

YEAR 1890

Four storms were found to have occurred in 1890. Tracks for these storms are presented in Fig. 3.

Storm 1, 1890 (May 27-29), T. S.

This is a new storm case which was recently documented by the author of this study. The following information was used in documenting this storm: 1) Perturbation about the end of May 1890 affected the entire island of Cuba (Martinez-Fortun, 1942). 2) May 28-29, 1890. Cyclonic perturbation which formed over the eastern portion of the Gulf (of Mexico) produced such rains that produced immense flooding and overflow. The worst was felt from Havana eastward. There was great damage associated with collapsing buildings, landslides and flooding and, in addition, a good number of persons were drowned. Boats and life-saving devices were sent from Havana to some towns in the interior of the island. An entire family was picked up from a house which was being steered by the current, and saved. Firemen, sailors and civil guards were sent from Havana to the interior of the island to provide help; a good number of these helpers lost their lives (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza, which is included in Sarasola (1928). 3) Havana, May 29. All telegraphic communications and nearly all railway traffic have been interrupted by floods from excessive rains. The weather continuous threatening. The barometer registers 756 millimeters (29.76 inches). The amount of rain which has fallen during the past 36 hours is 345 millimeters (13.58 inches), an amount unprecedented at Havana in the same length of time. The center of the disturbance is now N.W. of the island. The villages of Calabazar, Chorrera, Rincon, San Antonio and Puentes Grandes are partly inundated. Due to the capsizing of a boat today, three sailors and a fireman were drowned (The New York Times, May 30, 1890, p.1, col.4). Author's note: A much shorter version of this dispatch was published in The Times (London), May 31, 1890, p.7, col.4). 4) New Orleans, Jun. 3. The Picayune's Havana special said that since Saturday May 17 when the rainy season commenced, frequent heavy showers which were beneficial to growing crops have fallen and the country around Havana presented a beautiful appearance until May 27. The first rains, however, were followed by decided signs of the cyclonic season, which were accompanied by the heaviest fall of rain in many years continuing without cessation until May 30 and doing an immense amount of damage throughout the city and vicinity. The trainroads were submerged and bridges carried away, interrupting communications E. and W. These have been the most disastrous rains that had ever visited Cuba, damages being estimated in millions of dollars (The New York Times, Jun. 4, 1890, p.1, col.4). 5) The steamer "Catalonia", which arrived at Queenstown (Ireland) last evening from Boston, brings intelligence of the foundering of the steamer "Mountain Girl" during a fierce gale in the Gulf of Mexico on May 29 and the loss of two of her crew. The ill-fated steamer was proceeding to Ertez from New Orleans (The Times, London, Jun. 11, 1890, p.5, col.5). 6) A

telegram from New Orleans states that the British barque "Bruce", from Fleetwood, timber laden, has returned to Ship Island, having sprung a leak and with sails split, etc. (The Times, London, May 31, 1890, p.8, col.6). 7) The Norwegian vessel "Norge", from Buenos Aires to Ship Island, has been totally lost at Cayo Cantiles. Crew saved (The Times, London, Jun. 10, 1890, p.10, col.6). Author's note: Cayo Cantiles is a small key off the southern coast of Cuba, which is located about 30 miles to the east of Isle of Pines. This event is likely to have been related to the storm but such a thing cannot be definitively stated. 8) The British barque "E. Sutton", from Manzanillo to Boston, has been totally lost at Holandes Point, Cuba (The Times, London, Jun. 10, 1890, p.10, col.6). Author's note: Holandes Point is located on the southern coast of Cuba, just to the east of the western tip of that island. Although this event is likely to have been related to the storm, such a thing cannot be definitively stated. 9) A slight disturbance developed on the middle Atlantic coast on May 27, within the limits of a trough of low pressure which extended from Florida to northern New York. It apparently passed off the middle Atlantic coast to the northeastward, increasing greatly in energy as it approached Nova Scotia. Strong N. and W. gales occurred on the New England coast on May 28 and marine reports indicate that this storm continued to increase in energy as it approached the Newfoundland coast on May 30-31 (Monthly Weather Review, May 1890). Author's note: Although this storm was not directly linked to the storm in the Gulf of Mexico, the latter seems to have developed at the southern end of the same trough. 10) The steamer "Santiago" arrived yesterday from Cuba and Nassau, making a remarkably quick run from the latter port. Although for a large part of the way she experienced heavy N.E. gales, she made the distance in 3 days, 6 hours and 30 minutes. This is 30 minutes better than the previous record (The New York Times, May 31, 1890, p.8, col.1). Author's note: It is not clear whether these gales were related to the storm near Cuba and over the Gulf of Mexico or to the extratropical one described in item 9), or to both of them. 11) Some maximum winds reported at Florida: Titusville, S.E. 38 mph on May 26; Jupiter, S.E. 29 mph on May 29 (Monthly Weather Review, May 1890). Author's note: The Titusville wind was probably associated with the storm which developed on the middle Atlantic coast on May 27 (item 9).

In spite of that the information contained in the above items precludes the determination of a track with a high degree of confidence, the author of this study has attempted to depict the storm evolution by establishing an approximate northwest to northward course over western Cuba into the Gulf of Mexico. Taken into account that worst effects of this system were felt from Havana eastward (item 2) and that rainfall in excess of 13 inches fell at Havana over 36 hours ending on May 29 (item 3), the author's first position for the storm was one corresponding to 7 A.M. May 27, which he roughly estimated to have been near 20.5 degrees N., 83.0 degrees W. The author's track then brought the central region of the system over western Cuba and placed it just off the northwestern coast of Pinar del Rio province, roughly near 23.0 degrees N., 84.0 degrees W. at 7 A.M. May 28, the first day mentioned in item 2) as the storm to have formed in the Gulf of

Mexico. The author's position for 7 A.M. May 29 was estimated to have been near 24.7 degrees N., 84.5 degrees W. and was primarily based on the May 29 location of the storm to the N.W. of Cuba (very likely to the N.W. of Havana) given in item 3) and, to a lesser extent, on the S.E. 29 mph wind reported at Jupiter on the same day (item 10). The track for the storm is displayed in Fig. 3.

The tropical storm status that the author of this study decided to attribute to Storm 1, 1890 was based on information pertaining to the foundering of the steamer "Mountain Girl" during a fierce gale in the Gulf of Mexico on May 29 (item 5). As no strong winds were reported from Cuba, intensification to tropical storm status was likely to have occurred over the S.E. Gulf of Mexico late late on May 28 or on May 29.

Storm 2, 1890 (Aug. 18-27), T. S.

This is a new case which was recently documented by the author of this study. Documentation of this case was based on the following information: 1) The ship "Smeaton Tower" arrived yesterday from San Juan, Puerto Rico, with the captain and 7 of the crew of the bark "Aspatogan" which was bound to New York from Port of Spain (Trinidad) with a cargo of asphalt. The bark encountered very heavy weather about Aug. 18 and began to leak. They kept her afloat until Aug. 21 when she foundered with 12 feet of water on her hold, about 35 miles S.E. of Ponce. They got ashore on boats and were picked up by the "Smeaton Tower" (The New York Times, Sept. 11, 1890, p.8, col.7). 2) A cyclone passing to the S. of Cuba affected the entire island from Aug. 22 to Aug. 25, 1890 (Martinez-Fortun, 1942). 3) Aug. 22-25, 1890. A moderate cyclone passed to the S. of the island of Cuba, causing copious showers and moderate winds along the island, from Santa Clara to Pinar del Rio. It was rather beneficial. (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza, which is included in Sarasola (1928). 4) In the evening of Aug. 23, a dispatch from Havana, Cuba, stated that there was a moderate cyclonic disturbance, with heavy rain, southeast of that place. On Aug. 24, a dispatch from Havana stated that a disturbance was S.W. of that place, increasing in energy. A dispatch dated Havana, Cuba, Aug. 25, 7:35 P.M., indicated that the disturbance was to the W. (of the city), probably moving W.N.W. and, on Aug. 26 a dispatch from Havana stated that there was a disturbance far W. by N., resembling a moderately large diameter cyclone, which will probably recurve near Texas (Monthly Weather Review, Aug. 1890). Author's note: In addition, The New York Times, Aug. 26, 1890, p.5, col.5. published a dispatch from Havana, Aug. 25 indicating that a cyclonic disturbance west of the island (Cuba) was reported. Although it was not specifically stated, Father Benito Vines, S.J., director of the Belen College Observatory, should have been the source of all dispatches coming from Havana. 5) On the morning of Aug. 27 the storm referred to in the dispatches from Havana was well-defined over the northwestern Gulf, and during that day it advanced over the lower Mississippi Valley (Monthly Weather Review, Aug. 1890). 6) The maximum wind reported at Port Eads, La., was S. 48 mph on Aug. 27 (Monthly Weather Review, Aug. 1890).

Based on information contained in the above items, the author of this study produced an approximate track for this storm. The author's track was started on Aug. 18 with an estimated 7 A.M. position near 14.0 degrees N., 62.0 degrees W. which was based on information in item 1); it should be mentioned that the author's confidence in this position was rather low, not that much about the longitude but particularly in terms of the latitude. Author's 7 A.M. positions for the period Aug. 19-21 were estimated primarily on the basis of space-time continuity between the first position and the one for 7 A.M. Aug. 22; these positions were as follows: Aug. 19, 14.7 degrees N., 65.5 degrees W; Aug. 20, 15.3 degrees N., 69.0 degrees W.; Aug. 21, 15.7 degrees N., 72.5 degrees W. The author's 7 A.M. Aug. 22 position estimate was near 16.5 degrees N., 76.5 degrees W. and was based on statements that the storm passed to the S. of Cuba over the period Aug. 22-25 (items 2 and 3). Author's 7 A.M. position estimates for the period Aug. 23-26 were primarily based on Havana dispatches contained in item 4) and, to a lesser extent, on space-time continuity and on information in items 2) and 3); these positions estimates were as follows: Aug. 23, 17.5 degrees N., 80.0 degrees W; Aug. 24, 19.0 degrees N., 83.3 degrees W.; Aug. 25, 21.5 degrees N., 86.7 degrees W.; Aug. 26, 24.0 degrees N., 90.0 degrees W. The author's 7 A.M. Aug. 27 position estimate was near 28.0 N., 92.0 degrees W. and was based on information contained in item 5). The author's track for this storm is shown in Fig. 3.

The maximum wind reported in connection with the storm was 48 mph at Port Eads on Aug. 27 (item 6) and, therefore, it was found to fully justify tropical storm intensity associated with this weather system. However, the fact that the words "cyclone" (item 2) and "moderate cyclone" (item 3) were used in reference to the storm while passing to the south of Cuba provided some hints of possible hurricane intensity. The author of this study was unable to check such intensity and decided to attribute only a tropical storm status to Storm 2, 1890.

Storm 3, 1890 (Aug. 26- Sept. 3), H.

This case corresponds to Storm 1, 1890 in Neumann et al. (1993).

The following information was found about this storm: 1) Storm of Aug. 26- Sept. 4, 1890. Leeward Islands, Atlantic (Tannehill, 1938). Author's note: The storm actually passed a good distance N.E. of the Leeward Islands. 2) Steamship "Haytian" Aug. 26, noon, lat. 24 52 N., long. 54 45 W., moderate E.S.E. breeze, cloudy, squally, dirty weather, and wind increasing in the afternoon. Aug. 27, noon, lat. 22 18 N., long. 58 35 W., squally E. wind, dull weather, falling barometer, heavy rain and high sea; in the afternoon and the evening hard gale and high sea, terrific squalls, wind and rain, blinding lightning from west and southward; stopped engines and hove ship on starboard tack, heading N.N.E.; at midnight, gale with terrific squalls. Aug. 28, noon, lat. 22 55 N., long. 59 34 W., wind E., strong, and heavy easterly swell (Monthly Weather Review, Aug. 1890). 3) Mr. Joseph Ridgway Jr., the observer at St. Thomas, reported that on Aug. 26 and 27 there were

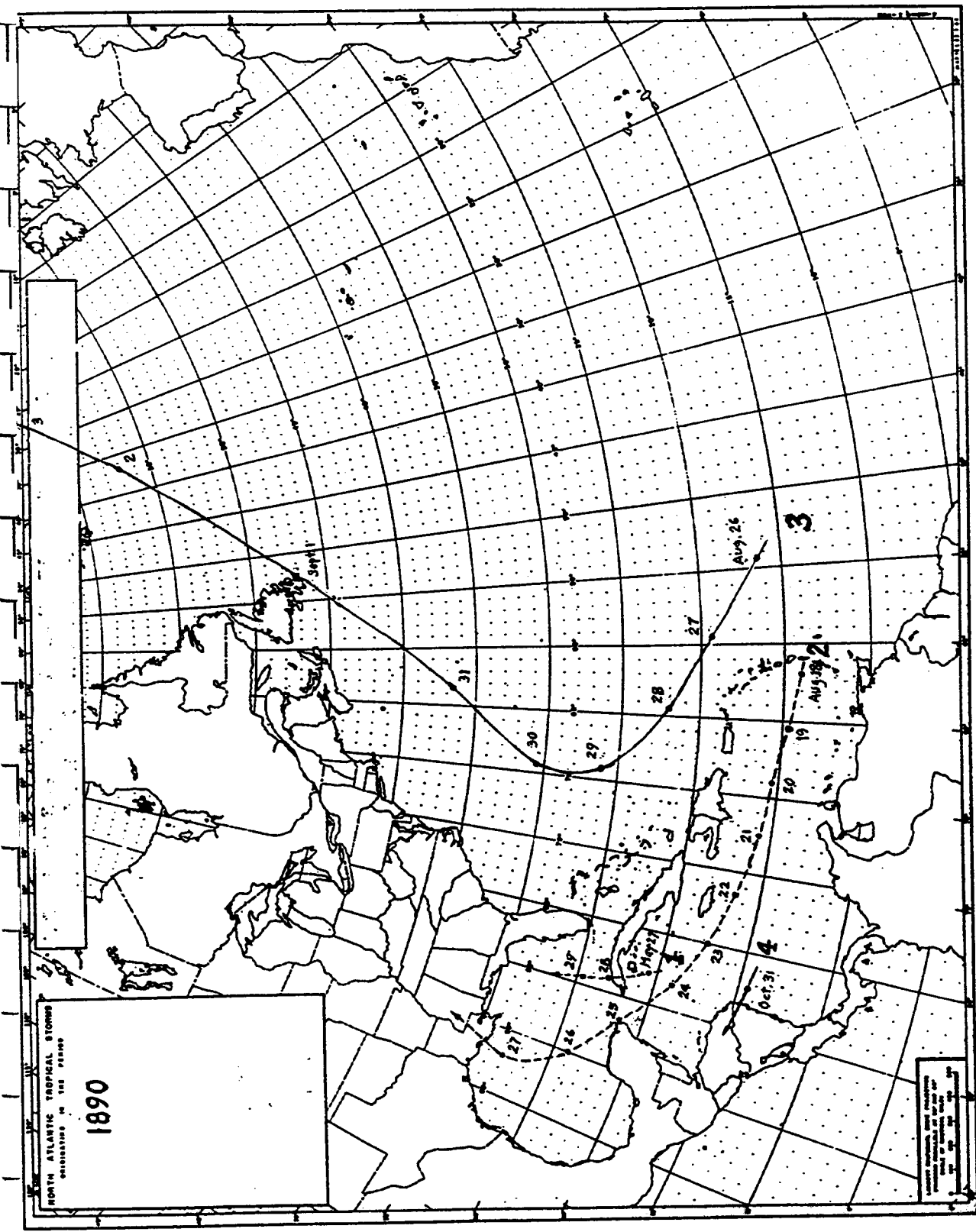


Fig. 3.

indications of a cyclone in the neighborhood of St. Thomas. The barometer (aneroid) fell to 29.89 inches. The wind shifted from N.E. to N.W. and W., with strong puffs from the N.E. The tide was higher than usual and there was a southerly swell. The barometer did not rise to its usual position until midnight Aug. 27-28 (Monthly Weather Review, Aug. 1890). Author's note: The wind and pressure behavior indicated that the cyclone passed to the N.E. of St. Thomas. Therefore, the southerly swell reported by the observer appears to be in error. 4) Steamship "Alliance", from Newport News, arrived at St. Thomas at 11 P.M. Aug. 28 and reported having encountered heavy seas from E. and S.E., lowest barometer 29.90 inches (Monthly Weather Review, Aug. 1890). Author's note: This information was furnished to the Signal Service by Mr. Ridgway, observer at St. Thomas. 5) The "Portuense" was sunk in a hurricane on Aug. 28 about 250 miles N.E. from Anegada Island, and the captain and 9 of crew were lost; the balance of the crew reached Tortola Island in the ship's life boat. The "Portuense" foundered in about lat. 21 N., long. 63 W. shortly after 6:30 A.M. Aug. 28; between 2 and 3 A.M. a fearful N.E. hurricane raged and the barometer was reported 28.50 inches; shortly after the ship foundered, the wind went to S.S.E. (Monthly Weather Review, Aug. 1890). Author's note: Information about the "Portuense" was also furnished by Mr. Ridgway. 6) The barkentine "Onalaska", Aug. 28, 8 A.M. lat. 24 N., long. 62 20 W., had hard gale from E.S.E. with terrific sea running from S.E. and S.; the barometer which had been standing at 30.30 inches fell to 29.70 inches. Hove to head to S. and so remained 10 hours; the hurricane evidently passed to the S.W. (Monthly Weather Review, Aug. 1890). 7) Albury's Park, N.J., Aug. 29. The ocean worked great damage here this afternoon and evening to the famous board walk along the beach. This afternoon the sea began pounding at the bulk heads under the walk. At a late hour tonight the waves were still surging in and out under the ocean plaza and weakening everyting (The New York Times, Aug. 30, 1890, p.5, col.5). Author's note: These sea conditions were found to have occurred on the New Jersey coast when the hurricane was at the great distance of over 600 miles from the coast. 8) The "Bermuda" brought the captain and crew of the schooner "Lion of the Runnenburg", after having picked them up 650 miles E. of Florida (lat. 29 N., long. 69 W.) last Wednesday morning (Sept. 3). Capt. Peters of the schooner said that they had an uneventful time (going from Kingston, Aug. 15 to Halifax) until about noon Aug. 29 when the barometer began to drop and signs of a big hurricane came out from the S.E. At 5 o'clock the vessel hove to and 2 hours later the wind had so increased that the boltrope was torn out of the double reefed foresail. The wind and rain were both terrific and at 3 A.M. (Aug. 30) a tremendous sea boarded the vessel knocking her on her beam ends, breaking off her bowsprit and cutwater and wrecking her whole stern. By early afternoon the wind and sea went down. Then they started the pumps to work until they were picked up by the "Bermuda" (The New York Times, Sept. 7, 1890, p.14, col.6). 9) Bark "Beatrice" (from New York Aug. 11 to Port-au-Prince, Haiti) met the cyclone and was dismasted. Brig "Allie Clifford" rescued the crew just before the "Beatrice" foundered and brought them to Fernandina, Fl. (The New York Times, Sept. 16, 1890, p.8, col.6).

10) On Aug. 30, the brig "Abbie Clifford" was wrecked, with lost of life, in about lat. 30 N., long. 67 W. (Monthly Weather Review, Aug. 1890). Author's note: The name of the wrecked vessel might be erroneous, provided that the brig "Allie Clifford", which rescued the crew of the "Beatrice" (item 9), and the "Abbie Clifford" are the same vessel and that the apparent name difference just reflects a typographic error. If this were the case, the wrecked vessel would have been the "Beatrice". 11) The steamer "Orinoco" arrived from Bermuda. The vessel left here on Aug. 28 and experienced good weather until Saturday morning (Aug. 30). At 9 P.M. the barometer began to fall rapidly until getting down to 29.20 inches. The gale broke about 11 P.M. and the sea began to run mountain high before the wind that blew 70 mph. All this happened about 200 miles N.W. from Bermuda. The passengers next morning had to stay in their berths until the sailors bailed out the 6 inches of water that had accumulated on the stateroom and cabin floors (The New York Times, Sept. 8, 1890, p.8, col.7). Author's note: A second report about the "Orinoco" was published in the Monthly Weather Review, Aug. 1890. This second report stated that the vessel was struck by the hurricane at 2 A.M. Aug. 31 about 100 miles N.W. of Bermuda. The wind came from about S.S.E. and terrific seas swept over the "Orinoco". The barometer stood at 29.20 inches until 4 A.M., when it began to rise and at 10 A.M. the wind was S.W. 12) The steamer "Mount Tabot" was struck by the hurricane of Aug. 31, coming from Gibraltar and India, and was caught in its fury for about 10 hours (The New York Times, Sept. 8, 1890, p.8, col. 7). 13) Terrific storms of hurricane force intensity were encountered during Aug. 31 along the steamship routes south of Nova Scotia (Monthly Weather Review, Aug. 1890). 14) Ship "Glencaird", from Liverpool, was roughly handled in the hurricane of Aug. 31 and Sept. 1 and arrived here this morning in fair condition. Ship "Habitant", from Bristol, and bark "Highlands" of St. John, N. Brunswick, were also caught in the same gale (The New York Times, Sept. 13, 1890, p.5, col.4). 15) Steamer "La Normandie" spoke ship "Challenger" Sunday afternoon (Sept. 14) about 3 P.M. The captain informed that the ship (from England, Jul. 29 to New York) was struck by the storm with scarcely a moment's warning in the morning of Sept. 1. A blow came that tore the masts, bowsprit and all the standing rigging and threw the ship on her beam ends. Twelve men were carried into the sea and lost. The remaining crew got up two small sails and two staysails and managed to ride out the hurricane. They made about 3 knots from then and were off George's Shoals about 250 miles off Sandy Hook when sighted by the "La Normandie" (The New York Times, Sept. 16, 1890, p.8, col.6). 16) The storm lasted for 9 days. It was first observed at lat. 16 N., long. 54 W. on Aug. 26 and was last observed at lat. 67 N., long. 12 W. A track for the storm is shown on a map corresponding to Aug. cyclones (Mitchell, 1924).

The track for this storm, which is shown in Neumann et al. (1993) as for Storm 1, 1890, was found to be supported, in general, by the information contained in the above items. Therefore, the author of this study accepted such a track without any modification and reproduced it as for Storm 3, 1890 in Fig. 3.

Information contained in several of the above items fully supported the hurricane status that Neumann et al. (1993)

attributed to it as for Storm 1, 1890. The lowest barometer reading of 28.50 inches, which was reported to have occurred on board the "Portuense" (outside the eye of the storm) before the vessel sank on Aug. 28 (item 5), showed that the tempest was, in fact, a major hurricane.

Storm 4, 1890 (Oct. 31), H.

This is a new storm case which was recently documented by the author of this study. The following information was used to document this storm: 1) New Orleans, Nov. 12. The steamship "Gussie" which was reported lost during the storm off the Nicaraguan coast on Oct. 31 arrived at her mooring here today uninjured except for the loss of her smokestack, which was carried away by a 90 mph wind. The main cable then parted and the ship drifted over the Cape Gracias bar and settled on the sand flat inside. The cargo of fruit and rubber was thrown overboard next morning and a stack improvised from some corrugated iron debris found in the town of Cape Gracias. The vessel was worked off the flat and steamed to this city. Capt. Brown, a seaman of 33 years experience, pronounced the storm as one of the severest ever experienced in those latitudes and praised the discipline of his crew and the self-possession of the 8 passengers (The New York Times, Nov. 13, 1890, p. 2, col.4).

The information above clearly indicated that this storm reached hurricane intensity. No track could be definitively established from this information alone. However, as no mention of it is made in the catalogs of Cuban hurricanes (Sarasola, 1928; Martinez-Fortun, 1942), the author believes that the hurricane did not affect Cuba at all and should have pursued a westward course, passing into Central America just to the south of Cape Gracias a Dios, Nicaragua. This is reflected in the one-day, suggested track which the author has prepared. His storm position estimate for 7 A.M. Oct. 31 was roughly near 14.5 degrees N., 82.3 degrees W. and the track is shown in Fig. 3.

Special statement.

In addition to the storms fully discussed above, several other possible cases were found for 1890. Available information related to such cases was, of course, insufficient to determine the tropical nature of the cases and/or their evolution. Three of these cases are presented next.

A) Case of Oct. 2, 1890.

This possible case was identified by using the following information: 1) The steamship "Don" brought the captain and crew of brigantine "Lily". The "Lily" left Cardiff on Aug. 15 for La Guayra (Venezuela). On her arrival in the West Indies she encountered heavy tropical gales and about 11 P.M. on Oct. 2, with the weather very gusty and dark, she ran on Blanquilla Island (which is off the Venezuelan coast) and broke up. On Oct. 6, the captain decided to ask for help and sent off two crew in a 15 ft. boat they had recovered from the wreck. On Oct. 9, they reached La Guayra after a passage which involved much peril because frequent heavy squalls

were experienced. A sloop was sent to Blanquilla and the rest of the crew was rescued. All were sent to Barbados on the steamer "Aden" (The Times, London, Nov. 6, 1890, p.6, col.4). Author's note: The crew of barkentine "Anita" was also on the "Don". The "Anita" sailed from Genoa to Maracaibo (Venezuela) on Jun. 3, encountered heavy weather, sprung a leak and, when about 250 miles from her destination, had to be abandoned. It seems very likely that the weather encountered by the "Anita" was unrelated to the event involving the "Lily" and it is possible that the "Anita" encountered Storm 2, 1890.

As it is not clear if the weather affecting the "Lily" when she was wrecked on Blanquilla during the night of Oct. 2 was related to a tropical cyclone or to other type of disturbance, such as an Intertropical Convergence Zone disturbance, the author of this study decided to keep this system as a possible case.

B) Case of Oct. 21-26, 1890.

The following information was found about this possible case:

1) The more southern disturbance of a continental, complex low pressure system moved southward over eastern Texas to the W. Gulf where it was centered on the morning of Oct. 21. It changed direction to the N.E. near to and S. of Galveston and passed to the E. Gulf coast, causing severe gales. As the center reached the vicinity of Mobile the disturbance divided, one portion passing to the east of the Alleghany range and the other passing to the Ohio Valley. These two disturbances united in the afternoon of Oct. 23, the center being located on the middle Atlantic coast. It continued its N.E. course during Oct. 24-25, reaching its maximum energy after the center passed to the eastward of the coast line on Oct. 24, the maximum wind velocity reported being 72 mph at Block Island, R.I. On the morning of Oct. 26 it was last observed as central to the S.E. of Nova Scotia (Monthly Weather Review, Oct. 1890). 2) The steamship "Titanic", which left Port of Spain on Oct. 18, met sharp gales out of the S.W. in lat. 30 degrees N., long. 39 W. (it should read 69 W.), accompanied by a falling barometer and a remarkable black cloud effect. A storm of thunder and lightning then came on, followed by a hurricane from the N.W. that blew nearly 100 mph. A tremendous sea was kicked up. She was hove to for 14 hours until the morning of Oct. 24, and then came on her way meeting heavy weather up to Sandy Hook (The New York Times, Oct. 30, 1890, p.9, col.3). 3) The steamship "City of Para" arrived yesterday morning from Colon. Capt. Lockwood did not report anything serious in the condition of the weather until arriving about Hatteras Wednesday (Aug. 22). Wednesday afternoon a series of heavy rain squalls struck the vessel coming in from the E.S.E. At night it closed in very thick, the sea increasing all the time. The next morning it was blowing a gale, with the wind getting worse and worse every moment. The surface of the water was one driving mass of foam, the crest of one wave after another striking the vessel's side and dashing clean across. At 6 P.M. Thursday (Oct. 23) the wind was blowing with hurricane force (nearly 100 mph, Capt. Lockwood said) and the ship was rolling and pitching so badly that he concluded that it would be better to heave to. Never in the experience of the officers of the "City of Para" had she gone through such a sea. At 7 P.M. the ship took an extraordinary lurch

to leeward and a tremendous sea, mast high, through itself into the starboard quarter. Hardly had the steamer began to regain her equilibrium when another wave as large as the former struck her in about the same place and this time the steamer was thrown nearly on her beam ends. All night (Oct. 23-24) the storm raged fiercely and the steamer rode the sea as best she could. When day broke, there was a slight moderation, the wind veered to N.W. and the sea was so high that when the vessel reached the neighborhood of Sandy Hook it was impossible to brig her in (The New York Times, Oct. 26, 1890, p.2, col.5). 4) The steamship "St. Asaph". from London, also reported severe handling of the cyclone. She was struck again and again by huge seas, etc. And the "City of Chester", from Liverpool, passed through the storm, but without serious injury (The New York Times, Oct. 26, 1890, p.2, col.5). 5) Map showing a track for the storm. Daily positions are: Oct. 21, 27.5 degrees N., 95.5 degrees W.; Oct. 22, 31 degrees N., 87.7 degrees W.; Oct. 23, one center near 37.5 degrees N., 85 degrees W., a second center near 35.3 degrees N., 77.5 degrees W; Oct. 24, 39 degrees N., 73.5 degrees W.; Oct. 25, 40.3 degrees N., 69 degrees W.; Oct. 26, 42.7 degrees N., 58.5 degrees W. (Monthly Weather Review, Oct. 1890).

The reason for including this storm as a possible case is the wind as high as 100 mph reported by the "Titanic" (item 2) and the "City of Para" (item 3), both in the vicinity of the Gulf Stream. These extremely high winds undoubtedly suggest an explosive intensification once the storm moved from the continent to the vicinity of the warm oceanic current, an occurrence that in a number of cases (but not always) is known to be accompanied by tropicalization of the original non-tropical system. Information in items 1) through 5) was found to be insufficient to determine if tropicalization did occur in this particular case.

C) Case of Oct. 26-28, 1890.

The following information was found about this possible case: 1) It apparently developed to the east of North Carolina on Oct. 26. Gales from the N.W. were reported at Hatteras on Oct 26, and gales from the N.E. on the south New England coast on Oct. 27. By Oct. 27, it was a storm of considerable energy, with pressure below 29.20 inches, between Nova Scotia and Bermuda, whence it moved northward to the Gulf of Saint Lawrence on Oct. 28. The barometer fell to 28.88 inches at Halifax on Oct. 27, when the center of the disturbance passed near that station. On the regular telegraphic weather chart it was located as central near Bird Rocks, Gulf of St. Lawrence on the morning of Oct. 28, accompanied by heavy gales and pressure below 29.00 inches, after which it disappeared north of the region of observation (Monthly Weather Review, Oct. 1890). 2) Halifax, Oct. 28. The steamer "Portia" arrived this morning. Capt. Ash reported that he left New York Saturday (Oct. 25) at 2 P.M. and outside encountered heavy seas, the effect of the recent gale on the coast. They had good weather Sunday (Oct. 26) and yesterday morning. Yesterday afternoon (Oct. 27) they had a terrible gale and the vessel was able to make only 3 knots. About 10 P.M., the wind shifted to westward and blew heavily until nearing Sambro, when the wind increased to a regular hurricane. The barometer was very low and the seas lashed the vessel with great fury (The New York Times, Oct. 29, 1890, p.1, col.4). 3) Boston,

Oct. 27. The extreme high tide of the past two days has caused much damage along the line of the Boston, Revere Beach and Lynn Railroad (The New York Times, Oct. 28, 1890, p.1, col.5). Author's note: The tide might have been associated with possible case B) as well. 4) Map showing a track for this storm. Daily positions are: Night of Oct. 26, 35.7 degrees N., 70.7 degrees W.; Oct. 27, 39.7 degrees N., 65.7 degrees W.; Oct. 28, 47.5 degrees N., 62.5 degrees W. (Monthly Weather Review, Oct. 1890).

This was the second storm which apparently moved over or near the Gulf Stream in a matter of a few days. The reason to include this storm as a possible case of having acquired some tropical characteristics was its intensity which apparently approached or attained hurricane force on the basis of winds reported by the "Portia" (item 2) and the minimum pressure of 28.88 inches recorded at Halifax (item 1). Again, it is a well known fact that some late season storms of non-tropical origin tend to greatly intensify as a result of becoming tropical under the influence of the warm waters of the Gulf Stream. Insufficient information in the items above prevented to prove or disprove that this happened in this particular case, and this uncertainty justifies to keep the storm as a possible case.

As case C) appears to have been independent from case B), the presence of two consecutive storms of hurricane intensity traversing the same mid-latitude area within an interval of two or three days so late in the hurricane season was a very unusual event, and it makes one to wonder about the possibility of having been only one storm which either described a loop track or underwent some reformation process what indeed happened. The author considered that possibility and looked for it, but found no clue pointing to such occurrence.

It should be mentioned that cases B) and C) were just two out of the five cyclones which affected the northeastern U.S., the Canadian Maritime Provinces and their respective offshore waters during the second half of Oct. 1890. The remaining three storms had trajectories primarily over land and/or over the cold waters located just S. of Nova Scotia and Newfoundland (Monthly Weather Review, Oct. 1890) and this is why they were not considered as possible cases in spite of that they were quite intense storms. The storm of Oct. 19-21 was particularly intense, the "Alsatia" having reported that the barometer fell from 30.00 to 29.05 inches in 7 hours during Oct. 20 and that the wind, which attained hurricane force, blew from all points of the compass (The New York Times, Oct. 25, 1890, p.2, col.3).