

Climate of Mississippi

Introduction

This publication consists of a narrative that describes some of the principal climatic features and a number of climatological summaries for stations in various geographic regions of the State. The detailed information presented should be sufficient for general use; however, some users may require additional information.

The National Climatic Data Center (NCDC) located in Asheville, North Carolina is authorized to perform special services for other government agencies and for private clients at the expense of the requester. The amount charged in all cases is intended to solely defray the expenses incurred by the government in satisfying such specific requests to the best of its ability. It is essential that requesters furnish the NCDC with a precise statement describing the problem so that a mutual understanding of the specifications is reached.

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The Means and Extremes of meteorological variables in the Climatography of the U.S. No.20 series are recorded by observers in the cooperative network. The Normals, Means and Extremes in the Local Climatological Data, annuals are computed from observations taken primarily at airports.

The editor of this publication expresses his thanks to those State Climatologists, who, over the years, have made significant and lasting contributions toward the development of this very useful series.

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Topographic Features- Mississippi has an area of a little over 47,000 square miles, with a north-south length of about 330 miles and a width of about 180 miles. The State lies entirely within the Gulf Coastal Plain Province, an extensive lowland bordering the Gulf of Mexico. The topography is not monotonous, as implied by the term “plain”, and elevations range from sea level to 806 feet. The State has a diversity of surface features resulting from differential erosion of varying geologic formations. Areas of sandy outcrops stand as hilly uplands or belts of undulating plains between the hilly districts. The State is consequently divided into 10 distinct physiographic regions. These divisions conform closely to the geology of the State, and the soils, hydrologic features and vegetation also exhibit a generally marked relationship to the physiographic regions.

The Fall Line Hills Region, associated with the Appalachian foothills, is a maturely dissected highland area covered with hardwood forest in the extreme northeastern part of Mississippi. The divide between the Tennessee and Tombigbee rivers lies in this region, but a “divide cut” was made to join the two systems during the construction of the Tenn-Tom Waterway in the 1970s, providing a controlled water route from the Ohio River Valley to the Gulf of Mexico through Mobile, Alabama. This region contains the State’s highest point, Woodall Mountain (806 feet elevation).

Bordering the Fall Line Hills on the west and running from the Tennessee border south to Noxubee County is a crescent-shaped strip of level terrain known as the Black Prairie. This region is underlain by evenly eroded chalk which has weathered to produce black prairie soils. The region lacks permanent surface water features and forests, and relies heavily on groundwater sources. It is extensively used for agriculture. Forming the western boundary of the Black Prairie is a narrow upland known as Pontotoc Ridge. This feature has been deeply dissected by stream action into a series of elongated hills and valleys. It extends southward only into northern Clay County.

West of Pontotoc Ridge is a relatively narrow and low strip known as the Flatwoods. This region is underlain by clay, which has weathered to produce a distinctive lack of relief. The region is forested, and soils are of the swell/shrink type. Local flooding frequently occurs in late winter and spring. South and west of the Flatwoods is the large, wide, highland belt of North Central Hills extending from the Tennessee border to the Alabama border. Stream action has cut deep valleys throughout this forested region, producing an area of consistently rugged relief. In the southeastern portion of the region near Meridian, a cuesta interrupts the uniformity of relief. The steep face of the cuesta faces northeast, and south flowing streams on the less steep southwest side of the cuesta have cut deep incisions in the ridge, isolating sections to the extent that they are known locally as “mountains”.

On the western side of the North Central Hills and running from Tennessee on the north and Louisiana on the south are the Loess Hills. This narrow region, 15 - 25 miles in width, is underlain throughout its entirety by a thick deposit of Aeolian silt called loess. Peculiar features of this region are steep cliffs lining stream courses and road cuts indicating the ability of the loess to resist ordinary erosion that wears down other types of unconsolidated sediments. Due to soil limitations, this region is no longer in agricultural use but is mainly forested. The North Central Hills gradually merge in the south into a gently rolling zone called the Jackson Prairie. This region is underlain by clays that have eroded into the characteristic subdued relief. Prairie vegetation occurs in patches surrounded by pine and hardwood forest.

Extending south from the Jackson Prairie almost to the Gulf Coast is the Pine Hills region. A maturely dissected highland, surface elevations slope from about 500 feet on the north and west to about 100 feet at the southern margin. As the name implies, the region is covered with pine forest, which is a major contributor to the economy in this part of the State. Between the Pine Hills and the Gulf Coast lies a low, flat strip of land ranging from five to 30 miles in width known as the Coastal Terrace. This strip was deposited as coastal sediments during and since the Pleistocene, and the surface descends gradually from an elevation of 50 - 75 feet along the landward margin to sea level at the coast. Near the coast, there are considerable tracts of swamp and marsh.

On the western side of the State, between the Loess hills and the Mississippi River lies the most distinctive physiographic province in the State, the Mississippi Alluvial Plain. Locally known as the "Delta" or the Yazoo Basin, this region is characterized by flat monotonous topography. Elevations range from 210 feet near the Tennessee state line to 94 feet at Vicksburg. This general topography is further modified by extremely sinuous, shifting courses of the streams and by the presence of numerous ox-bow lakes. The alluvial soil and flat surface combine to make this a vital agricultural region. Long known for the production of cotton and soybeans, this region has more recently become the catfish production leader in the United States, as the terrain, soils, and climate favor the establishment and maintenance of around 100,000 acres of aquacultural ponds.

Mississippi Sound, an arm of the Gulf of Mexico, forms the southern boundary of the State. Land areas near the coastline, in contrast to those of Louisiana, are sharply defined with the land rising to elevations of 10 to 20 feet behind the beaches. The coast is cut by numerous bays and a string of barrier islands parallels the coast a few miles offshore. The coastal strip is a popular tourist destination with numerous large casinos. The water of Mississippi Sound modifies the summer heat and winter cold, so that Biloxi has an average of 53 days with a temperature of 90 degrees Fahrenheit (° F) or higher, while just 40 miles inland, Wiggins averages 86 such days annually. Biloxi has 13 freeze days each year contrasted with about 33 in Wiggins.

Mississippi is situated in a region where water is a bountiful natural resource, tying with Louisiana as the "wettest" state in the union considering the average amount of precipitation over the State's area. The statewide average of above 56 inches over nearly 31 million acres produces a volume in excess of 142,000,000 acre-feet of water delivered to the State by the atmosphere annually, providing both surface and groundwater in abundance. Though Mississippi has no natural large inland lakes, flood control dams in the Yazoo-Tallahatchie basin and water supply

reservoirs at Jackson and Meridian have formed large lakes in the north, and these have added to the fishing and recreational resources of the State. All the larger streams flow year-round.

All of the State is in the Gulf of Mexico drainage. Main rivers which flow directly into the Gulf include the Tombigbee in the northeast portion and the Pascagoula and Pearl in the south. The Mississippi River forms most of the State's western boundary and has the Tellahatchie, Yalobusha, Yazoo and Big Black rivers as its principal tributaries in the western part of the State.

The flood season in Mississippi is November through June (the period of greatest rainfall), with March and April being the months of greatest frequency. The main Mississippi River has its highest flows during the first six months of the year. In other streams, flooding sometimes occurs during the summer from persistent thunderstorm rains, or during the late summer or early fall from heavy rains associated with tropical cyclones passing through or close to the State.

Local overflows occur on many streams three or four times a year in association with extended rainy spells and saturated soil conditions. Severe general flooding occurs about once in two years from upstream runoff. The only important contribution to the Mississippi within the State is from the Yazoo Basin. A system of levees prevents major damage from Mississippi River floods.

The climate of Mississippi is controlled by the land mass to the north, its subtropical latitude, and the Gulf of Mexico to the south. The location and seasonal intensity of the Bermuda High can dominate an entire season in the State. These controls produce the Humid Subtropical climate type, typified by mostly mild winters without extended periods of temperatures below freezing; long, hot summers; and no routinely recurring wet or dry season. This climatic setting has given the State a traditional orientation toward agriculture and forestry. Given the number of factors controlling climate in Mississippi, the State is characterized by a "feast" or "famine" situation in many years, with the "average" traits seemingly never prevailing. For example, an active Subtropical Jet Stream during the winter can aid the persistent development of mid-latitude cyclones in the Gulf of Mexico or Texas, which move over or near the State and bring warm, wet winter weather spells. A strong Bermuda High in the summer can cause devastating drought conditions for weeks or months. Mississippi's climate is also controlled to some extent by more global mechanisms and teleconnections such as El Niño and La Niña phenomena. These can bring warm, wet or cold, dry winter and spring seasons, and can also influence the occurrences of tornadoes and hurricanes for the State.

In the warmer season (and throughout much of the rest of the year) prevailing southerly winds provide humid, semitropical conditions often favorable for afternoon thunderstorms. These storms produce an average of about 25 percent of the State's annual precipitation, and are at times accompanied by locally violent and destructive winds. High humidity, combined with hot days and nights, generally produces discomfort from May through September, with dewpoint temperatures routinely in the upper 70s. When the pressure distribution is altered so as to bring westerly or northerly circulation, periods of hotter and drier weather interrupt the prevailing humid condition. It is not unusual for these circulation shifts to produce very pleasant spells of weather in May, June and September, with the dewpoints dropping into the 30s for a few days.

In the colder season, the State's weather is dominated by the positions of the Polar and Subtropical Jet Streams, and their subsequent control over passages of cold and warm fronts of mid-latitude cyclones. These frontal passages alternately subject the State to cold continental air and warm tropical air, in periods of varying length. However, cold spells seldom last over three or four days. The ground rarely freezes, and then mostly in the north and only a few inches deep. Continental Polar and Arctic air behind cold fronts is usually considerably modified by the time it enters the State, but these air masses can occasionally bring large and sudden drops in temperature. When the upper air circulation is configured to support the intrusion of bitterly cold Arctic air masses into the State, a situation referred to as "The Siberian Express", extreme cold spells may occur. Temperatures in the northern part of the State have fallen to -19° F at Corinth during one such occurrence. Conversely, it is not unusual for warm fronts to bring air masses with temperatures in the 80s into the State during January and February.

Temperature- The normal annual temperature ranges from 60° F in the northern border counties to 67 in the coastal counties. Daily highs in January average about 48 in the north to about 61° F along the coast. Daily minimum temperatures in January average 27 and 43° F in the north and along the coast, respectively. The area experiencing the maximum number of days with temperatures at or above 90° F occurs about 50 miles inland from the ameliorating affects of the coast. Over 100 days annually may top 90° F in this region. Temperatures at or below freezing occur decrease from 82 such days along the Tennessee border to less than 10 along the coast.

Temperatures exceed 100° F at one or more station every year, and 115° F has been recorded at Holly Springs in the north. Subzero temperatures occur somewhere in Mississippi an average of one in five winters and to 32° F or lower every winter as far south as the Gulf Coast. Average last freeze dates are quite variable, averaging from April 3 in the north to February 20 along the coast. However, one site in east-central Mississippi has a last freeze date that has varied from February 8th to April 21st.

Precipitation- Mean annual precipitation ranges from about 50 inches along the northern border to about 65 inches along the coast, averaging about 56 inches statewide. During the freeze-free season rainfall ranges from 23 - 25 inches in the Delta region to 36 - 38 inches in the southeast. This distribution discourages the growth of crops with critical water requirements, such as corn, in much of the Delta and Black Prairie provinces, but it is beneficial for cotton. Conversion from row crops to cattle in large areas of the north is due, at least in part, to insufficient or poorly distributed rainfall. Irrigation is being increasingly practiced because the abundant rainfall does not always come in the time of greatest need. It is not unusual for Mississippi to experience general agricultural droughts, especially during the summer season. Stream flow and precipitation records indicate at least nine significant periods of extended drought in the State since 1930.

During the winter, the precipitation maximum is centered over the northern and western counties (16 - 18 inches) with the minimum (13 inches) on the coast. In summer, the maximum shifts to the coastal counties (19 - 21 inches) and the minimum to the Delta counties (nine to 11 inches). The spring and fall patterns are very similar to the summer pattern. The fall months are the driest of the year with precipitation ranging from eight to 13 inches. This favors harvesting of crops. Fall is the most agreeable season of the year, with cool nights and mild, clear, sunny

conditions persisting for several days, and even weeks, at a time. The most intense rains are associated with thunderstorms; stalled fronts and tropical systems usually cause heavier rains over longer periods of time. Daily totals may amount to over eight inches along the coast and over four inches further inland.

While snowfall is not of much economic importance, it is not such a rare event in Mississippi as is generally believed. Measurable snow or sleet falls on some part of the State in 95 percent of the years. North of 34° North latitude, measurable snow falls about 70 percent of the years; between 33 and 34° North, about 50 percent; between 32 and 33° North, 30 percent; between the coast and 32° North, measurable snow falls in about 10 percent of the years. Amounts of up to 12 inches are found in the records for many individual snow events in the northern part of the State. For perspective, the record for Jackson, Mississippi, in the center part of the State, shows that 60% of snow falls in January, a snowfall greater than one inch occurs every two and a half years, heavy snowfall (three inches or greater) occurs once every four years, and the longest period between one inch snowfalls is seven years. Ice storms occur about once every four years in the northern half of the State and about once every 13 years in the southeastern portion.

Thunderstorms produced from afternoon heating of warm, moist air and from cold frontal passages occur on an average of 50 to 60 days a year in northern sections of the State and 70 to 80 days annually near the coast. Thunderstorms occur more frequently in July than any other month, with least number reported in December. Those in late fall, winter and early spring produce more high winds than those in the summer. However, in the summer after a spell of unusually high temperatures, afternoon airmass thunderstorms may develop with local violence. During late fall, winter, and early spring, thunderstorms may occur at any time of the day, as they are usually associated with frontal activity. During the warm season, about 65 percent of the thunderstorms occur between Noon and 6:00 p.m. and 85 percent between Noon and Midnight in the interior. Near the coast, 30 percent occur between 6:00 a.m. and Noon, 60 percent between Noon and 6:00 p.m., or about 90 percent between 6:00 a.m. and 6:00 p.m.

A hazard to life and property in Mississippi is the tropical cyclone. While these storms generally move into the State on the coast, they have on occasion entered as far north as Meridian and Greenville after crossing part of Alabama or Louisiana. The topical cyclones are weakened (usually quickly) by passage over land, so loss of life and property damage due to high winds is confined mainly to the coastal areas with losses further inland generally owing to rain damage to crops and from floods. However, the hurricane of September 26 - 27, 1906, which moved inland between Pascagoula and Mobile, caused great damage as far inland as Brookhaven and Waynesboro; about 10 percent of the virgin timber in the area was destroyed.

The hurricane of July 5 - 7, 1916, pursued one of the most unusual courses ever observed. It moved inland near Pascagoula late on July 5 on a northwest course as it decreased in intensity. It passed over Jackson to Cleveland, where it turned east during the night, moving over Macon to near Selma, Alabama, a west turn carried it over Birmingham and Huntsville on the 7th and 8th. Another turn took it past Nashville, Tennessee and into the Ohio Valley on the 10th. Attending heavy rains for three days caused enormous losses of staple crops and resulted in great floods on the rivers of eastern Mississippi as well as Alabama and Georgia.

Mississippi has been affected by high winds, high tides and heavy rains by many tropical cyclones. The strongest was Camille on August 17, 1969, which killed 135 people in Mississippi and caused more than \$5 billion (1969 figure) in damages. A wind gust of 229 mph was recorded in Biloxi during this event. The intensity of the storm was heightened by its course into the State, crossing the coastline directly northward with the eye on the western side of the coast. Since the northeast quadrants of tropical cyclones have the strongest winds, the storm surge is greatest in that vicinity. In the case of Camille, the surge was in excess of 20 feet above sea level in places along the coast from Pass Christian eastward to Pascagoula, and directly onshore. Tropical systems which move inland on the Alabama coast, east of Mississippi, may affect the State only slightly because of the less intense and offshore winds on the western side of the eye.

A more deadly hurricane struck on August 29, 2005. Hurricane Katrina made landfall in southeastern Louisiana near Buras as a category 4 storm with sustained winds of 140 mph. The storm brought devastation and loss of life that were nearly incomprehensible. The city of New Orleans, much of which sits below sea level, was inundated with up to 20 feet of water when several levees broke. Insured damages from Louisiana eastward to the western portion of the Florida panhandle were in \$50 billion range. Uninsured or underinsured losses were estimated in the \$100 to \$150 billion range. More than 230 Mississippians and nearly 1,100 Louisianans lost their lives in the storm. This was the largest number of weather-related fatalities in the US since the "Lake Okeechobee Storm" of 1928 produced 2,500 deaths.

Mississippi also commonly experiences tornadoes, many of which are violent. Four of the deadliest ever to occur within the U.S. took place in the State, killing a total of 538 people (Natchez, May 1840; Purvis, April of 1908; Natchez, April of 1908; Starkville, April 1920). The State ranks 12th nationally in the total number of reported tornadoes and 8th nationally in the number of tornadoes per 10,000 square miles. A regrettable statistic is that the State ranks 1st nationally in tornado deaths per 1,000,000 population. However, the tornado threat is not spatially consistent across the State. The greatest frequencies occur in: Simpson, Grenada, Harrison, Humpheys, Leflore and Jones counties. Minimum frequencies are found on an axis from Yazoo to Itawamba counties, the extreme southwestern counties, and along the extreme eastern edge of the southern half of the State.

The largest number of tornadoes usually occurs in the late winter-early spring period (February-May), with these four months accounting for about two-thirds of all tornadoes. Tornadoes do occur in all months, with the fewest occurring during the August - October period. Tornadoes in Mississippi occur at any hour of the day or night, but are least likely between 4:00 a.m. and 7:00 a.m. and most likely between 11:00 a.m. and 9:00 p.m. Nearly one-half of all tornadoes in Mississippi occur between 2:00 p.m. and 9:00 p.m., with the peak occurring between 6:00 p.m. and 7:00 p.m.

Climate and the Economy- Mississippi's climate is characterized by extreme heat in the summer and by the absence of severe cold in the winter. The ground rarely freezes and outdoor activities are generally favored year-round. Cold spells are usually of short duration and the growing season is long; rainfall is plentiful though not reliably distributed throughout the year. Dry spells accompany harvest time when they are needed most, but drought is a damaging aspect of the

climate. While tornadoes and tropical cyclones can cause severe damage, they affect only a small portion of the State at any time and protective measures can be taken against them.