

TABLE 2.—Average height of clouds as determined by pilot-balloon observations, September 1937 to June 1938, inclusive

Cloud Type	Spring		Summer <sup>1</sup>		Autumn		Winter		Annual	
	Average height	Number observations	Average height	Number observations	Average height	Number observations	Average height	Number observations	Average height	Number observations
Cl.....			5,677	1	5,227	2			5,377	3
Cs.....	4,095	9	5,317	2	3,877	1			4,282	12
As.....	2,435	4	3,187	6	3,157	2	2,257	4	2,763	16
Ac.....	2,437	1			2,317	3			2,347	4
Sc.....	1,311	13	1,165	9	1,065	5	1,054	3	1,201	30
St.....	1,115	9	804	2	1,378	4	1,033	11	1,097	26

<sup>1</sup> Month of June 1938, only.

## TROPICAL DISTURBANCES OF OCTOBER 1939

By WILLIS E. HURD

[Weather Bureau, Washington, November 1939]

*Hurricane of October 12-18, 1939.*—The fourth tropical disturbance of 1939, that of October 12-18, unlike its predecessors of June, August, and September, which were of light to moderate character, was a hurricane of fully developed intensity. It originated to the eastward of the Antilles, and its preliminary signs were evidenced by unsettled weather and somewhat depressed barometer, with light winds, over the Leeward Islands during the afternoon of the 9th. From the 9th to the 12th there was but little change in the situation, except for a slight fall in barometer over the Leewards. By the morning of the 13th, cyclonic circulation appeared to be developing northeast of Puerto Rico, with winds of force 5-6 reported by ships south and west of the center which, at 7 a. m. (E. S. T.) was in approximately 21° N., 66° W. The lowest known barometer at the time was 1,005 millibars (29.68 inches), wind west, force 5, reported by a ship near 19° N., 65° W. Thereafter development of the disturbance was much more rapid, and it moved, first in a north-northwesterly direction, then north-northeast past Bermuda on the 16th, until its identity was lost on the 18th east of northern Newfoundland.

By 7 a. m. (E. S. T.) of the 14th, although there were no ships' observations to the near eastward of the center, winds in other quadrants of the disturbance denoted the establishment of a cyclonic circulation. The American steamer *Argentina*, near 25° N., 68° W., at that time, gave a barometer of 1,001 millibars (29.56 inches), wind east-northeast, force 6. At local noon of the 14th the Panaman motorship *Permian*, in 22°43' N., 69°33' W., reported the earliest known gale, a northwest wind of force 7, barometer 1,001.7 millibars (29.58 inches), observed in connection with the cyclone. Squally weather continued over a wide area throughout the day, with highest winds reported as of force 7, lowest barometers about 999 millibars (29.50 inches).

During the night of the 14th-15th, or very early on the 15th, rapid intensification set in. A report received by mail from the American steamship *F. W. Abrams* shows that at 1:50 a. m., local time of the 15th, the barometer on ship had fallen to 988.5 millibars (29.19 inches) in 26°54' N., 66°18' W., with wind east, force 8. At 7:50 a. m., local time, in 26°36' N., 66°48' W., the wind was a hurricane from the east, with barometer down to 941.4 millibars (27.80 inches), the lowest pressure observed

during the course of the storm. The center at 7 a. m. (E. S. T.) of that date was close to 27° N., 67° W. High winds covered a wide extent of the sea during the local forenoon hours of the 15th. At 2 a. m. the southbound American steamship *Borinquen* in 28°00' N., 65°30' W., had a barometer of 969.5 millibars (28.63 inches), with northwest winds, force 10. Between about 10 a. m. and 2 p. m. the ship encountered southwesterly gales of hurricane force, with rising barometer. Considerably to the northwestward, the Dutch steamship *Telamon*, near 29° N., 69° W., had a northeasterly gale of force 10 during the midday hours, and at local noon the American steamship *Ponce* had a force-8 gale in 32°30' N., 71°45' W. During the afternoon the Dutch southbound steamship *Bacchus* experienced gales of force 10 to 12 from north to northeast, lowest barometer 993.9 millibars (29.35 inches) at 5 p. m. near 30° N., 68° W. In the same position, during the early morning hours of the 16th until about 6 a. m., the winds at the ship continued at force 11 from north-northeast. The cyclone center at that time was a short distance south of Bermuda.

From early morning on the 14th, the hurricane, which until then had been pursuing a generally north-northwesterly course, began curving into a north-northeasterly direction, under the influence of a strong anticyclone that was pressing seaward with crest over the Middle Atlantic States. It was during this recurve that the storm rapidly entered its hurricane stage.

For the 16th ship reports are lacking from near the center of the hurricane and, except for the force-11 gale experienced in the early morning by the *Bacchus*, no other vessel reported a wind higher than force 9. This was in 36°22' N., 66°55' W., lowest barometer 1,003 millibars (29.62 inches), read on the Dutch steamer *Hermes*. At greater distances north and west of the storm center, there were moderate to fresh gales.

Press reports from Bermuda show the islands to have been swept by hurricane winds for several hours during the afternoon of the 16th, with a maximum velocity of 131 miles an hour from the north at 6:40 p. m., as the center of the hurricane passed close to the eastward. Here considerable damage was done to trees, boats, houses, and public utilities.

During the greater part of the 17th the hurricane continued on a north-northeasterly course, with the center

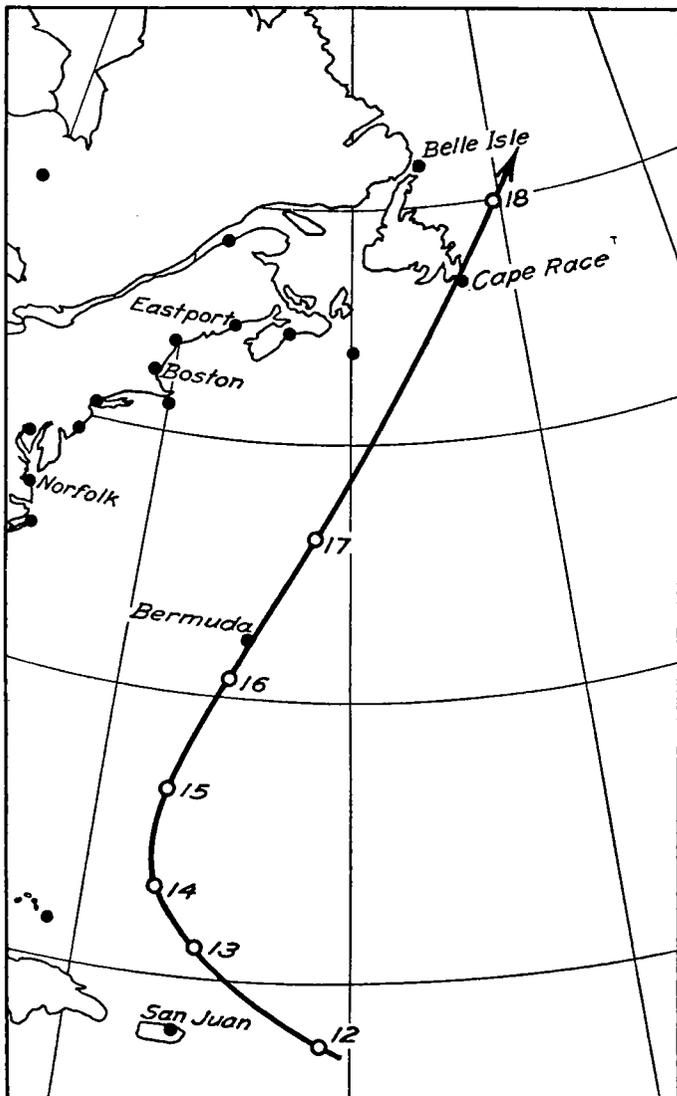


FIGURE 1.—Approximate track of the North Atlantic hurricane of October 12-18, 1939. The circles show closely the positions of the storm center at 7 a. m. (E. S. T.) on the dates given.

at 7 a. m. (E. S. T.) at approximately  $36^{\circ}$  to  $37^{\circ}$  N.,  $61^{\circ}$  W. Several ships were heavily involved. The Dutch steamship *Palembang* in  $35^{\circ}24'$  N.,  $58^{\circ}21'$  W., had lowest barometer 991.6 millibars (29.28 inches), with a south-southeast gale of force 10. About 6 hours later the wind at ship had changed to southwest, force 11. Early in the afternoon on a westerly course, she had passed to the southward of the storm center. The Dutch steamship *Ulysses*, somewhat closer to the center, had a south-southwest wind of force 11, barometer 966.8 millibars (28.55 inches), at 6 a. m., local time, in  $36^{\circ}37'$  N.,  $60^{\circ}02'$  W. At 10 a. m., the wind had arisen to force 12 from the west, with rising pressure. A report from the Belgian steamship *Indier* noted dense fog from 9 a. m. until 3 p. m. This vessel had lowest barometer 986.8 millibars (29.14 inches), with hurricane wind from the north, at local noon of the 17th, in  $41^{\circ}34'$  N.,  $61^{\circ}12'$  W.

To the eastward of the *Indier*, on the 17th, the American steamship *Acadia* was very close to the storm center at 4 p. m., with lowest barometer 961.7 millibars (28.40 inches), wind northwest, force 12, near  $42^{\circ}$  N.,  $59^{\circ}$  W. For several hours thereafter this westbound vessel, hove to, continued in the grip of full hurricane winds.

At 7 p. m. (E. S. T.) of the 17th the hurricane center was very close to  $44^{\circ}$  N.,  $56^{\circ}$  W., as indicated by the report from an unnamed ship near  $42^{\circ}$  N.,  $56\frac{1}{2}^{\circ}$  W., with a barometer of 954 millibars (28.17 inches), and a hurricane wind from south-southwest. Storm to hurricane winds were met by several ships within the region  $40^{\circ}$ - $45^{\circ}$  N.  $50^{\circ}$ - $60^{\circ}$  W.

Late on the night of the 17th the American liner *President Harding*, westbound for New York, encountered such heavy weather about 300 miles south of St. Johns, Newfoundland, according to press reports, that one of her crew was drowned and 73 of her passengers and crew received serious to minor injuries, necessitating an emergency call for medical supplies. These supplies were received from the Coast Guard Cutter *Hamilton* during the 18th. Some damage was done to the ship, as well as to other vessels, due to heavy winds and seas.

During the night of the 17th-18th the center continued in a north-northeasterly direction. In the early morning of the 18th it lay east of Newfoundland, still of great intensity, as shown by the report of the steamship *American Shipper*. At 4 a. m., local time, this vessel, in  $47^{\circ}55'$  N.,  $50^{\circ}59'$  W., had a low barometer of 953.3 millibars (28.15 inches), with a south wind of force 11, changing, 2 hours later, to a southwest wind of force 12. The Belgian steamship *Kasongo*, at 2 a. m., had a hurricane wind from the south much farther to the eastward, in  $45^{\circ}35'$  N.,  $47^{\circ}30'$  W., but with much higher barometer.

The storm center at 7 a. m. (E. S. T.) of the 18th was located close to  $50^{\circ}$  N.,  $50^{\circ}$  W. There is no certainty as to its later movements or intensity owing to lack of reports, due to the war situation.

Figure 1 shows the approximate track of the storm, which may be subject to revision if later information warrants.

From the beginning of the disturbance as an area of unsettled weather late on the 9th in the Leeward Islands until early on the 13th when the low center lay northeast of Puerto Rico, advisories were issued frequently from the forecast center at San Juan, P. R. Thereafter until the 16th, advisories were continued from the forecast center at Jacksonville, Fla., and on the 17th, from Washington, D. C.

*Disturbance of October 27-November 6.*—Late in October disturbed conditions developed in the southwestern Caribbean Sea. The disturbance moved northward to the vicinity of Swan Island on the 29th. On the 30th it took an east-northeasterly direction, crossing Grand Cayman Island, where hurricane intensity was developed on the 31st, then passed between Jamaica and Cuba during November 1-3. Considerable damage was done in Jamaica due to wind and heavy rains. A complete account of the cyclone will be reserved for the November issue of the REVIEW, pending further receipts of ships' reports.