approximately 90% of its mean annual rainfall during June–September. The rainfall is monsoonal and its penetration into the region is closely related to the position of the mid- and upper-level jets, and to the ITCZ, which starts its northward progression in March and reaches its northernmost position in August. Seasonal precipitation exhibits a strong meridional gradient, with average totals exceeding 600 mm in the south, and 100–300 mm in the north. These larger-scale circulation features are fairly sensitive to changes in the global monsoon circulation on both interannual and interdecadal time scales.

Further south, along the central Gulf of Guinea coast, the rainy season is bimodal and runs from about April to October, typically with a "little dry season" in July–August. This configuration produces an extremely marked north-to-south gradient in annual precipitation totals across the region.

(ii) Precipitation

The 2005 rainy season featured above-normal rainfall across most of the Sahel (Fig. 6.6). Rainfall totals exceeded 100 mm above average across most of the central and western areas of the Sahel. Overall, the 2005 rainy season was the second wettest since 1994.

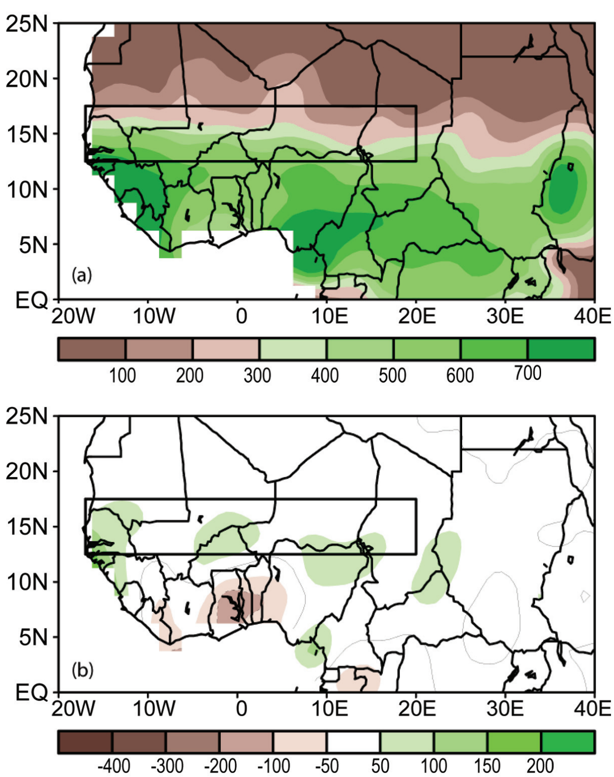

Fig. 6.6. June–September 2005 (a) total rainfall and (b) anomalies (mm; 1971–2000 base) for western Africa. Boxed region is the Sahel.

In particular, most of Senegal and southern areas of Mauritania, northern Burkina Faso, eastern Mali, southern and western Niger, and southeastern Nigeria received above-normal rainfall throughout most of the rainy season, with the exception of July precipitation in southeastern Nigeria. Rainfall anomalies were extremely strong over western Senegal, which received around 700 mm of rainfall between July and September (Fig. 6.6). That is about 300 mm above the long-term mean, making 2005 the rainiest season in this area since 1970. Seasonal totals along most of the Gulf of Guinea coast, from Côte d'Ivoire to western Nigeria were below normal, particularly in central Benin and Côte d'Ivoire. Rainfall deficits ranged between 50 and 200 mm below the climatological mean in the central areas of Ghana, Togo, and Benin.

Heavy rainfall in June, near the start of the rainy season in Guinea and Guinea-Bissau, reportedly sparked a severe cholera epidemic that would eventually spread to at least nine countries in West Africa over the course of the last half of the year, according to the World Health Organization (WHO). Initially, cases were largely confined to the capital city of Bissau, but it spread quickly. Heavy rainfall in Dakar, Senegal, from mid-August through early September not only flooded areas of the city's outer suburbs and forced the evacuation of approximately 60,000 people, but it also triggered a sharp increase in the number of local cholera cases. According to WHO statistics available in late September 2005, at least 43,638 cases of the disease and 759 deaths had been reported throughout West Africa. The end of the rainy season and a lack of new reported cases by the end of December allowed the Ministry of Health in Guinea-Bissau to declare an end to the epidemic in that country, according to the UN Integrated Regional Information Networks (IRIN).

c. North America

1) Canada—C. Kocot,[39] D. Phillips,[67] and R. Whitewood[92]

The climate of Canada in 2005 was characterized by warmer and wetter conditions than normal (relative to the 1951–80 base period). Although Canada was spared much of the extreme weather that impacted other regions of Earth, it was not totally immune. Anomalous winter warmth adversely impacted snowpack in British Columbia (BC). Several tornadoes and heavy flooding in three provinces contributed to 2005 being the costliest year to date, weatherwise, for insurers.

(i) Temperature

Above-normal temperatures were observed throughout the country, with most areas at least 1°C above normal (Fig. 6.7). Departures of 3°C above normal were experienced in the southwest corner of the Yukon Territory. The 1.7°C above-normal (1951–80 mean) average national temperature experienced by Canada in 2005 marked it as the ninth consecutive year of above-normal temperatures (Fig. 6.8). Overall, 2005 tied 2001 and 1999 as the third warmest year since reliable nationwide records began in 1948. The year's national average is exceeded only by 1998 (+2.5°C) and 1981 (+2.0°C).

Ten of the 11 Canadian climate regions had temperatures that ranked among the 10 warmest years in their records. However, of those, only the north BC mountains/Yukon region tied 1981 for its warmest year (+2.8°C). The remaining nine regions were the following: Arctic mountains and fjords (second warmest, +2.0°C); Pacific coast (fifth warmest, +1.2°C); northwestern forest (sixth warmest, +2.0°C); Arctic tundra (sixth warmest, +1.7°C); northeastern forest (sixth warmest, +1.4°C); Mackenzie district (seventh warmest, +2.1°C); Atlantic Canada (seventh warmest, +0.9°C); south BC mountains (eighth warmest, +1.1°C); and Great Lakes/St. Lawrence (ninth warmest, +1.1°C). The lowest-ranked region, the prairies, experienced its 11th warmest year (+1.2°C). Over the 58-yr period of record (1948–2005), all 11 regions show a positive annual temperature trend, with the greatest increase (+2.2°C) in the north BC mountains/Yukon and the smallest (+0.1°C) in Atlantic Canada.

(ii) Precipitation

In 2005, Canada experienced its wettest year in the 58 years since reliable nationwide records commenced (Fig. 6.7). The 13.4% above the 1951–80 mean displaced the previous record of +9.1% (1996). Areas with precipitation values over 20% above normal in 2005 were most of Yukon, some of the southern Northwest Territories, most of Nunavut, the southwest coast of BC, southern Alberta, most of Saskatchewan and Manitoba, the extreme north of Quebec, and the western part of Nova Scotia. Areas with precipitation amounts at least 20% below normal were along the west coast of BC, the eastern edge of BC, and the western edge of Alberta. The remainder of the country was close to normal.

Regionally, six climate regions experienced conditions in 2005 that would rank them among the 10 wettest years: Arctic tundra (second wettest, +23.1%); northwestern forest (second wettest, +12.8%); Arctic mountains and fjords (fifth wettest, +32.0%); Mackenzie district (fifth wettest, +19.9%); north BC mountains/Yukon (fifth wettest; +19.1%); prairies (seventh wettest, +18.2%). While no region ranked 2005 as the record wettest, a sufficient portion of the country was enough above normal to collectively produce Canada's wettest year on record. The three driest regions of the country were south BC mountains (–3.8%), Pacific coast (–5.5%), and Great Lakes/St. Lawrence (–3.5%). These three regions recorded only slightly drier-than-normal conditions.

(iii) Notable events

Although 2005 started out dry across the province, a series of June storms drenched portions of southern Alberta, resulting in widespread flooding as rain-swollen rivers escaped their banks. Extensive damage was reported to dwellings and infrastructure in over 40 municipalities. At 247.6 mm, Calgary recorded its wettest June on record (79.8 mm is normal). Outside

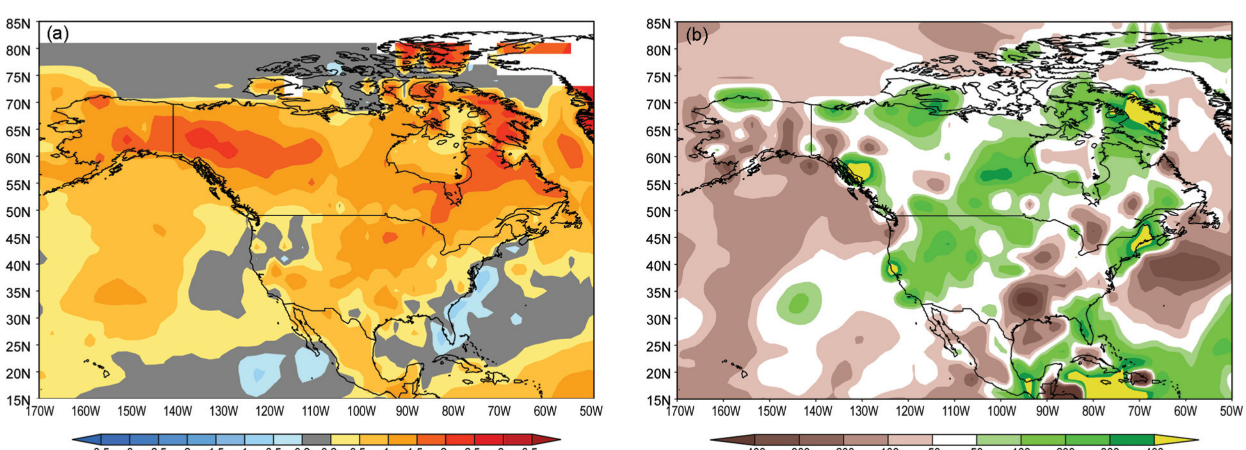

Fig. 6.7. North American 2005 annual (left) temperature anomalies (°C; 1971–2000 base), and (right) precipitation anomalies (mm; 1979–2000 base) from CAMS–OPI.

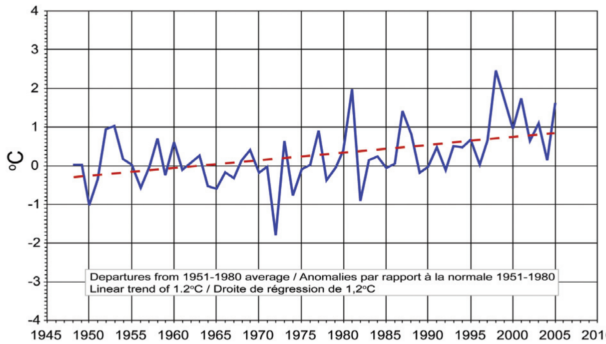

Fig. 6.8. Annual average air temperature anomalies (°C; blue) and 1948–2004 trend (red) for Canada. [Source: Environment Canada]

the city, monthly rainfall approached 400 mm. Total losses are estimated at $400M (million) Canadian dollars (CAD; $344M USD) of which $275M CAD ($232M USD) was insured, making this weather event one of the costliest in Alberta's history.

Manitoba was treated to rare and record widespread flooding as the result of frequent and intense June and July thunderstorms. The Churchill River crested at its highest levels ever recorded and Manitoba Agriculture estimated more than a quarter of the province's farmland was inundated during the flooding.

A line of severe thunderstorms tracked across southern Ontario on 19 August, leaving record damage estimated at over $500M CAD ($430M USD). The storms spawned two F2 tornadoes and a rare tornado warning was issued for Toronto. In and around Toronto, ~45 mm diameter hail, straight line winds with gusts reaching 72 km h^{-1}, and rainfall rates exceeding 100 mm h^{-1} generated the most damage.

The 2005 sea ice extent in Canadian Arctic waters dropped to its lowest level on record, 5.3 million km^2; down 20% from 1978 when satellite observations began. The previous record minimum of slightly less than 6 million km^2, was set in 2002. Since the 1970s the geographical extent has been decreasing by around 8% $decade^{-1}$.

The Canadian International Forest Fire Centre (CIFFC) reported a near average fire year in Canada in terms of the number of fires (7438; –1.3% of normal), but with significantly fewer hectares (ha) of forest consumed, 1.7 million ha, or ~68% of the 1995–2004 mean. The total number of fires in 2005 was down in most provinces and territories, with notable exceptions in Ontario (1961 fires; +51% of normal) and Quebec (1374 fires, +57% of normal). In contrast, and with respect to the total area affected, all provinces and territories, with the exception of Quebec, reported lower than average area burned. The total area burned within the province of Quebec in 2005 (831,022 ha) however, accounted for ~49% of the national total.

ii) United States of America—K. L. Gleason[28]

(i) Overview

Reliable weather records for the United States exist from 1895 to the present, enabling the climate of 2005 to be placed in a 111-yr context for the contiguous United States. The nationally averaged temperature in 2005 was the seventh (105 of 111 years) warmest on record, with an annual mean of 12.3°C (+0.8°C relative to the period of record). The linear temperature trend for the 111-yr record over the contiguous United States is 0.056°C $decade^{-1}$, with an increase to 0.32°C $decade^{-1}$ since 1976. Seven of the ten warmest years on record for the United States have occurred since 1986.

Precipitation in the United States in 2005 was variable throughout much of the country, with periods of excessive rainfall in the Southwest and Northeast, persistent drought in portions of the Northwest, and developing drought from the Southern Plains to the Great Lakes. Nationally, it was the 43rd wettest year on record, which is near the long-term mean. Maine and New Hampshire had their wettest year on record, surpassing 1909 and 1954, respectively. Conversely, Arkansas had its second driest year since 1895.

Temperature and precipitation anomalies for the United States are based upon the 1895–2005 data record, rather than on any particular 30-yr normal statistics (e.g., 1971–2000 mean). With respect to the United States, temperature or precipitation is described as "much above" or "much below" normal when the value falls within the top or bottom 10% (decile) of the historical record distribution. Temperatures are simply "above" ("below") normal if they fall within the upper (lower) third, or tercile, of the distribution, but are not in the top (bottom) decile. Values falling within the middle tercile are considered near normal.

(ii) Temperature

Temperatures were above average across most of the contiguous United States from December 2004 to February 2005, with no state ranking below average. Colorado, Wyoming, and Utah were much above normal for the season. From March to May (spring) was exceptionally cool from Texas to Florida and along the entire eastern seaboard. Eleven states had below-average seasonal temperatures. Three additional states reported much-below-average temperatures for the season (Fig. 6.9, left). Extremely cool May temperatures covered the Northeast and Mid-Atlantic coast, with seven states (Connecticut, Rhode Island, Massachusetts, Pennsylvania, Delaware, Maryland, and South Carolina) experiencing one of their 10 coldest Mays on record.

In contrast, record to near-record summer (June–August) heat occurred from the Great Lakes into the Northeast with record seasonal heat in New Hampshire and New Jersey. Much-above-average temperatures in the southwestern United States during July resulted from an upper-level ridge situated over the region for most of the month. Temperatures exceeded 38°C (100°F) and broke more than 200 daily records in six western states. A new record of seven consecutive days at or above 52°C (125°F) was observed in July at Death Valley, California (previous record of five days). A persistent upper-level cyclonic circulation positioned over the central United States into August contributed to above-average summer temperatures across the eastern United States, where August temperature records were set in New Jersey and Rhode Island. No state in the contiguous United States reported below-average temperatures during the season.

An uncharacteristic blocking ridge over Alaska fostered an exceptionally warm and dry summer throughout the state. Statewide June–August 2005 temperatures were third warmest since reliable records began in 1918. Overall, 2005 was Alaska's sixth warmest year on record, and was the sixth consecutive above-average year for the state (Fig. 6.10).

Autumn (September–November) temperatures were much above average across large parts of the southern and central United States and portions of the Northeast and Mid-Atlantic, with warmer-than-average temperatures present throughout all but three states in the Pacific Northwest (Fig. 6.9, right). The contiguous United States recorded its fourth warmest autumn in the last 111 years. This near-record heat resulted from a quasi-stationary 500-hPa ridge situated across eastern North America. No state in the contiguous United States was cooler than average during this season.

(iii) Precipitation and drought

Average precipitation for the contiguous United States in 2005 was 755 mm, slightly above the long-term (1895–2005) mean of 740 mm. Precipitation across the United States in 2005 was characterized by persistent moderate wetness in the Northeast and Southwest, below-average precipitation in some parts of the Northwest, and developing dryness from the Southern Plains into the Great Lakes (Fig. 6.9). An area from Texas to parts of the Midwest and Ohio Valley was drier than normal. Also, despite the significant rainfall associated with Hurricanes Katrina and Rita, Arkansas and Louisiana reported much-below-normal precipitation for the year. Conversely, Maine and New Hampshire had their wettest year on record, and most states had above- or much-above-normal precipitation.

December 2004 through February 2005 was very wet from the California coast, through the Plains, and into the Great Lakes and Northeast. There also was much-above-normal precipitation around the Great Lakes. A strong blocking high over the Gulf of Alaska in conjunction with an amplified trough over the southwestern United States generated an active storm season along the West Coast. However, March marked the beginning of a very dry period across the central United States, extending from

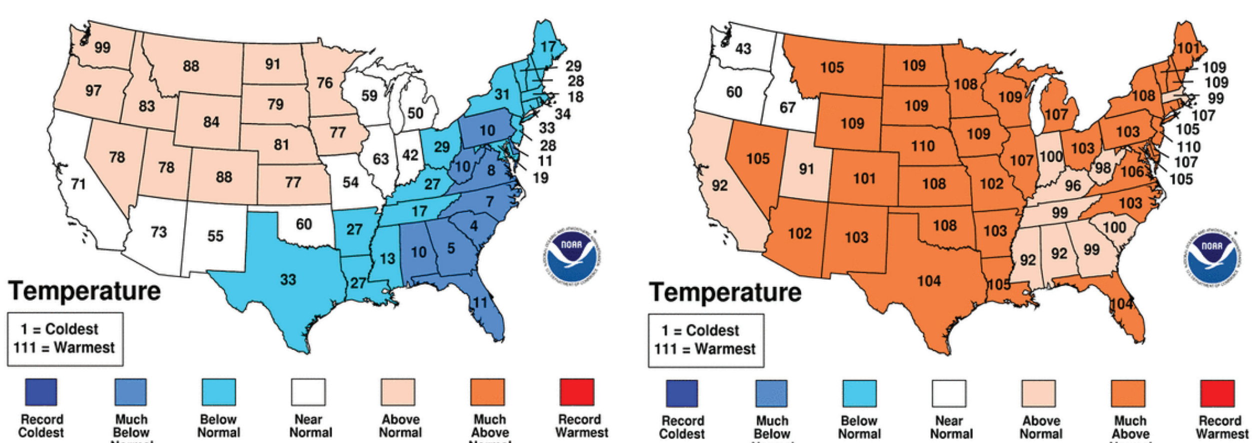

Fig. 6.9. Statewide rankings of temperature as measured across the contiguous United States in 2005: (left) March–May and (right) September–November. A rank of 111 (1) in the U.S. Historical Climatology Network (USHCN) record represents the warmest (coldest) season since 1895.

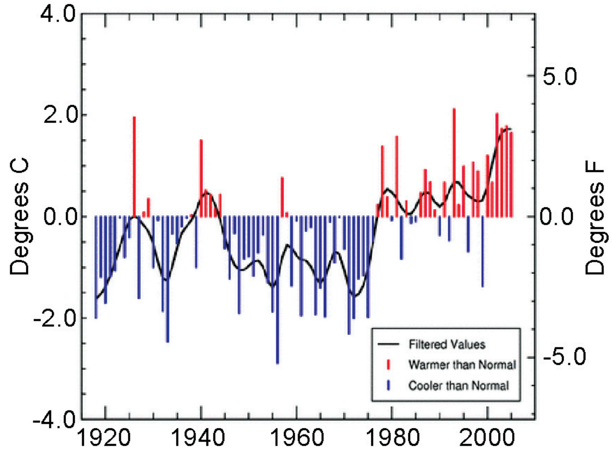

FIG. 6.10. Alaska statewide average annual temperature anomalies (°C), 1919–2005. [Source: NOAA/NCDC]

Texas to the Great Lakes (Fig. 6.11). An active storm track across the western United States led to above to much-above-normal precipitation in the West, the Northern Plains, the Southeast, and the far Northeast.

Boreal summer (June–August) brought much-above-normal rainfall to the Southeast and parts of the central and northern Great Plains. Only nine states experienced below-normal precipitation, and just one state (New Mexico) much-below-normal summer precipitation. Stormy conditions contributed to a record wet October and fall season across much of the region. Six states (Maine, Vermont, New Hampshire, Connecticut, Rhode Island, and Massachsetts) reported their wettest fall on record, and nine states set a record for the wettest October, with two additional states reaching their second wettest. Mt. Washington, New Hampshire, set a record for the greatest October snowfall on record (200 cm), exceeding the previous record set back in 2000 by 102 cm.

The year ended with a very dry December from the Southwest, across the Southern Plains, to the Ohio Valley and eastern Great Lakes. Several states from the Southwest to the Lower Mississippi Delta had one of their 10 driest Decembers; Arizona and Arkansas had their driest December on record. December capped a three-month period of much-drier-than-normal weather in the Southern Plains, with Arkansas and the Arklatex region (nexus of Arkansas, Texas, Louisiana, and Oklahoma) all experiencing the driest October–December on record.

At the beginning of the year, approximately 8% of the contiguous United States was in moderate to extreme drought, as defined by the Palmer Hydrological Drought Index (PHDI; Palmer 1965; Heim 2002). The areal extent of moderate to extreme drought grew to reach a peak of 21% of the contiguous United States in December 2005 (Fig. 6.12). Precipitation deficiencies from March to June and again from September to December resulted in the emergence and intensification of drought conditions from the Texas Gulf Coast to the Great Lakes. Northeastern Illinois and the Arklatex region were significantly impacted by the emerging drought.

The development of drought conditions in parts of the Midwest and Southern Plains can be attributed to a pronounced shift in synoptic circulation in March–June and October–December. During both periods, the northern branch of the polar jet was active across the western United States, while the southern branch was active over the United States. Southeast and Atlantic coast. The resulting absence of storms from the Deep South to the Great Lakes created substantial precipitation deficits. The lack of precipitation from October to December left Arkansas with its driest of such periods on record and Louisiana with its third driest.

The same synoptic conditions brought above to much-above-normal rainfall to the northwestern United States during the spring and the last two months of 2005, contributing to a significant reduction in total drought area across parts of the Northwest by the end of the year. The western United States drought of 1999–2004 was one of the most severe droughts in this region over the last 100 years. More than five years of precipitation deficits lowered streamflows and depleted reservoirs. Some reservoirs recovered during 2005, but aggregated reservoir levels were still below average at the end of the year.

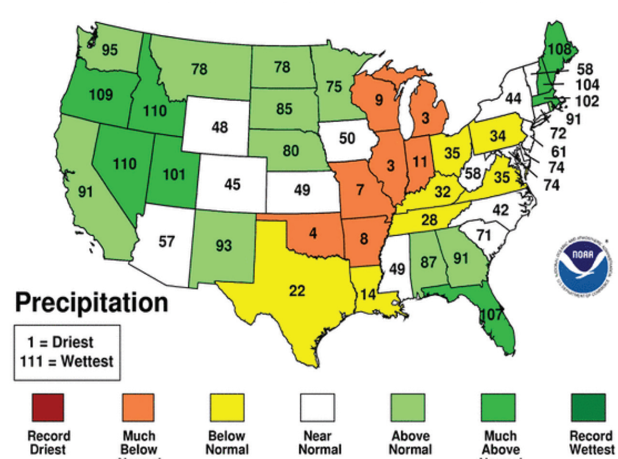

FIG. 6.11. March–May 2005 statewide ranks of precipitation for the contiguous United States. A rank of 111 (1) in the USHCN record represents the wettest (driest) year since 1895.

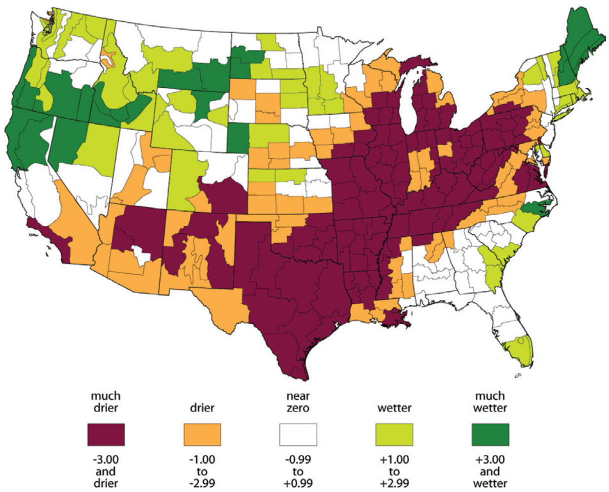

FIG. 6.12. Change in the PHDI between 1 January–31 December shown by U.S. Climate Division. [Source: NOAA/NCDC]

(iv) Snowpack and wildfires

(a) Snow

The 2004/05 snow season and snowpack was generally above average across the Southwest and much below average across the northern Rockies and Pacific Northwest. By the end of the 2004/05 winter, the Northwest snowpack was just 50% of normal. Snow cover was slightly below average for the North American continent as a whole over the winter, and much below average for the spring. This is consistent with a trend toward reduced spring snow cover over North America (Mote et al. 2005). Snow cover has been below average in all but four years since the mid-1980s.

Notable snow storms in 2005 include a major winter storm, referred to as the "Blizzard of 2005," which deposited well over 30 cm of snow across much of southern New England in January. Boston, Massachusetts, had its snowiest January on record partly as a result of that storm. NOAA's operational Northeast Snowfall Impact Scale (NESIS), developed by Kocin and Uccellini (2004) to characterize and rank high-impact northeastern U.S. snowstorms, ranked this January snow storm as the seventh most intense on record for the region. In other regions, a late-season (April) snow event produced over 61 cm of accumulation in the mountains west of Denver, Colorado, and a significant snow storm on 27–28 November generated blizzard conditions across the northern High Plains, accumulating up to 61 cm of snow in parts of Nebraska and the Dakotas.

In contrast to the above-average snowfall season in 2004/05, the beginning of the 2005/06 snow season in the Southwest was nearly nonexistent. An examination of USDA snowcourse/snow telemetry (snotel) station data in Arizona revealed that 31 of 33 sites (94%) were snow free at the end of 2005—the most snow-free locations in at least the past 40 years.

(b) Wildfires

Preliminary estimates from the National Interagency Fire Center suggest that 2005 will break the record set in 2000 with over 3.45 million ha (8.53 million acres) burned. During the 2000 fire season, roughly 3.41 million ha were consumed across the entire United States, with over 2.83 million ha burned in the contiguous United States. Despite the record area burned, the total number of fires across the country continued to decline in 2005, suggesting the average size of individual fires has increased over the past 20 years.

In Alaska, over 1.78 million ha burned in 2005, compared to nearly 2.43 million ha consumed in 2004, which was the worst fire season on record for the state. Above-average temperatures coupled with below-normal precipitation during the summer months contributed to the above-average wildfire season across Alaska in 2005.

Atypical wildfire activity erupted across parts of the central United States during December 2005. Numerous large fires, enhanced by extreme drought conditions, developed across parts of Oklahoma, Texas, and the Southern Plains. Many of these fires continued to burn into early January 2006. Over 162,000 ha had burned across the Southern Plains during the first week of the New Year, normally a time of very low fire activity.

(v) Severe extratropical storms

Preliminary estimates indicate there were only nine very strong to violent tornadoes (F3–F5 on the Fujita scale) during the 2005 official tornado season (March–August), all of F3 intensity. This was significantly below the 1971–2000 mean of 37, contributing to a slight negative trend in very strong to violent tornadoes observed since 1950. However, two late-year (out of season) tornado outbreaks increased the annual total.

A severe weather outbreak accompanied by over 30 reported tornadoes occurred across Mississippi and Louisiana in April. In June, tornadoes ripped through the town of Hammond, Wisconsin, causing over $3 million USD in damage. Severe thunderstorms in August generated tornadoes that killed at least three people in Wisconsin and Wyoming. Tornadoes also touched down in September across parts of the central United States between Oklahoma and Wisconsin. On

6 November, a deadly Midwestern tornado outbreak claimed 24 lives in and around Evansville, Indiana. This was the deadliest United States outbreak since 1998. Additional severe weather impacted the same region on 15 November, with over 30 tornadoes reported. Among these was the strongest tornado of the year, an F4 twister that reached a higher intensity than any of the tornadoes that developed during the official season.

III) MEXICO—M. Cortez Vázquez[18]

(i) Temperature

In 2005, the areally averaged annual mean temperature for Mexico was 21.4°C, which is 0.7°C warmer than normal (based on the period of record, 1980–2004). The year, 2005, was ranked as the second warmest, behind 1998, since the start of the national temperature dataset in 1980 (Fig. 6.14). The warmth in 2005 continued the trend of above normal temperatures in Mexico since the mid-1980s. Nationally, the lowest minimum temperature for the year was –17°C, reported in the mountains of Durango in northwest Mexico, the same area that holds the long-term historical record minimum temperature of –25°C reported in December 1997 (based on 1980–2005 data). In 2005, maximum temperatures of 49.5°C were reported in Chihuahua and Michoacán, and these temperatures were only 0.5°C less than the national all-time historical record temperature of 50°C.

(ii) Precipitation

Nationwide, the areally averaged rainfall was 778 mm, which was 14.5 mm (2%) above the long-

U.S. CLIMATE EXTREMES INDEX (CEI)—K. L. Gleason[28]

How has the climate changed over the past century? In what ways is it changing and by how much? Many people, including climatologists, have been struggling with these questions for some time now, not only for scientific interest, but also to aid in policy decisions (Houghton et al. 2001) and to inform the general public. In order to answer these questions, it is important to obtain comprehensive and intuitive information that allows interested parties to understand the scientific basis for confidence, or lack thereof, in the present understanding of the climate system. One tool, first developed as a framework for quantifying observed changes in climate within the contiguous Unites States, is the United States Climate Extremes Index (CEI).

The CEI was first introduced in early 1996 (Karl et al. 1996), with the goal of summarizing and presenting a complex set of climate changes in the United States so that the results could be easily understood and used to aid decision making by policy makers. The CEI initially consisted of a combination of five separate climate change indicators. Recent revisions include a sixth indicator related to extremes in landfalling tropical system wind speed. The CEI is also now evaluated for nine standard periods or seasons including: spring (MAM), summer (JJA), autumn (SON), winter [December–February (DJF)], warm (April–September), cold (October–March), hurricane (June–November), year to date, and annual (January–December). The CEI conveys the percentage area of the United States that has been affected by climate extremes as they relate to monthly maximum and minimum temperatures, daily precipitation, and the Palmer Drought Severity Index (PDSI) within a given period.

The annual CEI for 2005 was about 41%, which is much above the expected value of 20% and is the second largest value since reliable records began in 1910 (Fig. 6.13). This high 2005 CEI was due to the combined impacts from a record active Atlantic hurricane season, extremes in monthly maximum and minimum temperature, much-above-normal wet PDSI, and extremes in daily precipitation. In addition, the 2005 hurricane and cold seasons had record CEI percentages. Approximately 44% of the United States was affected by climate extremes during the hurricane season and nearly 38% during the cold season. All six indicators were well above the expected percentage during the hurricane season. Extremes in much-above-average mean minimum temperature were more than five times the expected value. Much-above-average mean maximum and minimum temperatures, a wet PDSI, and the large number of days with precipitation all contributed significantly to the record extreme 2005 cold season. A more detailed explanation of the CEI and graphs of the most current CEI and the individual indicators that comprise the CEI may be viewed at the NCDC CEI Web site at www.ncdc.noaa.gov/oa/climate/research/cei/cei.html.

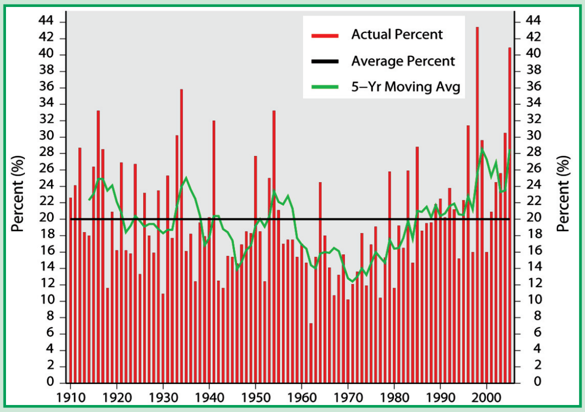

FIG. 6.13. Annual U.S. Climate Extremes Index values (1910–2005). [Source: NOAA/NCDC]

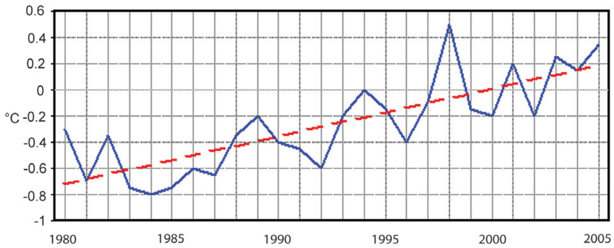

Fig. 6.14. Annual temperature anomalies (°C) over Mexico (1980–2005).

term climatological mean defined by the period of 1941–2004. The year ranks as the 25th wettest on record. Although the annual rainfall total was slightly above average, rainfall distribution was very irregular throughout the year. The rainy season (June–October) was characterized by short events of heavy rainfall, which were mainly associated with tropical cyclones that approached Mexico from the Atlantic side of the continent. Wet conditions were observed in February, followed by a dry trend from March to May. The onset of the summer rainy season started 3–4 weeks later than normal in southern Mexico, and this delay influenced the northward progression of the monsoon during the early summer. The 2005 rainy season was finally established after mid-June, with exceptionally wet conditions being recorded in July and again in October. Large rainfall deficits developed in September, which is normally the wettest month on average for Mexico. Although the total amount of rainfall was slightly above normal, precipitation was localized over small areas in the south and southeast, around the tracks of landfalling tropical cyclones.

Portions of northern Mexico also received significant amounts of rain during February, associated with midlatitude systems. However, an early withdrawal of the summer monsoon in northern Mexico, along with a persistent meteorological drought in the western part of the country during the entire summer, resulted in limited water storage at all dams and hydrological drought declarations by year-end along the Lerma–Chapala and Cutzamala Basins.

(iii)Notable events

Climatologically, the annual rainfall distribution in Mexico clearly reflects the influence of tropical cyclone activity on both sides of the country (Fig. 6.15). The southwest coast and western Mexico typically receive appreciable rainfall from Pacific tropical storms, but during the 2005 season the storms developed and tracked farther offshore than normal (see section 4c). This helped to depress rainfall totals in western and northwest Mexico, with only two systems (Dora and Otis) approaching the Pacific coast states. In contrast, a very active season was observed in the Atlantic and Caribbean basins, with seven systems making landfall in Mexico: Hurricanes Emily, Stan and Wilma; Tropical Storms Bret, Gert, and Jose; and Tropical Depression Cindy. The number of landfalling tropical cyclones in Mexico in 2005 represented a new record since the start of the satellite era. In southeast Mexico, Stan produced abundant rainfall across the Yucatan Peninsula on 2–3 October before moving into the states of Veracruz and Oaxaca. Pentad and monthly rainfall totals exceeded 200% of normal along and to the right of Stan's track into mainland Mexico, with heavy flooding in portions of northern Veracruz and Oaxaca. Stan developed a large moisture tap across the Pacific slope of Chiapas and this promoted widespread flooding along the Pacific slope of Chiapas, and sections of Central America. By far the most destructive tropical cyclone during the 2005 season was Wilma, which moved slowly across the Yucatan Peninsula on 20–23 October causing severe economic loss and several fatalities in the Cozumel and Cancun areas. Based upon wind speeds and sea level pressure readings, Wilma was the most powerful hurricane on record to make landfall in Mexico.

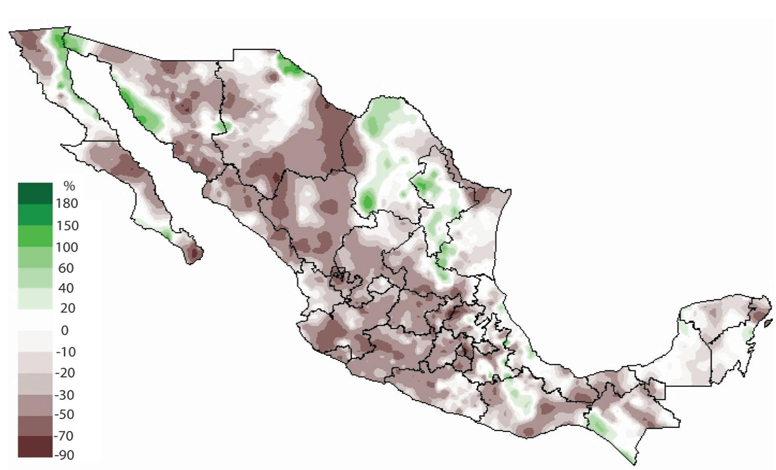

Fig. 6.15. Percent of normal precipitation across Mexico during the 2005 rainy season (May–October) relative to the 1941–2005 mean.