Higher starting velocities, however, show conclusively that the Robinson responds more readily than at the lower ranges. For example, from 30 to 40 miles per hour, the Dines increased from 52 to 20 percent, but the Robinson from 89 to 33 percent.

In the case of the isolated gusts, previously discussed, due to the conditions mentioned in the above paragraph, the factor is 1.06. As the gust reaches its maximum and minimum in an extremely brief interval, the impulse given the cup anemometer must carry it through the corresponding minimum and cause it to register higher than it would normally.

The factor for average Dines velocities as compared to Robinson velocities was only 0.78, but was discarded for the reasons previously mentioned.

Check comparisons were attempted with records from New York City and Chicago, but proved to be of no value for the purpose.

No attempt will be made to draw conclusions from the data as it is realized that these are only approximations.

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TROPICAL DISTURBANCES OF AUGUST 1938 [1]

By I. R. TANNEHILL

[Marine Division, Weather Bureau, Washington, September 1938]

August 8–10.—The first clearly defined tropical disturbance of the 1938 season appeared on the morning of August 8 among the islands to the eastward of Puerto Rico. Early in the day, the Am. S. S. *West Isleta* experienced heavy squalls of hurricane intensity and rough, heavy sea and swell from the east-southeast. The ship was then near 21° N., 64° W.

During the 8th the center of the disturbance passed some distance to the northward of Tortola and caused some damage on the island of Anegada. The lowest barometer reading reported from Tortola was 29.58 inches at 1:44 p. m. (local time) of the 8th.

On the 9th and 10th squally conditions progressed rapidly west-northwestward, along the northern coasts of Haiti and Cuba, and into the Florida Straits. Its progressive movement probably exceeded 20 miles an hour. However, no definite cyclonic circulation was charted after the 8th. There are no reports to indicate that the disturbance was of more than moderate intensity at the time of its maximum development. Advisory messages were issued from San Juan on the 8th and from Jacksonville on the 9th and 10th.

August 9 to 14.—While the preceding squally condition was in progress on the 9th and 10th, a slight disturbance passed rapidly through the Windward Islands into the eastern Caribbean Sea. Advisory information was issued on those dates from the Weather Bureau forecast center at San Juan. It is not possible with reports at hand to trace the center of the disturbance with any assurance of accuracy beyond 14° N., 67° W., which was its approximate position at 7 p. m. (eastern standard time) of the 10th. However, its rapid progressive movement westward and the subsequent appearance of a rapidly moving tropical cyclone in the western Caribbean Sea on the 12th, indicates the probability that it continued to move west-northwestward on the 11th and is identical with the latter.

On the morning of August 12 a disturbance of marked intensity was centered near Grand Cayman Island, where shortly before 7 a. m. (eastern standard time) the wind reached a maximum velocity of 95 miles an hour from the east. Maintaining marked intensity, but with rather small diameter, the storm passed through the Yucatan Channel on the night of August 12–13, moved rapidly northwestward to the Central Gulf and thence north-northwestward into western Louisiana. Its average rate of progressive movement across the Gulf was 18 to 20 miles an hour. The storm passed inland over Cameron and Calcasieu Parishes, during the evening of the 14th with the center a short distance west of Lake Charles at about 8:30 p. m. (eastern standard time).

The report of the forecaster at New Orleans, R. A. Dyke, includes the following:

> Though the storm was without a deep center of low pressure, as far as known, and winds were rather weak on the left side, the winds to the right of the center showed considerable strength over the Gulf, a wind of force 11, or "storm," being reported by the steamship *John D. Archbold* at 9 a. m., eastern standard time, of the 14th, in latitude 27.1° N., and longitude 91.9° W.; and winds were estimated as of hurricane force at Grand Chenier near the coast of eastern Cameron Parish, La., about 7 p. m., of the 14th. At Lake Charles, La., 35 miles inland, with the disturbance decreasing in intensity, a southeast wind of 50 miles per hour was recorded between 8:00 and 8:30 p. m., with gusts up to 60 miles per hour; and the lowest pressure was 29.56 inches at 8:30 p. m. At Port Arthur, Texas, the lowest pressure was 29.73 inches at 8:20 p. m. and maximum wind velocities of 32 to 34 miles per hour from the east and southeast were recorded between 2:30 p. m. and 4:12 p. m.
>
> The gales attending the storm drove in many sea birds, which were observed at the game preserve of Avery Island, Iberia Parish.
>
> The movement of the storm favored increasing tides on the east coast of Texas on the 13th–14th and on the Louisiana coast on the 14th. The highest tides at various points follow: Galveston, 3.6 feet above mean low tide, at 6 to 7 p. m., on the 14th, or 2.8 feet above normal predicted tide; Sabine Pass, 7 p. m., 4.1, or 2.7 feet above normal predicted tide. Water was 4 to 5 feet above mean low tide on the coast of Cameron and Vermillion Parishes with lowlands flooded for depths of 1 to 4 feet. The storm caused a rise of about 2.5 feet in the Atchafalaya River at Morgan City, La., and tide slightly more than a foot above normal predicted tide at Grand Isle, La.
>
> Torrential rainfall preceding and attending the passage of the storm caused extensive overflow of crops and detours or interruption of highway traffic for a considerable distance inland, between twenty and forty miles east of the path of the storm center, especially in Jefferson Davis Parish and neighboring localities.
>
> Damage to buildings, wires, derricks, piers, and other property is estimated at $133,000; to crops, $110,000, principally to rice, but including considerable cotton damage from the heavy rains, and slight damage to sugarcane snapped off by the wind. Total losses are conservatively estimated at $243,000.
>
> At 10:30 a. m. of the 15th, about 12 hours after the storm center had passed, a small tornado occurred at Kinder, Allen Parish, 28 miles northeast of Lake Charles, destroying a house and prostrating two barns, fences, and some trees, with damage of $2,000 reported.

Advisory warnings were issued from Jacksonville on the 11th and 14th. Storm warnings were hoisted on the

[1] Tracks of the tropical disturbances of August are shown on chart X.

coast of Louisiana and the east coast of Texas early in the morning of the 14th and hurricane warnings were ordered from Morgan City, La., to Point Bolivar, Tex., at 2 p. m. (eastern standard time).

August 23–28.—Vessel reports showed disturbed conditions in the central Caribbean Sea on the morning of August 23 with some evidence of cyclonic circulation central about 250 miles southeast of Jamaica. This disturbance moved west-northwestward across northern Yucatan, with rapidly increasing intensity, and reached the Mexican Coast between Tampico and Brownsville on the morning of August 28.

On crossing Yucatan the storm was of full hurricane intensity. The Am. S. S. *Agwistar* was in the center on the morning of the 26th, while anchored 7 miles north of Progreso. Winds of hurricane force were experienced from 4 a. m. to 7 a. m. (local time) but with a dead calm from 5:15 to 6:00 a. m. Lowest pressure was 28.92 inches during the calm. The highest wind was estimated at 90 miles an hour. The Nic. M. S. *Sama* also became involved in the hurricane on the 26th. The ship was very near the center at 4:00 a. m. of the 27th, at 22½° N., 93½° W., barometer 29.26 inches. According to estimates of the ship's officers, the highest wind was 90 miles an hour between 8 p. m. and midnight of the 26th.

As to the effects of this storm during its early history, Forecaster Norton at Jacksonville says:

> We have had no reports of damage, and since the storm did not seriously affect any land area in the Caribbean except the sparsely settled coastal section of northeastern Yucatan, it is believed that damage was relatively small. The paucity of ships' observations near the storm center made the problem of the forecaster somewhat difficult in charting the exact center of the storm and calculating its intensity, but this lack of ships' reports is indicative of the value of the advices to shipping, and no reports have been received of any ship having been damaged in the Caribbean.

Concerning the winds aloft during the progress of the disturbance, Forecaster Dyke of New Orleans makes the following comment:

> Upper winds during the movement of the storm were from the east over the Middle and West Gulf States except for a brief interruption in the morning of the 26th, when upper winds, 10,000 feet and higher, were from the southeast over Texas. Upper winds at Tampico were from the northeast until the storm approached near enough to deflect them to the north and northwest. Under the prevailing flow of air no turning to the right was to be expected.

The following is taken from the report of the official in charge of the Weather Bureau office at Brownsville, regarding the passage of the storm into Mexico and the damage resulting there:

> Reports from Capt. Durst, Pan American Airways pilot, through Mr. Ronning their meteorologist, and from local fishermen who apparently were in the northern portion of the storm track, the center apparently went inland in the vicinity of Boca Jesus Maria, and the width of path of damage on the beach was about 75 to 80 miles. The little village La Pesca on the beach in the same latitude as Soto La Marina appears to have had winds strong enough to blow their palm-thatched huts down or badly damage them. In Brownsville and vicinity fishermen, who happened to be on the beach or on an island some 20 miles north of Boca Jesus Maria, estimate the wind velocity around 75 to 80 miles per hour from northwest to north into the east. The center reached the coast line probably shortly after midnight Saturday.
>
> Velocities in some of the squalls along this immediate coast, according to Brazos Coast Guard personnel, were estimated at about 45 miles per hour. The condition of the Gulf of Mexico along this immediate coast, however, was affected greatly, according to the Brazos Coast Guard personnel and reports from others at or near the beach at Del Mar, a resort on the beach a short distance south of Port Isabel, Texas. The water was very rough and swells occasionally swept entirely across Padre and Brazos islands in places, washing away a few inexpensive structures at Del Mar—the only damage as a result of the storm in the vicinity of which we have any knowledge.

Frequent advisory warnings were issued from Jacksonville on August 23, 24, and 25 and from New Orleans on August 26, 27, and 28. Northeast storm warnings were hoisted on the extreme southern Texas coast at 9:30 p. m. of the 26th. Hurricane winds were forecast for the extreme northeastern coast of Mexico.

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By AMY P. LESHER

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