2003

In Afghanistan, [major sandstorms](#) affected more than 12,000 people and were described as the "worst sandstorms in living memory" (AFP). Sandstorms began in the region during early June and continued during July. Up to 20 villages had to be evacuated because they were completely covered in sand, and many irrigation canals and waterways had also been filled.

Cold and snowy weather characterized conditions across much of New Zealand during the first week of July, where locally 30 cm (12 inches) of snow fell in parts of the country. The

snowstorm was described by local media as the worst in 50 years, causing thousands of power outages to homes and businesses and stranding hundreds of motorists (New Zealand Herald).

Severe thunderstorms associated with a frontal system affected [areas of western and southwestern France on the 15th](#). Damaging winds, large hail and lightning were blamed for 4 fatalities and 70 injuries (AFP/BBC News). Some of the worst damage was in the southwestern city of Bordeaux, where winds reached as high as 150 km/hr (94 mph), damaging roofs and knocking down many trees.

In Peru, a series of strong cold fronts ushered in cold air and strong winds that affected the highlands of the southern departments of Arequipa, Puno, Moquegua, Tacna and Cuzco with temperatures falling as low as -20°C (-4°F). At least 25 deaths were attributed to the cold, with hundreds of livestock killed (IFRC).

[Typhoon Imbudo](#) developed in the western Pacific Ocean on the 16th and reached typhoon strength by the 18th. Imbudo made landfall across Luzon in the northern Philippines on the 22nd with maximum sustained winds near 240 km/hr (130 knots or 150 mph). The typhoon was the strongest to hit the Philippines in 5 years, causing 10 deaths, and producing at least \$18.5 million (USD) in damage to crops (Reuters). Imbudo then tracked westward through the South China Sea and came ashore in southern China near Yangjiang (about 190 miles southwest of Hong Kong) on the 24th. Maximum sustained winds were near 165 km/hr (90 knots or 105 mph) and it was one of the strongest typhoons to impact the region in several years, causing 20 deaths (Reuters). The Hong Kong Observatory reported that it was the strongest typhoon to hit Guangdong province since Typhoon Sally devastated the region in 1996. Typhoon Sally caused 123 deaths and 4,300 injuries (Reuters).

[A heat wave affected much of Europe during July](#), with daily temperatures between 30-37°C (90-99°F) across many areas from France and Switzerland southeastward across the Mediterranean region. In Switzerland, boulders in a rock face on the Matterhorn were released by the accelerated melting of ice at a height of 3,400 meters (11,220 feet), causing a huge rockfall that required the rescue of 40 climbers and the closing of the entire mountain to climbers for five days (WMO/MeteoSuisse). Across Italy, temperatures reached 36°C (96°F) on the 15th, where hot, dry weather intensified drought conditions. The hottest weather had shifted east across southern and eastern Europe by the 17th. Above average temperatures and dry weather worsened drought conditions throughout much of southern and central Europe, from France eastward through Romania and Croatia. Wildfires broke out from Portugal to eastern Russia, with 5 fatalities attributed to fires that burned in parts southern France (BBC News). Croatia's major rivers, including the Sava, Drava, Kupa and Danube, were reported at their lowest levels ever. In neighboring Serbia, the ecology minister reported that the country's rivers were at their lowest levels in 100 years (Associated Press).

Seasonal monsoon rains brought flooding to areas of South Asia, including parts of India, Bangladesh, Nepal and Pakistan, with more than 200 fatalities (Reuters). Some hardest-hit areas included much of Bangladesh and the states of Assam and West Bengal in northeastern India. On the 16th, flooding in the Shilagarh village in Himachal Pradesh; located about 400 km (250 miles) north of Delhi, killed at least 19 people at a construction site (BBC News). In China,

heavy rains that began in late June continued into early July, bringing floods to Guizhou, Hunan, Sichuan and Guangxi provinces in the south central part of the country. Flooding in China has been blamed for more than 300 deaths since it began in late June (AFP).

August 2003

A severe heat wave that [began in Europe during July continued in early August](#). In the United Kingdom, temperatures on the 6th reached 36.4°C (98°F) at Gravesend-Broadness, which was the highest temperature recorded anywhere in the country since August 3, 1990 (37.1°C/98.8°F at Cheltenham)(UK Met Office). On August 10, the all-time maximum temperature record was broken in the United Kingdom, with 38.5°C (101.3°F) at Brogdale near Faversham (Kent). In France, the summer was declared the hottest since at least World War II (BBC News). Health ministry officials in France announced that over 11,000 people had died of heat-related causes during the period from late July through mid-August (Reuters/Associated Press). In Slovenia, temperatures reached their highest levels of the past 100 years (Disasterrelief.org). Numerous wildfires burned throughout the region. Dry, hot weather also caused acute drought conditions throughout much of Europe. Officials in Croatia said the country was suffering from the worst drought in 50 years, with the main river, the Sava, at its lowest level in 160 years (BBC News).

At least one million people were affected by seasonal monsoon rains in southern Pakistan. Heavy rains, which began in July, caused 162 deaths in Pakistan as of August 3, with 153 of the fatalities in the Sindh province (AFP). More than half a million houses had been damaged or washed away in an area more than 1,000 square kilometers (400 square miles) in size. In Nepal, floods from monsoon rains had claimed 205 lives and destroyed over 3,000 houses (OCHA).

[Typhoon Krovanh](#) formed developed by the 21st and made landfall along the coast of Vietnam near the border with China on the 25th. The storm was the strongest typhoon to strike Vietnam in more than a decade, killing one person and destroying nearly 1,000 homes (Disasterrelief.org). In neighboring China, more than 11,000 homes were destroyed in Guangdong and Hainan provinces. It was the twelfth typhoon to affect China in 2003.

In China, at least 86 people were killed and \$700 million reported in losses (Reuters) due to flooding, landslides and [Typhoon Dujuan](#) in August and early September. Twelve days of heavy rain in the northern province of Shaanxi led to some of the worst flooding in 40 years for the region. Approximately 4.9 million people were affected by the flooding (Reuters).

September 2003

[Hurricane Fabian](#) developed in the eastern Atlantic from a tropical wave on the 27th of August, several hundred miles west of the Cape Verde Islands. Fabian became a tropical storm on the 28th and a hurricane on the 29th, and reached 'major hurricane' status (category 3 or higher on the Saffir-Simpson scale) on the 30th. Fabian reached category 4 strength on the 31st, but did not reach maximum wind speeds of 230km/hr (125 knots or 145 mph) until September 1st. Fabian passed near Bermuda on September 5th with maximum sustained winds on the island near 185 km/hr (100 knots or 115 mph) with gusts to 215 km/hr (115 knots or 132 mph). The storm was the strongest to hit the island since Hurricane Arlene in August 1963. The storm produced

widespread power outages and damaged nearly one-quarter of the island's hotels and guest houses. The storm was responsible for 3 deaths in a boating accident east of the Canadian Maritimes (Reuters).

Exceptionally heavy rains affected the Sahel region of Africa during late August and into September. Flooding affected parts Burkina Faso, Mali, Mauritania and Niger; causing at least 15 deaths and destroying thousands of homes (IFRC). In northern Nigeria, flooding was characterized as the worst in more than 20 years in Kaduna state. Thousands of people were forced to flee their homes as the Kaduna River rose above the flood stage on September 7 (IFRC).

[Typhoon Maemi](#) formed as a tropical depression on the 5th in the open waters of the Philippine Sea. Maemi reached typhoon status by the 7th, peaking out on the 10th with maximum sustained winds near 280 km/hr (150 knots or 170 mph). Maemi made landfall across southeastern South Korea on the 12th with maximum sustained winds near 195 km/hr (105 knots or 120 mph). The storm triggered landslides and floods that were responsible for at least 117 deaths, and forced 25,000 to evacuate their homes (OCHA). Estimated property damage was preliminarily set at \$4.1 billion (USD), with 5,000 homes destroyed and another 13,000 damaged (OCHA).

[Hurricane Juan](#) developed in the Atlantic Ocean well southeast of Bermuda as a tropical depression on the 25th. Juan moved north and made landfall in Nova Scotia late on the 28th/early on the 29th as a hurricane. Winds in Halifax gusted to 143 km/hr (77 knots or 89 mph), producing widespread power outages and wind damage, and resulting in two deaths (CNN/Associated Press). A state of emergency was declared in Halifax, and 150,000 people remained without power as of the 30th (Reuters).

In the United Kingdom, September was dry and warm. It was the driest month since 1997, with rainfall 58 percent of average. Sunshine in September averaged 6.06 hours of bright sunshine per day, or the most since the England and Wales sunshine measurements began in 1961. The Central England Temperature for January-September was 16.26°C (61.3°F), or the warmest January-September since records began in 1659 (UK Met Office).

October 2003

In the Democratic Republic of Congo (DRC), [severe thunderstorms affected the area around Bikoro on the 9th](#). A school with at least 200 students was struck by lightning, killing 11 and injuring 73 (IFRC). Climatologically, the DRC has the some of the highest concentration of lightning strikes worldwide.

In Vietnam, flooding and landslides in the central part of the country claimed 44 lives (AFP). Tens of thousands of homes were submerged and thousands of hectares of crops washed away from flooding that affected Binh Dinh and Quang Nam provinces during October 14-21.

Heavy snowfall affected the west coast of Finland during October 19-20. Across the southern and western parts of the country, temperatures fell to -9°C (16°F). According to statistics from

the Finnish Meteorological Institute, October temperatures fall this low only 5 times every 100 years (Helsingin Sanomat).

[Tropical Cyclone 23W](#) developed in the Gulf of Thailand on the 23rd and crossed the Malay Peninsula on the 24th as a tropical depression. The cyclone brought train traffic and other transportation to a halt and forced the evacuation of more than 700 people across southern Thailand. Thousands of people were affected by torrential rains, and two fishing vessels were capsized in the Gulf of Thailand on the 22nd as the storm was in its developmental stages. The cyclone moved westward and crossed the Bay of Bengal, making landfall in eastern India on the 28th..

November 2003

In Indonesia, torrential rains caused flooding in a resort area near the capital of the North Sumatra region, Medan. The flooding caused a large landslide, which affected the town of Bahorok on the 2nd. At least 151 people were killed, and the landslide was blamed partly on illegal logging in the area and the subsequent deforestation (AFP, Associated Press, BBC, OCHA). The flood destroyed dozens of guesthouses, restaurants and homes along the banks of the Bahorok River.

Heavy rains struck the Muslim holy city of Mecca, Saudi Arabia, on the 10th. Flooding was widespread in the city, with water levels reportedly reaching as high as 6 meters (20 feet) in some areas. The flooding claimed 12 lives and injured 50 people (AFP).

Heavy rains in the Dominican Republic which began in mid-November produced significant flooding across northeastern and northwestern areas of the country. Flooding along the rivers Yaque del Nore and Yuna produced flooding that damaged homes, crops, and inundated more than 200,000 hectares (500,000 acres) of farmland. The floods displaced around 12,000 people and resulted in 9 deaths (IFRC).

[Typhoon Nepartak](#) developed on the 12th in the Philippine Sea, and tracked through the Gulf of Tonkin during the 17th-18th. Nepartak reached maximum sustained winds of 140 km/hr (75 knots or 85 mph) as it skirted the west coast of Hainan on the 18th. Torrential rains produced flooding, especially through adjacent areas of Vietnam. In the Philippines, Nepartak was responsible for 4 deaths and loss of electricity to millions of people.

[Typhoon Lupit](#) developed on the 19th in the western Pacific Ocean and passed through the Chuuk and Yap islands (Federated States of Micronesia) on the 23rd with maximum sustained winds near 175 km/hr (95 knots or 110 mph). The typhoon damaged or destroyed 200 homes and also damaged crops in northeastern and southern outlying islands (OCHA). Lupit strengthened further as it moved away over open ocean waters, before weakening as recurved well east of Japan.

December 2003

A powerful mid-latitude storm system brought strong winds and flooding rains to southern France during December 1-3. Torrential rains and winds gusting up to 150 km/hr (90 mph) lashed southern France, causing 7 deaths and leaving a quarter of a million people without drinking water (AFP). Numerous rivers went above the flood stage, with some of the worst damage along the Rhone River.

[Tropical Storm Odette](#) formed in the Caribbean Sea on December 4th - the first tropical storm on record to have formed in the Caribbean Sea in December. Odette moved northeastward while strengthening slightly to a maximum intensity of 100 km/hr (55 knots or 65 mph), before coming ashore over the Dominican Republic on December 6th. Odette dumped up to 180mm (~7 inches) of rain on the Dominican Republic before moving off to the northeast and merging with a cold front off the coast of the United States. In the Dominican Republic, 8 deaths were attributed to the storm (Associated Press).

[Tropical Storm Peter](#) formed on December 9th in the eastern Atlantic and initially moved southwest and south over warmer waters. Peter then intensified rapidly to a maximum intensity of 110 km/hr (60 knots or 70 mph or just below hurricane strength) while moving north. However, Peter just as rapidly deteriorated to become a tropical depression on December 10th. The last time there have been two tropical cyclones in the Atlantic Ocean of at least tropical storm strength during the month of December was 1887.

In Iran, subfreezing low temperatures in the capital city of Tehran on the 9th resulted in the deaths of 40 homeless people (AFP). In northern India, more than 150 people died as a result of cold weather (AFP).

[Tropical Cyclone Cela](#) developed in the South Indian Ocean on the 5th moved across northern Madagascar on the 9th-10th producing torrential rains and maximum sustained winds near 85 km/hr (45 knots or 50 mph).

Heavy rainfall during mid-December was responsible for widespread flooding and landslides across the Philippines that resulted in at least 200 deaths (AFP).

A December cold wave in the United Kingdom during December 15-23 was blamed for as many as 2,500 deaths (BBC News).

For more information on Weather and Climate Extremes, refer to ...

[The Climate of 2003](#)
[Extreme Weather and Climate Events](#)

Citing the Article

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