Cyclones and gales.—August, like the two preceding months, was remarkably free from storms of extratropical origin, and storm reports have been recorded for only three vessels north of the thirtieth parallel, with no wind higher than force 9 reported.

Tropical disturbances.—On the 12th and 13th there was a severe tropical disturbance in the Gulf of Mexico, that will be described in detail in a later issue of the REVIEW The Honduran S. S. *Nicarao* (O. Pedersen, captain and observer) was caught in the center of the disturbance off Galveston. At the time of lowest barometer the wind was practically calm. The barometer was later tested at New Orleans, and the lowest corrected reading, 27.82 inches, indicates the intensity of this storm over the Gulf. Chart VIII shows the conditions on the morning of the 13th.

On the evening of the 29th there was a well-developed disturbance near Miami which had originated several days before near Puerto Rico. It passed on into the Gulf of Mexico and moved inland near Pensacola on the night of the 31st. Shipping was not seriously affected by this storm, apart from some delays and minor damage.

At the end of the month another tropical disturbance was in progress a short distance north of Puerto Rico, and this afterwards developed into a severe hurricane that will be described in a later issue of the REVIEW.

OCEAN GALES AND STORMS, AUGUST, 1932

Vessel	Voyage		Position at time of lowest barometer		Gale began	Time of lowest barometer	Gale ended	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
NORTH ATLANTIC OCEAN			° ′	° ′				*Inches*					
Patrick Henry, Am. S. S.	Houston	Canal Zone	26 40 N	91 35 W	Aug. 12	9p., 12	Aug. 13	29.52	NE	NE, 10	SSE	NE, 10	NE-E-S.
Gertrude Kellogg, Am. S. S.	do	Baltimore	27 00 N	[1] 88 00 W	do	4p., 12	do	[2] 29.89	SE	SE, 7	SE	SE, 8	
Wm. Boyce Thompson, Am. S. S.	do	Marcus Hook	27 00 N	[1] 90 00 W	do	4a., 13	do	30.07	SE	SE, 7	SE	—, 9	
Nicarao, Hond. S. S.	Galveston	Bluefields	29 00 N	94 50 W	Aug. 13	7.30 p., 13	Aug. 14	27.82	NE	NE, —	SSE	NE, 12	NE-SSW.
John D. Archbold, Am. S. S.	New York	Corpus Christi.	27 08 N	92 02 W	Aug. 12	7a., 13	Aug. 13	29.83	SE	SE, 8	S	SSE, 9	SSE-SE.
Unicoi, Am. M. S.	St. John	Port Said	38 50 N	17 40 W	Aug. 17	6a., 18	Aug. 18	29.89	NW	NNE, 6	N	NNE, 8	NNE-N.
City of Harvard, Br. S.	River Tyne	Norfolk	49 10 N	39 50 W	Aug. 26	4p., 26	Aug. 26	29.77	SW	SSW, 8	NW	SSW, 8	SSW-NW.
West Chatala, Am. S. S.	Houston	Liverpool	47 43 N	34 23 W	Aug. 28	—, 28	Aug. 29	29.88	SSW	SSW, 7	WNW	—, 9	SSW-NW.
El Estero, Am. S. S.	Baltimore	Galveston	25 52 N	79 30 W	Aug. 29	Mdt, 29	Aug. 30	29.70	E	SE, 10	S	SE, 10	E-SSE.
Delftdijk, Du. M. S.	Swansea	Colombia	20 30 N	65 00 W	Aug. 31	6p., 31	Sept. 1	29.76	SE	SSE, 9	S	SSE, 10	SSE-S.
NORTH PACIFIC OCEAN													
Elmbank, Br. M. S.	Osaka	Shanghai	29 50 N	123 39 E	Aug. 1	1p., 1	Aug. 2	29.30	ENE	ENE, 6	SSW	NE, 8	ENE-E.
Do	do	do	26 52 N	125 27 E	Aug. 3	1p., 3	Aug. 3	29.68	S	S, 5	SW	SW, 9	S-SW.
Nevada, Am. S. S.	Hong Kong	San Francisco	32 00 N	128 30 E	Aug. 1	8p., 2	do	29.29	SE	SE, 11	S	SE, 11	None.
Do	do	do	40 55 N	139 00 E	Aug. 5	6p., 5	Aug. 6	29.20	SSW	E, 3	NE	NNE, 10	SSW-E-NNE.
Steel Age, Am. S. S.	Honolulu	Panama Canal.	18 30 N	133 40 W	Aug. 8	1a., 9	Aug. 9	29.85	NE	NE, 8	NE	NE, 8	ENE-NE.
Golden Peak, Am. S. S.	San Francisco	Yokohama	42 01 N	154 27 E	Aug. 16	8p., 16	Aug. 17	29.20	SSE	S, 11	NW	S, 11	SSE-SSW.
Hakonesan Maru, Jap. M. S.	Yokohama	San Francisco	40 01 N	150 48 W	Aug. 19	6a., 19	Aug. 19	29.93	S	S, 6	SE	S, 8	S-SE.
Ward, Am. M. S.	Shanghai	San Pedro	46 12 N	179 40 E	Aug. 26	10p., 27	Aug. 27	29.69	S	SSW, 9	SSW	SSW, 10	S-SSW.
Atago Maru, Jap. M. S.	Otaru	San Francisco	43 21 N	154 05 E	do	Noon, 26	Aug. 28	29.59	N	N, 7	N	NNW, 8	W-N.
Golden Star, Am. S. S.	Hong Kong	do	48 11 N	176 15 W	Aug. 27	5a., 27	Aug. 27	29.66	SE	SSW, 8	SW	S, 8	SSE-SSW.
MEXICAN WEST COAST GALES													
Point Palmas, Am. S. S.	San Pedro	New Orleans	16 40 N	101 05 W	Aug. 1	1a., 1	Aug. 1	29.90	SE	SE, 8	SE	SE, 8	Steady.
Losmar, Am. S. S.	Los Angeles	Balboa	20 05 N	106 37 W	Aug. 15	8p., 15	Aug. 16	29.80	SE	SE, 7	ESE	ESE, 8	SE-ESE.
Mauna Ala, Am. S. S.	Hawaiian Is.	do	15 00 N	110 48 W	Aug. 21	5a., 22	Aug. 22	29.08	NNW	E, 10	SSE	E, 10	NE-E-ESE.
Alaskan, Am. S. S.	Los Angeles	do	15 51 N	98 24 W	Aug. 24	5p., 24	Aug. 25	29.70	ESE	ESE, 9	ESE	ESE, 9	Steady.
Walter A. Luckenbach, Am. S. S.	San Pedro	Philadelphia	17 10 N	101 55 W	Aug. 25	4p., 25	Aug. 26	29.54	E	E, 10	ESE	ESE, 10	E-ESE.
Nora, Am. S. S.	do	Balboa	17 37 N	103 10 W	do	11p., 25	do	28.80	E	S, 12	SW	S, 12	S-SW.
Santa Ana, Am. S. S.	do	do	18 00 N	103 20 W	Aug. 26	4p., 26	do	28.64	NE	SSW, 12	WSW	NE, 12	NE-E.
Betterton, Am. S. S.	San Francisco	do	17 26 N	102 46 W	do	5p., 26	do	28.96	NW	SE, 12	W	SE, 12	N-E-S.
Knoxville City, Am. S. S.	do	do	19 31 N	107 10 W	do	4p., 26	Aug. 27	29.73	WNW	WNW	W	W, 8	NW-WNW.
INDIAN OCEAN													
Dunrobin, Br. S. S.	Freemantle, W. A.	Newcastle, N. S. W.	38 15 S	118 02 E	Aug. 1	11p., 1	Aug. 2	28.80	NE	NNE, 8	NW	NNE, 9	NE-N-NNW.
Achiles, Br. S. S.	Colombo	Suez	9 35 N	52 00 E	do	4p., 2	do	29.64	SSW	SSW, 8	S	SW, 10	SW-S.
SOUTH ATLANTIC OCEAN													
Strabon, Fr. S. S.	Antwerp	Buenos Aires	26 54 S	45 30 W	Aug. 7	3a., 7	Aug. 7	29.91	NNE	NW, 8	NW	NW, 9	NNE-NW.

[1] Position approximate.

[2] Uncorrected.

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WEST INDIAN HURRICANES OF AUGUST AND SEPTEMBER, 1932

THE TROPICAL STORM OF AUGUST 12–14, 1932, IN THE GULF OF MEXICO

[Weather Bureau, Washington, D. C.]

The active development of this disturbance occurred in the south-central, or middle, Gulf of Mexico, and its increase in intensity was phenomenally rapid. On the morning of the 12th, vessels in the northern Gulf indicated a disturbed condition over the middle Gulf, and coast stations were advised accordingly. On the morning of the 13th the S. S. *J. C. Donnel*, lat. 27°, long. 93° (about 190 miles southeast of Galveston), reported a barometer of 28.88 inches, wind southwest, fresh gales and heavy, confused seas. Advices were immediately issued as follows:

AUGUST 13.—Hoist NE. storm warnings 9:30 a. m. Port O'Connor to Morgan City. Tropical disturbance of increasing intensity attended by gales central about 175 miles southeast of Galveston apparently moving northwestward. Increasing northeast winds to-day, probably reaching gale force late this afternoon or early to-night. More detailed advices this afternoon.

As special reports indicated more clearly the direction of movement of the distrubance, hurricane warnings were ordered at 2:30 p. m. from Freeport to Port Arthur, and at 4:30 p. m. between Freeport and Seadrift.

During the night of the 13th, the center crossed the coast line near and slightly to the east of Freeport, passing almost over East Columbia (Brazoria County) in the interior. Winds of hurricane force were experienced near the center even for some distance inland. Mr. Tracy Clark, at East Columbia, at about 12:40 a. m. of the 14th reported lowest barometer reading as 28.17 inches (corrected 27.83 inches). Mr. Clark estimated the wind velocity at 100 m. p. h., and reported that the so-called eye of the storm was experienced. Capt. E. E. Howell, of the motor vessel *Texas Sport*, at Freeport, reported lowest barometer 28.03 at 9:25 p. m. of the 13th, but no indications of the eye of the storm. By back tracking the center prior to the 13th, taking into consideration its direction and rate of movement during the 13th and 14th, its origin may be tentatively traced to a slightly disturbed condition on the evening of the 10th, between Belize and Tela in Honduras. The complete track is shown on Chart VIII, at the end of this REVIEW.—*R. H. Weightman.*

TROPICAL STORM OF AUGUST 25-31, 1932

A tropical disturbance of very slight intensity appeared southeast of Puerto Rico on the 24th, and advanced on a course about northwest by west with an average speed of about 10 miles per hour, gradually increasing in intensity until it passed across the extreme southern part of Florida. The center passed over the southwestern part of the Island of Puerto Rico without causing damage. It was not attended by strong winds until the 28th, on the evening of which date it was about 100 miles southeast of Nassau, Bahamas, at which time storm warnings were ordered for the Florida coast between Jupiter and Key West. During the next 12 hours its center advanced to the south of Andros Island and storm warnings were ordered between Key West and Fort Myers. On the afternoon of the 29th, hurricane warnings were hoisted between Everglades on the west coast to Fort Lauderdale on the east coast, with the advice that the disturbance was of considerable intensity but small diameter and would pass near and probably south of Miami, attended by dangerous shifting gales and possibly winds of hurricane force near the center. On the evening of the 29th, when the center was about 50 miles south-southeast of Miami, hurricane warnings were extended northward on the east coast to West Palm Beach and northward on the west coast to Boca Grande and storm warnings were extended northward on the west coast to Tarpon Springs and on the east coast to Eau Gallie. The center, which was quite small, passed about 35 miles south of Miami attended near, but only quite near, the center by winds of hurricane force. The disturbance continued its northwestward course, being central on the morning of the 30th, about 30 miles south of Fort Myers. By the following morning it was about 110 miles south by west of Apalachicola. Storm warnings had been previously ordered for the Gulf coast between Carrabelle, Fla., and Morgan City, La. Shortly after noon of the 31st, hurricane warnings were hoisted between Biloxi, Miss., and Panama City, Fla. The center passed inland a short distance west of Mobile about 11 p. m. of the 31st, and recurved to the north and northeastward over western Tennessee and northwestern Ohio, with greatly diminished intensity. The lowest barometer at Fort Morgan was 29.16 inches at 10:30 p. m., of the 31st, and a ship about one mile south of Fort Morgan gave a reading of 28.92 inches at 10:50 p. m. of the 31st. At Bayou Battre at 1:45 a. m., of September 1, a pressure of 29.03 inches was recorded, while the lowest pressure at Mobile was 29.21 inches at 1:45 a. m. of September 1. The disturbance was attended by shifting gales and winds probably reaching hurricane force near the center. The maximum wind at Pensacola was 72 miles per hour from the southeast and at Mobile 52 miles. (See Chart VIII at the end of this REVIEW.)—*R. H. Weightman.*

THE TROPICAL STORM OF AUGUST 30–SEPTEMBER 15, 1932

This disturbance was first noted north of the Virgin Islands the evening of August 30, at which time it was of minor intensity. Its center passed a short distance north of Turks Island, West Indies, and moved west-northwestward during the night of September 2–3, while the storm increased to moderate intensity. During the next three days it increased greatly in intensity, passed east of Nassau, Bahamas, the morning of the 5th, moving

northwestward, then recurved to the north and northeast and passed over Great Abaco Island the afternoon of the 5th; with a reported pressure of below 27.50 inches. Great damage was done by the storm on this island; 16 persons were reported killed and about 300 injured. Capt. H. B. Roberts, master of the Government steamer *Priscilla* and a resident of Green Turtle Cay for 40 years declared, according to the Miami (Fla.) Daily News, that the storm was the worst in his memory. He said that two churches, both built of heavy stone walls almost 3 feet in thickness, were demolished, and the wind, estimated by him at over 200 m. p. h., carried some of the heavy stone blocks nearly half a mile. Photographs published in the News indicate that winds in excess of 150 m. p. h. must have prevailed at Green Turtle Cay.

Several vessels were near the hurricane center during the 6th and 7th; the S. S. *Yankee Arrow* at 3:15 a. m. of the 7th, in lat. 29° 24′ N., long. 76° 30′ W., reported a lowest pressure of 27.65 inches and the S. S. *Deer Lodge*, near the same position, reported 27.58 inches at 6 a. m. These vessels, as well as several others, reported shifting winds of force 12. As the storm moved northeastward over the ocean during the next few days it was attended by winds of force 11–12 near its center. The highest velocity reported at a land station in the United States was 56 m. p. h. from the northeast and north during the night of the 8th–9th at Nantucket, Mass.

The storm passed over and south of Newfoundland during the 11th, reached Iceland on the 14th, and passed Jan Mayen Island on the 15th, with central pressure still 29 inches, or lower.

Twice-daily advisory warnings were issued in connection with this storm from August 31 to September 9, inclusive. Northeast storm warnings were ordered displayed from Punta Gorda to Daytona, Fla., at 10 a. m. of the 5th, and north of Daytona to Wilmington, N. C., at 9:30 p. m. of the same date. On the morning of the 6th warnings were extended northward to Cape Hatteras and on the following morning to the Virginia Capes. By the morning of the 7th the storm was moving northeastward more rapidly and northeast warnings were ordered north of the Virginia Capes to Eastport, Me. (See Chart VIII at the end of this REVIEW.)—*C. L. Mitchell.*

THE TROPICAL DISTURBANCE OF SEPTEMBER 9–19

A disturbance of moderate intensity that was first located some distance north of Frontera, Mexico, in the southwestern Gulf of Mexico on September 9, moved very slowly northward for two days, then slowly northeastward for three days, being central about 100 miles south of the mouth of the Mississpipi River on the morning of the 14th. This disturbance moved as far during the ensuing 24 hours as it had in the preceding five days, the center passing into the Atlantic Ocean near Jacksonville, Fla., on the morning of the 15th. It continued to move northeastward, passing inland over the coast of Maine on the 17th, then moved northward and later northwestward, reaching western Hudson Strait on the morning of the 19th. The highest wind velocities reported at land stations were 40 m. p. h. at Hatteras and Atlantic City, and 48 m. p. h. at New York City.

Northeast storm warnings were ordered displayed at 4 p. m. of the 12th from Morgan City, La., to Pensacola, Fla., and east of Pensacola to Cedar Keys at 6 p. m. of the 14th; at 10 p. m. of the 14th northeast warnings were displayed from Savannah, Ga., to the Virginia Capes. They were extended northward to Atlantic City at 10 a. m. of the 15th and to Boston at 4 p. m. of the same date. The next morning they were extended to Eastport, Me. (See Chart VIII at the end of this REVIEW.)—*C. L. Mitchell.*

THE TROPICAL DISTURBANCE OF SEPTEMBER 17–21

Another disturbance of slight to moderate intensity moved north-northeastward over the western Gulf of Mexico during the 18th and 19th and passed inland over the Louisiana coast a short distance west of Morgan City shortly after noon of the 19th. No winds of gale force were reported. The disturbance moved northeastward during the next two days and dissipated over southwestern Pennsylvania during the 21st. The lowest pressure reported was 29.66 inches at Morgan City, La., on the 19th.

Northeast storm warnings were displayed from Corpus Christi to Port Arthur, Tex., at 10 p. m. of the 18th, and southeast warnings on the Louisiana coast at 9:30 a. m. of the 19th. (See Chart VIII at the end of this REVIEW.)—*C. L. Mitchell.*

"SAN CIPRIAN"—HURRICANE OF SEPTEMBER 26–27, 1932

[Weather Bureau Office, San Juan, Puerto Rico]

Trajectory.—With extraordinarily high pressure prevailing over the entire Atlantic and the eastern half of the continent, this storm departed from a normal course and traveled slightly north of west from near St. Barthelemy to Puerto Rico, thence slightly south of west in almost a direct line to the coast of Yucatan south of Belize.

Statistics.—The vortex entered the Island of Puerto Rico near Ceiba at 10 p. m. of September 26, probably directly over the harbor of Ensenada Honda, where the steamers *Jean* and *Acacia* had taken refuge. The former reported 27.70 inches and the latter 28 inches as the low pressure, with a diametric windshift and brief lull. The vortex passed a short distance south of San Juan (28.95 inches at 1 a. m.) and left the island near Aguadilla about 5:30 a. m. of the 27th. The maximum wind velocity at San Juan is estimated at not less than 120 miles per hour. Unfortunately, the wind-instrument tower, an old one already in course of replacement, was blown down at 12:08 a. m., when the record was 66 miles per hour from the northeast. Rainfall was not unusually heavy compared with that during other visitations of this character.

Information.—The first information received at San Juan was from Antigua on the morning of the 26th, indicating that a moderate disturbance had passed there about 3 a. m. The news that St. Barthelemy was near the vortex with a pressure of 29.65 inches and an estimated velocity of 60 to 90 miles per hour was received by mail a week later. Current reports at 8 a. m. of the 26th located the vortex as having passed between St. Kitts and St. Martin. By evening the reports indicated that the vortex was passing between St. Thomas and St. Croix and the following bulletin was issued:

> SEPTEMBER 26, 1932.—Advisory 7 p. m. Storm center passing between St. Thomas (29.58 inches) and St. Croix (29.54 inches) apparently moving west-northwest about 10 miles per hour. Will affect east coast before midnight and remainder of island progressively later. Velocities up to 60 miles per hour reported from both St. Croix and St. Thomas.
>
> (Signed) HARTWELL.

All agencies of the insular government, the naval radio, and WKAQ did heroic work in disseminating the information after the first bulletin was issued, and the loss of life and property damage were materially reduced thereby.

Losses.—Many lives were lost from collapse of buildings which were supposed to be safe; some from flying débris,

some from drowning, the loss from the first cause being by far the greatest. As usual, first reports of loss of life were wildly exaggerated, but it would be difficult to exaggerate the effect of the storm on buildings. Only the heaviest construction of masonry and concrete, with cemented tile roofs, came out of the zone of heavy damage unscathed. Concrete walls with "lean" mixtures or too widely spaced reinforcement and with roofs improperly or poorly anchored were wrecked, in many cases with appalling loss of life. The common corrugated iron roofs, put on with smooth or even twisted nails, were carried off like so much cardboard. This material, put on with bolts and nuts over a properly anchored frame, in many cases remained intact. Casualties were 225 dead and 3,000 more or less injured. Property damage, including crops, will total near $30,000,000. The temporarily homeless were variously estimated from 75,000 up to near a quarter of a million, but these latter figures are somewhat mitigated by the fact that a considerable percentage live in comparatively crude shelters which are quickly replaced. Of crop losses the greatest percentage was citrus, as the citrus belt is almost wholly within the zone of heavy damage. Minor crops were generally a total loss, but they do not represent more than the loss of a single season, whereas citrus and coffee are set back by the loss of much tree growth which will take years to replace. The coffee belt was not all included in the zone of heavy or even moderate damage, but a contributing cause to heavier damage to that industry was the loss of their temporary shade, for which since San Felipe (September 13, 1928) banana plantings had been utilized. Moderate winds will wreck a banana or plantain planting and the heavy stems in falling break the young coffee trees. Sugarcane, in percentage, was probably least injured because, unless actually washed out of the ground by overflow, the canes will continue to grow and will mature. Sugar's greatest damage was to buildings and equipment.

Moderate damage was done on St. Barthelemy, on Tortola, also on St. Thomas and St. John of the United States Virgin Islands. St. Croix reports no damage. Culebra and Vieques, important islands off the east coast of Puerto Rico both suffered heavily; their figures are included in the losses for Puerto Rico.

After passing Puerto Rico, the southern part of Santo Domingo and Haiti felt the storm on the 27th, but no definite reports of losses from these Republics or from Jamaica are available. San Pedro de Macoris (90 miles per hour) and Santo Domingo City (50 miles per hour) give the best idea of intensity in that district.

Shipping.—The Bull Line S. S. *Jean* and the lighthouse tender *Acacia* both dragged their anchors in the harbor of Ensenada Honda near Ceiba and grounded. They were both floated by their own efforts after lightening cargo. One ship in San Juan Harbor had her bridge and boats blown away; the U. S. 3-masted schooner *Gaviota* was wrecked also in San Juan Harbor, and several pier buildings were badly wrecked. Otherwise shipping damage was confined to small craft.

More important storms in Puerto Rican history.—Santa Ana, July 26, 1825; Los Angeles, August 2, 1837; Santa Elena, August 18, 1851; San Narciso, October 29, 1867; San Felipe (1), September 13, 1876; San Ciriaco, August 8, 1899; San Felipe (2), September 13, 1928; San Nicolas, September 10, 1931; San Ciprian, September 26–27, 1932.

Comparative data of damages caused by San Ciriaco, San Felipe, San Nicolas, and San Ciprian storms

	San Ciriaco	San Felipe	San Nicolas	San Cipriaa
Loss of life	3,000	300	2	225.
Lowest barometer (San Juan)	29.23 inches.	28.81 inches.	29.17 inches.	28.95 inches.
Hurricane winds (San Juan)	3 hours	12 hours	2 hours	6 hours.
Maximum wind velocity	75 m. p. h.	150 m. p. h.	90 m. p. h.	120 m. p. h.
Maximum amount of rainfall	23.00 inches [1]	29.00 inches [1]	5.00 inches [1]	16.70 inches [2]
Advance warnings about storm.	19 hours	36 hours	40 hours	18 hours.
Damage to property, crops, etc.	$20,000,000	$50,000,000	$200,000	$30,000,000.

[1] In Adjuntas. [2] In Maricao.

This storm diminished greatly in intensity after leaving Puerto Rico, and no strong winds were reported west of Haiti. After passing inland near Belize, British Honduras, on October 1, the disturbance moved slightly north of west and dissipated near Vera Cruz, Mexico, on October 3.

Advisory warnings in connection with this disturbance were issued by the Washington office twice daily from September 26 to October 1, inclusive. (See Chart VIII at the end of this REVIEW.)—*F. E. Hartwell.*

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RECENT ADDITIONS

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TROPICAL DISTURBANCE OF OCTOBER 7 TO 15, 1932

By R. H. WEIGHTMAN

[Weather Bureau, Washington, D. C.]

A disturbed condition made its appearance over the western Caribbean on the 7th between Swan Island and Cape Gracias and during the next two days moved slightly north of west, with slowly decreasing pressure at the center. It was central on the evening of the 9th a short distance east of Belize, with lowest pressure 29.56 inches. It continued to move slowly westward until the 11th, when it was central near Carmen (Mexico). (See Track No. 10 on Chart VIII at end of this REVIEW.) It then turned more to the northwestward, and on the 14th, 8 a. m., it was located about 200 miles southeast of Brownsville. Storm warnings were hoisted between Brownsville and Corpus Christi following the receipt of 4 p. m. special observations from these stations. Brownsville reported winds shifting from the north to northeast and a fall in barometric pressure of 0.14 inch in three hours. By 8 p. m. of the 14th, however, the winds at Brownsville had backed to northwest, which with other available information placed the center about 150 miles east by south of Brownsville. During the next 12 hours the disturbance advanced northeastward and on the morning of the 15th was located about 120 miles southeast of Galveston. At that time storm warnings were ordered between Galveston and New Orleans and a little later between New Orleans and Apalachicola. The disturbance moved inland across the Louisiana coast during the afternoon of the 15th. While attended by gales no winds of hurriance force were reported at any time during its history.

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THE TROPICAL STORM OF OCTOBER 30–NOVEMBER 13, 1932

By C. L. MITCHELL

[Weather Bureau, Washington, Dec., 1932]

This storm was remarkable not only for its great intensity so late in the hurricane season, but also because of its unusual path during its early history and its moving into the Caribbean Sea at least two weeks later than any other tropical disturbance of hurricane intensity during the last 50 or more years.

The first evidence of this cyclonic circulation was noted on October 30 about 200 miles east of the island of Guadeloupe, West Indies. The disturbance, which was yet of slight intensity, passed over or near Guadeloupe during the 31st. During the next two days its direction of movement was unexpected, and, for this low latitude, unprecedented. Instead of passing westward a short distance south of Puerto Rico, it moved almost directly southwestward, apparently reaching hurricane intensity on November 2, and it was central approximately 75 miles north of Willemstad, Curacao, Dutch West Indies, the morning of that date. The next day its center passed westward about 50 miles north of Punta Gallinas, Colombia, the northernmost point of South America. For three days—November 2 to November 5, inclusive—the disturbance moved very slowly westward with steadily increasing intensity, the steamship *San Simeon* in lat. 14° 30′ N., long. 79° W., reporting a barometer reading of 28.48 inches and a southeast wind of force 12 at 7 a. m. of the 6th, just as the disturbance started to recurve to the north. During the night of the 8th–9th the storm recurved to the northeast and began to move more rapidly, the center passing near Cayman Brac on the early morning of the 9th. Later in the forenoon it passed inland over Cuba near Santa Cruz del Sur and between 1 p. m. and 2 p. m. it passed to sea again near Nuevitas, where a barometer reading of 28.85 inches and an estimated wind velocity of 125 miles per hour were reported. Charts VIII, IX, and X illustrate this storm on the 7th, 9th, and 11th, and show its track up to the latter date.

During the next several days the storm moved almost directly northeastward, and finally merged on the 13th with an extensive disturbance that passed eastward over the Canadian maritime Provinces and Newfoundland during the 12th–13th. At 8 a. m. of the 12th, St. Georges, Bermuda, reported a pressure of 29.38 inches, but it undoubtedly was lower later in the forenoon, when a maximum wind velocity of 88 miles per hour from the north was registered at that place.

The reports of damage caused by this very severe tropical storm are quite incomplete. Press dispatches indicate that some damage resulted along the northern coasts of Venezuela and Colombia and on Providence Island and Cayman Brac in the western Caribbean Sea. On Providence Island 36 houses were reported destroyed and crops ruined, while on Cayman Brac 69 persons were reported killed, hundreds were injured, and the island almost completely devastated.

The storm damage at Santa Cruz del Sur, Cuba, reached the proportions of a major catastrophe. According to the Associated Press the number of deaths reached 2,500 and less than 10 per cent of the town's 4,000 inhabitants escaped unhurt. The survivors stated that the hurricane began about 3 a. m. of the 9th, later driving the sea into the town and "converting it into a great lake," with scarcely a house left standing. Damages are estimated tentatively at several millions of dollars.

The damage on the island of Jamaica was comparatively small, except that there was over a 50 per cent loss to banana trees in some localities.

Advisory warnings were issued twice daily for a period of two weeks, beginning on October 31.

WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

[By the Marine Division, Willis E. Hurd temporarily in charge]

NORTH ATLANTIC OCEAN, NOVEMBER, 1932

By WILLIS E. HURD

Atmospheric pressure.—As indicated by Table 1, the average pressures at the middle latitude centers of anticyclonic action, as shown by Bermuda and Horta, were about normal for November, 1932. The monthly range in pressure, however, exceeded 1 inch at these stations. Along the American coast from Nantucket to Belle Isle the average barometer was from 0.1 to 0.2 inch above the normal, and the European coast from Portugal to the Shetland Islands also gave abnormally high average pressures. At Lerwick the November range exceeded 2 inches.

The Iceland LOW, as indicated by Reykjavik, was a tenth of an inch below normal, and the November pressure extremes at this Iceland station were 30.50 inches on the 15th and 28.39 inches on the 22d.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, November, 1932*

Stations	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Julianehaab, Greenland	29.82	------	30.28	15, 28	29.37	4
Reykjavik, Iceland	29.50	−0.12	30.50	15	28.39	22
Lerwick, Shetland Islands	29.82	+.12	30.75	13	28.63	23
Valencia, Ireland	30.03	+.14	30.49	28	29.66	22
Lisbon, Portugal	30.12	+.08	30.42	26	29.69	16
Madeira	30.04	+.03	30.34	26, 27	29.57	15
Horta, Azores	30.13	.00	30.61	28	29.25	16
Belle Isle, Newfoundland	30.05	+.17	30.46	17	29.32	6
Halifax, Nova Scotia	30.15	+.20	30.78	28	29.54	1, 30
Nantucket	30.15	+.10	30.74	4	29.56	19
Hatteras	30.13	+.02	30.61	4	29.60	9
Bermuda	30.06	−.02	30.42	5	29.30	12
Turks Island	29.93	−.06	30.00	20, 21, 25, 26	29.74	10
Key West	30.01	−.01	30.23	14	29.70	9
New Orleans	30.16	+.06	30.52	28	29.83	10
Cape Gracias, Nicaragua	29.86	−.04	29.98	21	29.48	7

NOTE.—All data based on a. m. observations only with departures compiled from best available normals related to time of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Cyclones and gales.—In northern waters storms, as a rule, ran in higher latitudes than normal for November, as was similarly true in October. Along the northern shipping routes the number of November gales with forces exceeding 8 showed very little if any increase over those of the preceding month, and the weather as a whole may be considered as less stormy than usual so far as it was affected by purely extratropical conditions. In American coastal waters north of the thirtieth parallel the number of gales was somewhat higher than the average for the month, and of these the greater part were due to a storm which first appeared as a shallow depression in the upper Gulf of Mexico on November 24. On the 26th this disturbance entered the Atlantic from South Carolina, attended by gales over the neighboring part of the sea. On the 27th and 28th it was causing fresh to whole gales over a considerable region north and west of Bermuda. On the 29th, central near 35° N., 65° W., it had acquired locally a force of 11, and on the 30th, south of Nova Scotia, similarly high wind forces occurred in its southern quadrants. (See Chart XI.)

Of other storms, specific mention may be made of one which caused gales of force 8 to 11 over a wide field west of the British Isles on the 9th to 11th, and with which one of the tropical cyclones of the month was merged.

Another was a cyclone which, originating on the 22d south of Newfoundland, moved northeastward with increasing intensity, and on the 26th and 27th caused strong gales in British waters.

Tropical hurricanes.—The principal November cyclones of the North Atlantic were of tropical origin, and as their courses ran well into middle latitudes, trans-Atlantic shipping was much more seriously affected by them than by all the storms of extratropical origin.

The disastrous hurricane of the month was that which appeared as a depression east of the Antilles on October 30. In its course nearly across the Caribbean Sea until November 7, its northward swing across central Cuba on the 9th, and its passing of Bermuda on the 12th, it was for the most part a deep and intense cyclone. South of Nova Scotia, after combining partly with the lower extension of a cyclone centered far to the northward, it inclined more to easterly, passed the Azores on the 16th, with low barometer of 29.25 inches at Horta, and on the 19th lay as a depression over Spain.

The principal history of this hurricane, including its disastrous effect upon Cuba, is treated on p. 222 in this REVIEW. Allusion should be made, however, to the experience of the British motorship *Forresbank*, southbound in the Caribbean. She hove to in the teeth of the gale on the morning of the 6th, in 17° N., 81° 11′ W. "This," said the observer, Mr. Cameron, "was the last known position till Wednesday the 9th—17° 22′ N., 79° 25′ W." The lowest barometer reading on this ship was 27.96 inches (uncorrected), at 3 a. m. of the 8th. Vessels close to San Salvador Island on the 10th reported readings close down to 28 inches. Mr. Hagens, observer on the Dutch steamer *Binnendyk*, said that when in the most violent part of the storm on the 10th, "between 8 and 12 a. m. the barometer dropped about 20 millimeters, the largest drop on one watch in this writer's experience."

A pronounced effect of this hurricane was felt in the Canal Zone on November 6. The total wind movement at Balboa Heights, midnight to midnight of that date, was 543 miles, which is a record total for the month for the period 1908–1932. At Cristobal on the 7th the barometer fell to 29.64 inches, which is within 0.01 inch of the record low in 25 years. Ships from the hurricane belt were later reported arriving here in a battered condition.

While this storm was in progress, a second hurricane sprang up in lower middle Atlantic. It was first observed, with moderate gales, on the 3d, central near 15° N., 48° W. By a devious route it cut its way northward against a bank of high pressure, gathering energy. Late on the 7th the American steamer *West Campgaw* reported a northeast gale, force 11, barometer 28.73, near 29° N., 48° W. By the 10th the cyclone had advanced on a northeasterly course to the Azores, attended by hurricane winds in southern quadrants. On the 11th, to the northward, it coalesced with a disturbance of higher latitudes.

Charts VIII, IX, and X, for November 7, 9, and 11, show both of these hurricanes in important stages of their existence. Chart X also shows a development of the extensive northeastern cyclone with which the mid-longitude hurricane of the 3d–10th had just merged.