

rainfall along the west Texas coast. It matters little what the season of the year, rainfall will almost always occur with a LOW in the Rio Grande Valley, and a HIGH over the region to the northeast.

Of course there are many exceptions to this rule, and rain may occur with a south wind, but the data for twenty years show plainly that heavy rains with southerly winds are rather rare in this region. In most cases the LOW is advancing towards the Rio Grande Valley, and will at first cause southerly winds, but soon easterly to northerly winds will set in, and then the rain will become general, heavy, and long continued.

Often the southward advance of a northwestern HIGH will cause precipitation without the presence of any well defined LOW over Texas, but with only a "relative LOW" over extreme southern Texas caused by the abnormally high pressure advancing from the Northwest. Thus it occurs that many "northers" in winter, spring, and fall are attended by general and sometimes heavy rains. Frequently these rains on the west Texas coast are little more than mists that come in with the north and northeast winds, but they often persist for several days, and cease only after the HIGH has advanced well into Texas or has passed entirely out of the western half of the country.

A peculiar feature of the influence of the sea coast on wind direction in this region is the fact that a northwest wind seldom persists for a long time. The "northers" that cause strong northwest winds in central Texas reach this coast as a northeast wind, or when sufficiently strong, cause a northwest wind for a short time, then shift to north, and finally to northeast. It is this tendency for a northwest wind to become a northeaster

that causes the mists referred to above. It also tempers the cold waves, because the wind blows over the water surface when it comes from the northeast. Frost and freezing temperature are therefore prevented from reaching this coast, except in the unusually severe cold waves.

It would seem from what has been said that it is an easy matter to forecast rain on this coast, the wind direction being the principal element to consider. As a matter of fact it is rather a difficult problem until the rain begins, as it is often uncertain where the LOW will advance when it is coming from the southern Rocky Mountains, and when it comes through Mexico it may cause rain before its presence is observed. After precipitation begins it is safe to assume that it will continue until the Rio Grande Valley LOW moves out or dissipates. These LOWs are usually sluggish, therefore a forecast for 24 or 36 hours ahead is not difficult once the rain begins. Occasionally, however, they advance rapidly, and a rain forecast for a certain period will occur before the verifying period begins.

In conclusion it may be said that local forecasters in this area should remember that light and infrequent precipitation occurs on this coast except when north to east winds prevail, generally induced by a Rio Grande LOW. Forecasters, therefore, should be wary about forecasting precipitation with an advancing LOW unless the central depression is far south, generally below Amarillo, and it is expected that the depression will move into the Rio Grande Valley. On the other hand, they should not forecast a cessation of precipitation with a Rio Grande LOW until it is certain that it will move entirely out of the Valley, and this is usually a slow process when a HIGH checks it.

WATERSPOUTS NEAR CORPUS CHRISTI, TEX.

By JOSEPH P. McAULIFFE, Meteorologist.

[Weather Bureau Office, Corpus Christi, Sept. 18, 1923.]

A waterspout occurred over Corpus Christi Bay during the morning of September 12, 1923 under conditions that were most favorable for observation and study. Unfortunately, however, no photographs were made of it.

The phenomenon formed during a morning that had given moderate to heavy local showers and squalls. It was the first occurrence of its kind since 1917, and the most perfect waterspout that has ever been observed so close to the city of Corpus Christi. Occasionally these phenomena are seen on the Gulf of Mexico, but seldom in the bays along this coast.

The writer was on the roof of the Federal Building examining the rain-gauge when his attention was attracted by heavy peals of thunder in the northeast. A thunderstorm was approaching the station from that direction. As the squall cloud advanced rapidly a thin pendent cloud suddenly appeared, waving to and fro and twisting irregularly, much like a pennant suspended horizontally, flapping in the breeze. This was exactly 10:31 a. m. The pendent cloud extended rapidly downward, and by 10:35 a. m. had touched the surface of Corpus Christi Bay, apparently 10 miles east-northeast of the station. The column was now straight as a plumb line, intensely black, except that a thin gray streak extended throughout its center from the cloud mass to the water. The spiral motion of rotation was plainly visible, and it caused a great agitation of the water surface over which it passed, causing water and spray to rise to a height estimated at 10 feet. The direction of the spiral motion was usual for such phenomena, i. e., counterclockwise. The waterspout advanced rapidly from the northeast,

breaking away somewhat from the main thundercloud, which advanced from a more easterly direction. At 10:40 a. m. the middle part of the pendent cloud made a sharp bend toward the south, leaving the upper and lower portions a little in its rear. A few minutes after this the waterspout broke into two parts, the upper part drawing up into the main storm cloud, while the lower part advanced onward toward the southwest, causing the agitation of the water surface to continue. In its last stages the only part of the waterspout visible was a twisting mass of spray moving rapidly across the bay. This disappeared when within a mile of the city and a half mile northeast of the Municipal Pier, where motorboats and skiffs were moored. This was exactly 10:44 a. m. The diameter of the waterspout was estimated at 40 feet. The entire distance traveled by the cloud after touching the water was about 12 miles, and it covered this distance in nine minutes. A sharp squall came in from the bay immediately after the disappearance of the waterspout, giving a maximum velocity of 26 miles an hour from the east at 10:46 a. m. Only 0.01 of an inch of rainfall occurred, the heavy rain area passing north of the station.

Fishermen returning from the Gulf reported having seen two waterspouts during the same day, and at different times and places. One of these was reported a few miles east of Corpus Christi Pass (about 12 miles southeast of the station), while another was seen in the Laguna Madre, probably 15 or 20 miles southeast of Corpus Christi. Neither of these was as large as the one observed over Corpus Christi Bay.