

If further study shows the storms listed in the table of tornadic winds to be true tornadoes, the 1936 number will be 135 tornadoes, 550 deaths, and property losses exceeding \$26,902,500.

TORNADOES AND PROBABLE TORNADOES

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Number.....	4	3	5	21	21	17	17	12	5	0	1	7	113
Deaths.....	18	0	4	490	13	9	3	2	0	0	0	1	540
Damage ¹	53.5	33.0	1,381.5	23,483.3	504.0	522.9	230.7	170.2	44.8	75.0	158.0	26,656.0	

¹ In thousands of dollars.

TORNADIC WINDS AND POSSIBLE TORNADOES ¹

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Number.....	0	0	3	5	4	7	2	1	0	0	0	0	22
Deaths.....	0	0	0	7	1	2	0	0	0	0	0	0	10
Damage ¹	0	0	50.5	25.8	20.2	124.1	25.0	(²)	0	0	0	0	245.6

¹ Some of these may not be classed as tornadoes in the final study.

² Damage occurred, no estimate obtained.

TROPICAL DISTURBANCES OF 1936

By I. R. TANNEHILL

[Weather Bureau, Washington, January 1937]

During the hurricane season of 1936 (June to November, inclusive), 17 tropical disturbances were charted over the North Atlantic Ocean, including the Caribbean Sea and Gulf of Mexico. This is the second largest number ever recorded in a single season, having been exceeded only by 21 in 1933.

The percentage which reached full hurricane intensity was unusually small in 1936. During the 50-year period, 1887 to 1936, inclusive, slightly more than 50 percent of all tropical disturbances of record were of full hurricane intensity, whereas during 1936 only 5 out of 17, or slightly less than 30 percent, were of known hurricane force. There was only one hurricane out of 6 disturbances in August; during that month more than 70 percent normally are fully developed hurricanes.

A synopsis of the outstanding features of the 17 disturbances of 1936 is given in the appended table.

While the number of disturbances during 1936 was unusually large and many of them were of minor character, it is not believed that the excess is due in any considerable measure to increased facilities for reporting them. In fact there were three disturbed conditions in tropical waters during the 1936 season that have not been listed in the table. The first of these reached the southern coast of Haiti on June 24, causing some loss of life and the grounding of the S. S. *Baron Ogilvy*. There were insufficient re-

ports in this case to show definite cyclonic character. On July 12 and 13, and again on July 21 and 22, there were disturbed conditions in the southwestern Gulf and near Puerto Rico, respectively, which were probably cyclonic but of very mild character. On the whole it must be considered an extraordinarily active season for the genesis of tropical disturbances, but one in which conditions were infrequently favorable for full development.

In respect to another feature, also, the season was an unusual one: From an examination of the accompanying track chart it will be seen that there was a remarkable deficiency of tropical storms in the Caribbean Sea. While it appears that several which crossed the Gulf had their origin in the extreme western Caribbean, the courses of nearly all of the season's disturbances lay wholly, or almost entirely, outside the Caribbean.

Of the five hurricanes, two crossed the coasts of the United States, and one, the great hurricane of mid-September, passed very near the Middle and North Atlantic coast. Loss of life and damage to property during the season were relatively small, however. Warnings and advices which were timely, frequent, and accurate, contributed largely to the preservation of life and property, notably in connection with the September hurricane on the coasts of North Carolina, Virginia, Maryland, Delaware, and New Jersey.

Synopsis of tropical storms 1936 (number of storm in table corresponds with number of track on accompanying chart)

Storm	Date	Place where first reported	Coast lines crossed	Maximum wind velocity reported	Lowest barometer reported	Place of dissipation	Intensity	Remarks
I	June 11-17.....	Bay of Honduras	Mexico, Florida.	Force 9, on 2 steamships.	29.46, S. S. <i>Duquesne</i>	North Atlantic.	Not of hurricane intensity.	Probably crossed Central America from Pacific. A.
II	June 19-21.....	Near Yucatan	Mexico	Force 8. S. S. <i>Cayo Mambi</i> .	29.52, S. S. <i>Cayo Mambi</i> .	Mexico	do	
III	June 26-27.....	Gulf, east of Brownsville.	Texas	80, ¹ WNW., Port Aransas.	29.16, fishing vessel <i>Sea Gull</i>	Southern Texas.	Probably of hurricane intensity.	Property damage \$550,000. A.
IV	July 26-28.....	Near western Cuba.	Louisiana	50, ¹ at Delta Farms, La.	29.62, Delta Farms, La.	Mississippi	Not of hurricane intensity.	B.
V	July 27-Aug. 1..	Southeastern Bahamas.	Florida	90-100, ¹ ENE., Valparaiso, Fla.	28.73, Valparaiso, Fla.	Alabama	Hurricane.	Property damage \$150,000. B.
VI	Aug. 4-9.....	Near 20° N., 60° W.	Newfoundland			North Atlantic	Minor	
VII	Aug. 8-12.....	Gulf, south of Louisiana.	Mexico			Mexico	Not of hurricane intensity.	
VIII	Aug. 15-19.....	Gulf, near Yucatan Channel.	do	Force 9, S. S. <i>Cauto</i>	29.56, S. S. <i>Cauto</i>	do	Doubtful, but near hurricane intensity.	
IX	Aug. 20-22.....	Bahamas	Florida	55, SW., Titusville, Fla.	29.60, Titusville, Fla.	Middle Gulf Coast.	Not of hurricane intensity.	C.
X	Aug. 23-30.....	Near east coast of Yucatan.	Mexico	Force 11, S. S. <i>Cayo Mambi</i> .	29.52, S. S. <i>Cayo Mambi</i>	Mexico	Doubtful but near hurricane intensity.	
XI	Aug. 23-Sept. 5.	Near 17° N., 43° W.	None	Force 12 S. S. <i>West Lashaway</i> .	28.32, S. S. <i>Nike</i>	North Atlantic	Hurricane.	D.
XII	Sept. 7, 8.....	Near 20° N., 55° W.	do			Near 22° N., 65° W.	Minor	

¹ Estimated.

Synopsis of tropical storms 1936 (number of storm in table corresponds with number of track on accompanying chart)—Continued

Storm	Date	Place where first reported	Coast lines crossed	Maximum wind velocity reported	Lowest barometer reported	Place of dissipation	Intensity	Remarks
XIII	Sept. 8-26.....	Near 13° N., 50° W.	Passed near Cape Hatteras.	80, NW., Hatteras.....	23.49, S. S. <i>Limon</i>	North Atlantic..	Hurricane.....	A violent hurricane of large diameter; damage \$1,600,000. D.
XIV	Sept. 11-13.....	Bay of Campeche.	Texas.....	Force 8, S. S. <i>Nemaha</i> ..	29.54, Brownsville.....	Southern Texas.	Not of hurricane intensity.	D.
XV	Sept. 19-24.....	Near 20° N., 62° W.	Nova Scotia.....	Force 12, S. S. <i>Saramacca</i> .	28.94 S. S. <i>Saramacca</i> ..	Nova Scotia.....	Hurricane.....	D.
XVI	Sept. 25-Oct. 1..	East of Florida..	Florida.....	Off New England coast.	Minor.....	
XVII	Oct. 9, 10.....	Bay of Campeche.	Mexico.....	Mexico.....	do.....	

More complete reports in MONTHLY WEATHER REVIEW: (A) June 1936; 64: 204, 205. (B) July 1936; 64: 238, 239. (C) August 1936; 64: 267, 268. (D) September 1936; 64: 297-299

EXTRATROPICAL DISTURBANCE IN LOW LATITUDES OF MID-ATLANTIC, DECEMBER 1936

By JEAN H. GALLENNE

[Marine Division, Weather Bureau, Washington, January 1937]

A disturbed condition, which appeared over the eastern Atlantic near the twenty-fifth meridian at about 30° N., on December 4, pursued an unusual course and attained considerable force on the 7th in mid-Atlantic. The track of the center of this disturbance is given on chart XI. Reports do not clearly show its movement from the 6th to 7th (dotted portion of track), and the center shown by observations on chart X may have been a fresh development. Its subsequent course to the south-southwestward carried it to low latitudes (apparently south of the twentieth parallel) on the 9th, after which it recurved and moved northwestward before dissipating on the 12th.

Pressure attending this disturbance was unusually low for the latitude and season; and the interruption of the trade winds over a considerable area was noted in many vessel weather reports. During this time the Atlantic anticyclone was well developed, but lay north and east of its usual position.

In fact, a ship report of 30.89 inches on December 8 at 44.5° N., 18.2° W. indicates an abnormal development and position of the Atlantic anticyclone. By the time the disturbance had dissipated, the anticyclone had assumed a position farther west than normal, with unusual development—pressure 30.74 inches on December 12.

At the time of the first appearance of the disturbance, observations from a number of ships indicated that barometric pressure over the North Atlantic Ocean in the vicinity of 31° N. and 32° W., was considerably below normal. A fairly well developed cyclonic wind circulation existed at 7 a. m. of the 5th. The Dutch steamship *Venezuela* at 9:32 a. m. (local mean time) of the 5th, when near 31° N. and 37° W., reported wind of force 6 from the west, barometer reading 29.87 inches. Winds of force 8 were also reported from ships in the northerly quadrant of the depression, on that date.

Progressing in a northwesterly direction during the next 24 hours, this disturbance was centered near 33° N. and 35½° W. at 7 a. m. (e. s. t.) of December 6. On the morn-

ing of that day, it appeared to be moving into a low trough which extended to the north-northwestward toward Julianehaab, Greenland; but due to the southwesterly trend of high pressure, which had overspread the northern portion of the Atlantic Ocean, its course was directed more to the westward.

The Italian steamship *Clara* at 9:50 a. m. (local mean time) December 6, when near 33° N. and 33¼° W. reported SSE. winds of force 5, rough sea, barometer reading 29.74 inches. This same vessel subsequently reported that at noon, near 33° N. and 33°40' W., SSE. winds of force 7 were encountered and that the barometer was falling. During the afternoon the wind shifted through S. to SSW., increasing to force 9-10, accompanied by a very high sea. The barometer continued to fall until 4 p. m. The barometric minimum, 29.41 inches (corrected), occurred at that time; the vessel reported her position to be 32°59' N. and 33°58' W.

Fresh to high winds were encountered by several ships near the path of the disturbance during the 6th. On the morning of the 7th, the British motorship *Benedick* at 8:42 a. m. (l. m. t.) when near 32°43' N. and 49°23' W., reported squally weather with NNW. wind of force 9 and a barometer reading of 29.65 inches. High winds accompanied by rain were also experienced on the 7th by vessels near the center of the disturbance at latitude 32° N. and 47° W. (chart X).

The steamship *West Irmo* noted whole gales from the NNE., with barometer reading 29.77 inches, on the morning of the 8th, when near 26° N. and 56° W. At the p. m. observation of the 8th this same vessel when near 24½° N. and 54½° W., reported NE. wind, force 8; barometer 29.74 inches. The disturbance was then moving south-southwestward.

During the period of recurve on December 9 and thereafter until the disturbance dissipated on the 12th near 25° N., 53° W., ships' reports do not indicate that there were any winds of gale force.