Juarez, Mexico (31°38'N, 106°26'W)

Full Year Climatology

CONVENTIONS: The spelling of place names and geographical features are those used by the National Imagery and Mapping Agency (NIMA). All distances are in nautical miles (NM) and kilometers (km), except for visibility, which is in statute miles and meters. Elevations are in feet above mean sea level (MSL), with a metric conversion following. Temperatures are in degrees Fahrenheit (F) and Celsius (C). Wind speeds are in knots. Cloud bases are above ground level (AGL) unless otherwise stated; tops are above mean sea level (MSL). Precipitation amounts are in inches, with a millimeter (mm) or centimeter (cm) conversion following. Precipitation values given are liquid equivalent unless stated otherwise. Standard pressure levels are expressed in millibars (mb). Time is reported either in Coordinated Universal Time (UTC) (also known as Zulu or Z), or Local (L).

TERRAIN. Ciudad Juarez, average elevation 3,800-3,900 feet (1,150-1,200 meters), is across the Rio Grande from El Paso, Texas. A bridge over the river connects the two cities. This arid terrain is rugged and arroyos and gullies are latticed throughout the foothills that surround Juarez and El Paso. The Rio Grande, which flows from the northwest to the southeast between El Paso and Juarez, is the only major permanent river in the region. A number of canals have been constructed southeast of Juarez close to the river.

The Sierra de Juarez range is just southwest of Juarez, and the terrain rises steadily to nearly 6,000 feet (1,800 meters) at the ridgeline. The Sierra de Juarez is oriented northwest to southeast and seasonal rivers flow down the northwestern through southeastern slopes in July through September or October. Across the Rio Grande, the Franklin Mountains begin 2.7 NM (5 km) due north of Juarez and extend 13.5 NM (25 km) straight northward toward the San Andres Mountains. Elevations along the ridgeline average 6,800-7,000 feet (2,100-2,135 meters) and the highest peak (North Franklin Mountain) reaches 7,192 feet (2,192 meters). The Hueco Mountains are 24 NM (45 km) to the northeast. They average 5,000-6,000 feet (1,500-1,800 meters) at their western edge and rise above 7,000 feet (2,100 meters) within another 40 NM (74 km) of Juarez.

Winter (November-February)

General Weather. This is the drier season for this rather arid region. The near equatorial tradewind convergence (NETWC) shifts south and cuts off the moisture that fueled rainshowers all over Mexico. The North Pacific and Bermuda highs both move south and east, which brings the Pacific high closest to Mexico and the Bermuda high farthest away by January. As a consequence, the deep trades no longer reach Mexico. Although the trough between the two oceanic highs still exists over Mexico in November, the gradient is weak and has little associated weather.

With both subtropical highs at their most southern positions, the subtropical westerlies also shift south. Extratropical cyclones that travel the westerlies also move to relatively low latitudes. Fronts with these lows bring occasional

bouts of bad weather to northern Mexico from late fall through mid-spring. December and January are when the most extratropical storms affect Mexico. These storms usually come from the Pacific in a series of waves and each develops its own low-pressure center as it moves inland over the southern US. Many dissipate, but others have enough energy to exhibit strong frontal characteristics.

These fronts bring only spotty rain and rainshowers to the region. Strong winds and sharp drops in temperature frequently occur without rain. Nortes, powerful, cold, northerly winds, blow behind cold fronts. Nortes are often preceded by suradas, warm, dry winds out of the south. Once the north winds begin, temperatures drop rapidly and winds are very strong. Nortes are moved eastward out of the area by a high-pressure ridge. Nortes generally last a few hours to 1-3 days. Cold outbreaks reach far south. Low temperatures and strong, gusty winds are typical of norte conditions.

The El Niÿo phase of the El Niÿo/La Niÿa cycle introduces extra rainfall. As in all arid to semi-arid areas, precipitation varies widely from year to year under normal circumstances, but there is a clear trend to higher than normal rainfall in El Niÿo years. Late winter and early spring have the largest increases. La Niÿa events are less clear because of the normal precipitation variance; however, they reduce precipitation. Spring tends to be the driest season under La Niÿas.

Sky Cover. The mean cloud cover is scattered all winter with slightly less cloud cover in November than the rest of the year. Ceilings below 10,000 feet

occur 10-15 percent of the time all season with little diurnal variation. Ceilings below 3,000 feet occur 5 percent of the time or less all winter with no diurnal variation. Ceilings below 1,000 feet are rare all winter and ceilings below 200 feet do not occur.

Visibility. The main causes of restricted visibility are fog, rain, smoke, and dust haze. Visibility is generally good. The most restrictions in Mexico occur in winter. Fog restricts visibility below 7 miles (11,000 meters) on an average of 1 day in November and 2-3 days per month in December-February. Visibility below 11,000 meters occurs less than 5 percent of the time all season with no diurnal variation. Visibility below 3 miles (4,800 meters) is rare all season and visibility below 1 mile (1,600 meters) does not occur at all.

Winds. The prevailing winds come from the north at 6 knots in November-January and from the west at 11 knots in February. Peak gusts reached 51 knots in November and 62-64 knots in December-February.

Precipitation. Precipitation occurs on an average of 3-4 days per month. Of those days, snowfall occurs on an average of 1 day or less per month all season. Thunderstorms are rare in November-January and occur on an average of 1 day in February. The mean monthly precipitation is 0.3-0.6 inch (8-15 mm) per month all season. The mean monthly snowfall is 1-2 inches (2.5 to 5 cm) per month. The extreme monthly precipitation was 2.5 inches (64 mm) in November, 3.9 inches (99 mm) in December, and 1.8-1.9 inch (46-48 mm) in January and February. The maximum 24-hour precipitation was 0.5-0.8 inch (13-20 mm) per month except in December, which recorded a 24-hour maximum of 1.5 inch (38 mm).

Note that snowfall is reported in centimeters while all other precipitation amounts are reported in millimeters. The record snowfall was 13 inches (33 cm) in November, 26 inches (66 cm) in December, and 8-9 inches (20-23 cm) in January and February. The maximum 24-hour snowfall was 7 inches (18 cm) in November and February, 15 inches (38 cm) in December, and 5 inches (13 cm) in January. In general, 1 inch (25 mm) of precipitable water produces 10 inches (25 cm) of snowfall but the ratio varies widely with the moisture content of the snow. Light, dry snow may have a ratio as low as 1 inch (25 mm) of water per 30 inches (76 cm) of snow and heavy, wet snow may have a ratio as low as 5 inches (13 cm) of snow per 1 inch (25 mm) of precipitable water. Because average temperatures are so warm, snow cover rarely lasts more than a few hours at a time.

Temperatures. The mean highs are 67F (19C) in November, 57 to 58F (14C) in December and January, and 64F (18C) in February. The extreme highs were 87F (31C) in November and 80 to 83F (27 to 28C) in December-February. The mean lows are 41F (5C) in November, 34F (1C) in December and January, and 37F (3C) in February. Extreme lows were 1F (-17C) in November, 5F (-15C) in December, -8F (-22C) in January, and 8F (-13C) in February. The temperature falls to or below freezing on an average of 7 days in November, 17 days per month in December and January, and 11 days in February. The average relative humidity is 60-70 percent.

Spring (March-April)

General Weather. The North Pacific high shifts north and west, which moves it

away from Mexico. Only an upper-level high remains. The Bermuda high intensifies and expands both east and west, which brings ever stronger and deeper, moist, easterly winds to Mexico. The NETWC begins to move northward and closer to the region and onshore flow out of the deep trades reaches the eastern seaboard by the end of April.

Although most effect the region in winter, extratropical storms still reach it in spring as well. Suradas still occur ahead of intense low-pressure systems with strong cold fronts out of the US. Nortes still occur behind the fronts in spring but are weaker than in winter. Low temperatures and strong, gusty winds are typical conditions with nortes.

Sky Cover. The mean cloud cover is scattered all spring with slightly more cloud cover in March than in April. Ceilings below 10,000 feet occur 5-10 percent of the time in both months with no diurnal variation. Ceilings below 3,000 feet are rare and those below 1,000 and 200 feet do not occur at all.

Visibility. Dust haze is the main cause of restricted visibility. Dust restricts visibility below 7 miles (11,000 meters) on an average of 1 day per month. Fog restrictions are rare. Visibility below 11,000 meters occurs 5 percent of the time or less at 09-23L and is rare the rest of the day. Visibility below 3 miles (4,800 meters) is rare at 12-20L and does not occur the rest of the day. Visibility below 1 mile (1,600 meters) does not occur.

Precipitation. While snow is still possible in spring, it does not occur often. Precipitation occurs on an average of 2 days per month and thunderstorms occur

on an average of 1 day per month. The mean monthly precipitation is 0.2-0.3 inch (5-8 mm) per month. The mean monthly snowfall is a trace or less per month. The extreme monthly precipitation was 2.2-2.3 inches (56-58 mm) per month. The maximum 24-hour precipitation was 0.8-1.0 inch (20-25 mm) in each month. Note that snowfall is reported in centimeters while all other precipitation amounts are reported in millimeters. The record snowfall was 7 inches (18 cm) in March and 17 inches (43 cm) in April. The maximum 24-hour snowfall was 6 inches (15 cm) in March and 7 inches (18 cm) in April. Because the average temperatures are so warm, snowfall does not linger long on the ground.

Temperatures. The mean highs are 70F (21C) in March and 79F (26C) in April. The extreme highs were 89F (32C) in March and 98F (37C) in April. The temperature rises to or above 90F (32C) on an average of 2 days in April. The mean lows are 45F (7C) in March and 51F (11C) in April. The extreme lows were 14F (-10C) in March and 23F (-5C) in April. The temperature falls to or below freezing on an average of 4 days in March and 1 day in April. The average relative humidity is 50 percent in March and 45 percent in April.

Summer (May-August)

General Weather. This is the relatively wet season for the region. The South Pacific high indirectly supplies moisture as it forces the NETWC northward. The NETWC, although not normally over Mexico, occasionally surges far north of its normal positions to lie over southern Mexico and destabilizes the atmosphere over the entire central plateau. The North Pacific high moves to its farthest

north and west position as does the Bermuda high. The Bermuda high affects the weather far more than the North Pacific high as deep easterlies flow around its base right into the Mexican eastern seaboard. The deep easterlies carry moist air far inland despite the mountains that surround the plateau. This is because of the thermal low that develops in summer over central Mexico. As summer wears on, the low draws in moisture from the Pacific, Gulf of California, and Gulf of Mexico. Convection occurs even deep in the interior because the Mexican anticyclone at upper levels above the thermal low provides outflow for thunderstorms. This is why peak rains fall in July through September over most of Mexico.

Fronts reach down into northern Mexico into early May but not often. Tropical disturbances bring widespread cloudiness and rain to the southern and southwestern coasts. From June through September, Mexico is dominated by moist, unstable, maritime air.

Summer air masses are almost exclusively maritime tropical and continental tropical. This air is unstable and moist and is frequently accompanied by convection. Tropical maritime air from the Pacific is relatively unimportant as it causes gradient flow that parallels the western coast of mainland Mexico and there is virtually no frontal activity that advects weather into Mexico from the west. The source of the continental tropical air is the thermal low over northwestern Mexico and the southwestern US. Although the air mass is convectively unstable, it is too dry to create much cloud cover. Moisture is drawn into the low from the surrounding seas, and the Mexican anticyclone aloft allows convection to develop. This reflects in a precipitation spike in July

and August, especially in the northern coastal areas.

Sky Cover. The mean cloud cover is scattered all summer with the most cover in July and August. Ceilings below 10,000 feet occur 7 percent of the time or less in May and June with little to no diurnal variation. In July and August, they occur 10-15 percent of the time with the highest rates at 15-05L. Ceilings below 3,000 feet are rare and those below 1,000 or 200 feet do not occur at all. Thunderstorm and rainshower cloud bases tend to be at 4,000-5,000 feet in this area.

Visibility. Visibility is generally good. Dust haze and fog rarely restrict visibility below 7 miles (11,000 meters). Visibility below 11,000 meters is rare at 15-23L in May and at 18-02L the rest of the summer and does not occur the rest of the day all season. Visibility below 3 miles (4,800 meters) does not occur.

Winds. The prevailing winds come from the west at 10-11 knots in May and June, from the south at 7 knots in July, and from the north at 6 knots in August. Peak gusts reached 48 knots in May, 56 knots in June, and 63 knots in July and August.

Precipitation. Rainfall occurs on an average of 2-3 days per month in May and June and 8 days per month in July and August. Thunderstorms occur on an average of 4 days per month in May and June and 9-10 days per month in July and August. Most rainfall is from rainshowers or thunderstorms. Thunderstorms often occur over the mountains in the area, and lightning over the mountains can make quite

a dramatic show. Because of the general aridity of the area, much of the rainfall from rainshowers and thunderstorms evaporates before it hits the ground (virga). Mean monthly rainfall is 0.3 inch (8 mm) in May, 0.7 inch (18 mm) in June, and 1.5-1.6 inch (38-41 mm) per month in July and August. The extreme monthly rainfall was 4.2 inches (107 mm) in May, 3.2 inches (81 mm) in June, 9.2 inches (234 mm) in July, and 5.6 inches (142 mm) in August. The maximum 24-hour rainfall was 1.2-1.3 inch (31-33 mm) in May-June and 1.8-2 inches in July and August.

Temperatures. The mean highs are 87F (31C) in May and 93 to 96F (34 to 36C) in June-August. The extreme highs were 104F (40C) in May, 112 to 113F (44 to 45C) in June and July, and 108F (42C) in August. The temperature rises to or above 90F (32C) on an average of 13 days in May, 26-27 days per month in June and July, and 24 days in August. The mean lows are 61F (16C) in May and 69 to 72F (21 to 22C) the rest of the summer. The extreme lows were 31F (-1C) in May, 47F (8C) in June, and 56 to 57F (13 to 14C) in July and August. The average relative humidity is 45 percent in May and June, 65 percent in July, and 70 percent in August.

Fall (September-October)

General Weather. As the South Pacific high shifts south to its winter position, the North Pacific high shifts south and east. The STJ reaches farther and farther south with deep troughs of cold air. Deep lows spin up in these troughs and march eastward across the US. Associated cold fronts begin to surge into the Mexico. Temperatures drop behind the front and conditions deteriorate

steadily. Although early in the cold half of the year, these nortes can last 2-4 days at a time in the fall. They are not as intense or as persistent as winter nortes. Winds with early nortes generally do not exceed 35-40 knots.

The thermal low rapidly disappears, but the trough between the Bermuda and North Pacific highs persists over Mexico. The upper-level high over the central plateau also disappears as westerlies reassert themselves in the region. Tropical disturbances still affect the region through the end of October. Although the trough between the two subtropical highs exists, the gradient is weak. Summer rains continue through early autumn. At many sites, September is the rainiest or second rainiest month of the year. By October, there is a marked decrease in precipitation and cloud cover.

Sky Cover. The mean cloud cover is scattered in both months with slightly more cover in September than in October. Ceilings below 10,000 feet occur 10 percent of the time all fall with no diurnal variation. Ceilings below 3,000 feet occur 5 percent of the time or less most of the day and are rare at 18-02L. Ceilings below 1,000 feet or 200 feet do not occur.

Visibility. Dust haze is the main cause of restricted visibility but visibility is generally good. Fog restricts visibility below 7 miles (11,000 meters) on an average of 1 day per month. Visibility below 11,000 meters is rare at all hours all fall. Visibility below 3 miles (4,800 meters) does not occur.

Winds. The prevailing winds come from the south at 6 knots in September and from the north at 6 knots in October. Calm conditions are common, especially

overnight. The peak gusts reached 55 knots in September and 51 knots in October.

Precipitation. Snow flurries are possible in late October but accumulations are extremely rare. Precipitation occurs on an average of 6 days in September and 4 days in October. Thunderstorms occur on an average of 4 days in September and 2 days in October. The mean monthly rainfall is 1.4 inch (36 mm) in September and 0.7 inch (18 mm) in October. The extreme monthly rainfall was 6.7 inches (170 mm) in September and 5.2 inches (132 mm) in October. The maximum 24-hour rainfall was 2.3 inches (58 mm) in September and 1.3 inches (33 mm) in October. The record snowfall in October was 1 inch (2.5 cm).

Temperatures. The mean highs are 88F (31C) in September and 79F (26C) in October. The extreme highs were 104F (40C) in September and 96F (36C) in October. The temperature rises to or above 90F (32C) on an average of 13 days in September and 2 days in October. The mean lows are 63F (17C) in September and 52F (11C) in October. The extreme lows were 42F (6C) in September and 25F (-4C) in October. Subfreezing temperatures are rare in October. The average relative humidity is 70 percent in September and 65 percent in October.

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