

## YEAR 1897

Six storms were found to have occurred in 1897. Tracks for these storms are presented in Fig. 4.

Storm 1, 1897 (Aug. 31- Sept. 10), H.

The following information was found in relation to this storm:

- 1) Mr. Joseph Ridgway, Jr. of St. Thomas, forwards the following extract from the report of Capt. Rusch of the steamship "Rhenania" from Hamburg, which encountered a severe hurricane Sept. 6-7 in lat. 31 45 N., long. 47 25 W. Up to 6 P.M. Sept. 6 there was no appearance of bad weather; at 11 P.M., wind S.E. by E. 1 A.M. Sept. 7 encountered full force of hurricane, wind N.E. by N. force 12, barometer 29.55 inches; 4 A.M., wind S.E. by E., barometer 29.20 inches; 5 A.M., foretopmast overboard; heavy seas cleared the deck, two officer's staterooms smashed, engine skylights and part of bulwarks washed overboard, one boat smashed, barometer 28.95 inches; 6:30 A.M., wind at its greatest force during the storm, barometer 28.70 inches; 7 A.M., wind S. by E., barometer 28.75 inches; 8 A.M., wind S.W.; 11 A.M., wind moderated; noon, wind had died away (Monthly Weather Review, Sept. 1897).
- 2) The steamship "Nymphae" reported on trip from Mediterranean ports to New York: Aug. 28- Sept. 3, fresh northerly winds; Sept. 8, strong southerly gale with confused sea, wind veering afterward to westward, vessel labored heavily, etc; thence to port experienced moderate weather (The New York Times, Sept. 19, 1897, p.12, col.6).
- 3) Halifax, N.S., Oct. 3. The barkentine "St. Peter" arrived today. She was partially dismasted in a hurricane which struck her on the night of Sept. 8. The "St. Peter" and other vessels were sailing within sight of each other all day Sept. 8. One of these was a four masted iron ship with a crew of at least 45 men. The hurricane swept the ocean and the crew did all they could to keep the barkentine afloat. On Sept. 9 the iron ship was not sighted, but they soon passed the floating wreck of a ship's deck house which the crew identified as belonging to the sailing companion of the previous day. The disaster occurred in lat. 38 N., long. 38 W. (The New York Times, Oct. 4, 1897, p.1, col.2). Author's note: A shorter version of this marine story was published in The Times, London, Oct. 6, 1897, p.4, col.2). This latter newspaper added that the "St. Peter" arrived (at Halifax) from Buenos Aires.
- 4) Storm of Aug. 31- Sept. 10, 1897. Cape Verdes, eastern Atlantic (Tannehill, 1938).
- 5) A storm was first observed at lat. 14 N., long. 25 W. on Aug. 31, 1897 and lasted 10 days; it recurved at lat. 26 N., long. 41 W. and it was last observed at lat. 42 N., long. 23 W. (Mitchell, 1924). Author's note: The track in Mitchell (1924) does not agree with the information above. Such a track shows the storm to have recurved at lat. 26 N., long. 50 W. and to have been last observed at lat. 50 N., long. 22 W. The track in Mitchell (1924) is very similar to the one in Neumann et al. (1993).

Information contained in the above items was found to support, in general, the track for Storm 1, 1897 which is shown in Neumann et al. (1993). Therefore, such a track was reproduced in Fig. 4.

The hurricane status which Neumann et al. (1993) attributed to this storm was found to be confirmed by the pressure of 28.70 inches reported by the "Rhenania" (item 1) and, to a lesser extent, by the description given by the "St. Peter" (item 3).

Storm 2, 1897 (Sept. 10-13), H.

The following information was found about this storm: 1) The barometer reached a minimum of 756.4 millimeters (29.72 inches) at Havana on Sept. 11 (Sarasola, 1928). 2) The storm in the east central Gulf has moved slightly N.W., causing a fall in pressure of 0.18 of an inch in 24 hours at New Orleans and a N.E. wind of 36 mph at Pensacola (The New York Times, Sept. 12, 1897, p.1, col.2). Author's note: This statement was probably issued the evening before its publication date. 3) The storm has moved from the central Gulf to the Texas coast increasing in intensity, a pressure of 29.58 inches being reported at Galveston and a N.E. wind of 42 mph at New Orleans (The New York Times, Sept. 13, 1897, p.1, col.6). Author's note: This statement should have been issued in the evening of Sept. 12. 4) The storm in the West Gulf has dissipated in central Texas (The New York Times, Sept. 14, 1897, p.1, col.6). 5) New Orleans, Sept. 13. A severe hurricane visited the towns of Port Arthur and Sabine Pass last night inflicting considerable loss of life and property. The number of dead is estimated at from 20 to 30. The loss at Sabine includes one schooner, 4 tugs, many buildings and 10 persons drowned; ; there is 6 feet of water in the pass. At Port Arthur three-fourths of the buildings are blown down and it is impossible to get a corrected list of the deaths and injured. The storm blew up from the ocean shortly before 6 P.M. and by midnight was so fierce that it produced a tidal wave all along the coast (The New York Times, Sept. 14, 1897, p.1, col.4). 6) Kansas City, Mo., Sept, 14. All of the small shipping at old and new town was wrecked and many of the larger vessels were badly damaged. Only the large buildings in the new town remain standing. During the storm 6 feet of water covered the town. When the terrific windstorm struck the town it was accompanied by brisk rain, which soon made rivers of the streets (The New York Times, Sept. 15, 1897, p.5, col.3). 7) The West Indian hurricane of Sept. 13 was severe on the Texas coast where 13 lives were lost , owing to high winds and tides, and property value at \$ 150,000 was destroyed (Monthly Weather Review, Sept. 1897). 8) Some maximum wind velocities were as follows: Pensacola, N.E. 42 mph on Sept. 11; Port Eads, N.E. 72 mph on Sept. 11; New Orleans, N.E. 42 mph on Sept. 12; Galveston, N.W. 37 mph. on Sept. 12 (Monthly Weather Review, Sept. 1897). 9) Storm of Sept. 12, 1897. Minimal on Louisiana and Upper Texas coasts. 13 killed. Damage \$ 150,000 (Dunn and Miller, 1960). 10) Storm of Sept. 11-13, 1897. Gulf, Louisiana (Tannehill, 1938). 11) A Sept. 1897 storm appeared at lat. 23 N., long. 85 W. and disappeared in Texas (Garriott, 1900). 12) A storm was first observed at lat. 27 N., long. 85 W. on Sept. 11, 1897 and lasted 2 days; it was last observed at lat. 31 N., long. 97 W. (Mitchell, 1924). Author's note: Except for the fact that the track in Mitchell (1924) was started one day later than the one in Neumann et al. (1993), both tracks are quite similar.

In order to fit information showing that the storm seriously affected Port Arthur and Sabine Pass (items 5 and 6), the track in Neumann et al. (1993) was slightly adjusted to the S. during late Sept. 12 to bring the storm center over the extreme N.E. Texas coast around midnight Sept. 12-13. This adjustment resulted, in turn, in an additional one of the 7 A.M. Sept. 13 position in the above publication by about 60 miles to the S.W. to near 30.7 degrees N., 95.7 degrees W. The author's track for Storm 2, 1897 is displayed in Fig. 4.

The hurricane status which Neumann et al. (1993) attributed to this storm was found to be supported by information in items 5) and 6).

#### Storm 3, 1897 (Sept. 20-25), H.

The following information was found about this storm: 1) A storm of considerable energy has developed in the East Gulf and will probably move over central Florida towards the Middle Atlantic coast, causing dangerous gales along the Middle and South Atlantic coast (The New York Times, Sept. 21, 1897, p.1, col.6). 2) Minimum pressure at Havana was 757.4 millimeters (29.82 inches) on Sept. 21 in association with the hurricane of Sept. 18-23 (Sarasola, 1928). Author's note: The starting day of Sept. 18 was found to be 2 days earlier than the one shown in Neumann et al. (1993). 3) It was the storm of the year (at Tampa) and when the rain began to fall, it fell in torrents. From early yesterday morning (Sept. 20) to 3 A.M. this morning the water fell in torrents. At 8 P.M. (Sept. 20) the electric lights all through the city were extinguished, and for an hour the Tribune and other offices that find it necessary to remain open, found themselves suddenly reduced to kerosene lamps and candles (The Morning Tribune, Tampa, Sept. 21, 1897, p.1, col.4). 4) The part of the city (Tampa) lying to the rear of the De Soto hotel was practically impassable; the streets were lakes and in some places the sidewalks were submerged and soaked. Fire Station No. 4 was badly damaged, one side of the building blown in by the wind. The doors of Station No. 2 were also blown in by the violence of the gale; but the bell towers, as to whose safety there has recently been some apprehension, escaped uninjured. The violence of the storm at Port Tampa tore the steamer "Florida" from her moorings and brought her into a violent collision with the phosphate steamer "Feliciana", seriously damaging the latter's hull. The smoke stack of the steamer "Clara" was blown away. The schooner "John Hoffman" was blown ashore on the north side of the channel, where she is lying high and dry. The pilot boat "Belle" was also blown on the beach at the mouth of the Manatee, and is leaking badly (The Morning Tribune, Tampa, Sept. 22, 1897, p.3, col.4). 5) From a letter to the editor by Rev. E.V. Blackmann, dated at Titusville, Sept. 23: Monday night (Sept. 20) a cyclone struck the town of Cocoa leaving ruin in its wake. The large furniture warehouse of O.K. Woods was blown into the river, with building and stock a complete loss. The bakery building which stood near the depot is entirely demolished, nothing being left but the oven. Edwin Stiling's new brick warehouse was unroofed. The force of the storm struck Cocoa coming from the S.E. Fifteen inches of

rain fell at Titusville, but no damage was done here (The Miami Metropolis, Sept. 24, 1897, p.5, col.3). 6) North of Titusville the principal damage resulted from the torrent of rain while at Cocoa, 20 miles S. of Titusville, the injury inflicted was mainly by the wind. Four buildings were demolished and 11 blown off their foundation at Cocoa. South of Eau Gallie the gale was not at all severe; at Jupiter it was only slight and at Lake Worth no unusual blow was noticed. At Fernandina the shipping in the harbor was tossed about and considerable damage resulted along the wharves and harbor front. At Palatka the streets were deluged with water and many small craft along the river front were wrecked. At Ocala many fences and trees were blown down and a few buildings unroofed. The worst washout was about 3 miles long at a point about 15 miles N. of Titusville. The storm was followed by phenomenally low temperature. The temperature fell to 49 degrees Fahrenheit at Jacksonville, breaking all previous records for Sept., and at Jupiter, it went down to 60 degrees Fahrenheit (The Miami Metropolis, Sept. 24, 1897, p.5, col.3-4). 7) The storm in the East Gulf has moved very slowly northeastward and is now central off the N.E point of Florida and has caused a N.E wind of 47 mph at Charleston. Heavy rains have occurred in Florida and showers on the South Atlantic coast (The New York Times, Sept. 22, 1897, p.1, col.6). Author's note: The above statement was probably issued in the evening of Sept. 21. 8) Jacksonville, Sept. 21. Florida was visited by a West Indian hurricane today. The rain at Jacksonville has been almost continuous for the last 36 hours but was not until early this morning that the wind accompanied it. The maximum velocity here has been between 30 and 40 mph, with sharp gusts (The New York Times, Sept. 22, 1897, p.2, col.5). 9) The hurricane of Sept. 21 skirted the South Atlantic coast and disappeared S. of New England on Sept. 24. Reports from incoming vessels indicate that it was quite severe off Hatteras on Sept. 22 (Monthly Weather Review, Sept. 1897). 10) The Gulf storm has moved from Jacksonville to the South Carolina coast and appears to be losing its energy (The New York Times, Sept. 23, 1897, p.1, col.6). Author's note: The above statement was probably issued in the morning of Sept. 22. 11) Storm signals were displayed at 9:50 A.M. (Sept. 22) from the bureau's tower at Broadway (New York). At 10 P.M. (last night) the center was off Hatteras but well out at sea (The New York Times, Sept. 23, 1897, p.1, col.6). 12) The storm has moved from the South Carolina coast to Maryland, causing gales off the New Jersey and southern New England coasts (The New York Times, Sept. 24, 1897, p.1, col.6). Author's note: This statement was probably issued in the evening of Sept. 23. 13) The storm raged off Hatteras with almost unabated fury from early Wednesday morning (Sept. 22) until late Thursday night (Sept. 23) and the seas ran higher than that have been encountered for years (The New York Times, Sept. 25, 1897, p.5, col.3). 14) The storm has moved from eastern Maryland to the S. of the St. Lawrence, causing showers in the lower lake region, the Middle Atlantic States and New England (The New York Times, Sept. 25, 1897, p.1, col.6). Author's note: This statement was probably issued in the evening of Sept. 24. 15) Sandy Hook, N.J., Sept. 24, 9:30 P.M.: Wind W., blowing a fresh breeze, clear, (The New York Times, Sept. 25, 1897, p.3, col.6). 16) The steamer

"Andes", which arrived yesterday from Costa Rica, had a dangerous encounter with the terrific seas left by the hurricane (The New York Times, Sept. 5, 1897, p.5, col.3). 17) The coaster "Excelsior", which arrived yesterday morning from New Orleans, ran into the hurricane, which lasted 24 hours, during which time terrific seas were encountered (The New York Times, Sept. 25, 1897, p.5, col.3). 18) The steamship "Amerika" from Christiania, passed through the edge of the storm (The New York Times, Sept. 25, 1897, p.5, col.3). 19) Some maximum wind velocities were as follows: Tampa, N. 36 mph on Sept. 21; Jacksonville, N.E. 36 mph on Sept. 21; Savannah, N. 40 mph on Sept. 22; Charleston N. 50 mph on Sept. 21; Wilmington, N.E. 26 mph on Sept. 22; Kittyhawk, N.E. 48 mph on Sept. 22; Norfolk, N.E. 26 mph on Sept. 22; Atlantic City, N.E. 31 mph on Sept. 23; Block Island, N.E. 42 mph on Sept. 23; New Haven, S.W. 27 mph on Sept. 24 (Monthly Weather Review, Sept. 1897). Author's note: The maximum wind velocity at Charleston should have occurred very late on Sept. 21. 20) Storm of Sept. 21, 1897. Northern portion of the Florida peninsula (Dunn and Miller, 1960). 21) Storm of Sept. 20-25, 1897. Near Atlantic coast; slight force (Tannehill, 1938). 22) Track for this storm showing morning and evening positions for it. The morning locations were as follows: Sept. 20, lat. 23.N., long. 85 W.; Sept. 21, lat. 28 N., long. 81.5 W.; Sept. 22, lat. 32 N., long. 80.3 W.; Sept. 23, lat. 36 N., long. 77.5 W.; Sept. 24, lat. 41.5 N., long. 73 W.; Sept. 25, lat. 48 N., long. 58 W. (Monthly Weather Review, Sept. 1897). Author's note: The track over land from the evening of Sept. 22 does not seem to match the maximum wind velocities from the N.E. direction reported from Wilmington to Atlantic City (item 19). 23) A Sept. 1897 storm appeared at lat. 22 N., long. 85 W. and disappeared near Newfoundland (Garriott, 1900). 24) A storm was first observed at lat. 24 N., long. 84 W. on Sept. 20, 1897 and lasted 5 days; it was last observed at lat. 54 N., long. 52 W. (Mitchell, 1924). Author's note: The track in Mitchell (1924), after having passed the center over the westernmost portion of the Pamlico and Albemarle Sounds, kept if just offshore the Middle Atlantic coast until making landfall on the central portion of Long Island. This track is very similar to the one displayed in Neumann et al. (1993).

Although information in item 2) suggests that the storm might have existed (probably over the southern Gulf of Mexico) prior to Sept. 20, no attempt was made by the author of this study to extend the track prior to that day. On the contrary, as Sarasola (1928) does not mention the storm as having occurred in Cuba, the earliest portion of the track in Neumann et al. (1993), which made the storm to have crossed that island near its western tip, was eliminated. Primarily on the basis that the storm skirted the coast and was quite severe off Hatteras and that the maximum wind velocities reported from Wilmington to Atlantic City were all from the N.E. direction (item 19), 7 A.M. positions for Sept. 22-24 in the above mentioned publication were adjusted eastward to new estimated positions as follows: Sept. 22, near 32.3 degrees N., 78.3 degrees W.; Sept. 23, near 35.5 degrees N., 75.3 degrees W.; Sept. 24, near 41.0 degrees N., 72.5 degrees W.; these adjustments ranged from about 80 miles on Sept. 23 to just a few miles on Sept. 24. The author's track for Storm 3, 1897 is displayed in Fig. 4.

Although no winds of hurricane force were reported from coastal stations (item 19), the author of this study decided to upgrade to a hurricane the tropical storm status which Neumann et al. (1993) attributed to this storm. The decision was made on the basis of information about the severity of the storm on Sept 22 as stated in item 9) and the terrific sea conditions described in items 13), 16) and 17).

Storm 4, 1897 (Sept. 25-29), T. S.

This is a storm which is not included in Neumann et al. (1993). Strictly speaking, the storm is not a new case in the sense that Sarasola (1928) shows that it occurred in Cuba and the Monthly Weather Review, Sept, 1897 offers a track for it over the Gulf of Mexico. The author's of this study just recently unearthed the storm.

Documentation of this storm was made on the basis of the following information: 1) Sept. 25-27, 1897. A cyclonic perturbation which formed in the South Sea (the Caribbean) passed into the Gulf (of Mexico) through the vicinity of the Yucatan Channel. It caused strong gusty winds at Pinar del Rio, and also heavy rains which extended (eastward) to Havana. There was flooding but no great damage, and some casualties (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza, which is included in Sarasola (1928). 2) A disturbance appeared to be developing over western Cuba, a fall of 0.08 of an inch in 24 hours being reported from Tampa and Key West (The New York Times, Sept. 26, 1897, p.1, col.6). Author's note: This and subsequent statements published by The New York Times were probably issued the evening before their publication dates. 3) A storm appears to be developing off western Cuba (The New York Times, Sept. 27, 1897, p.1, col.6). 4) The Gulf storm has remained nearly stationary off the western Cuban coast (The New York Times, Sept. 28, 1897, p.1, col.6). 5) The storm has remained nearly stationary in the East Gulf (The New York Times, Sept. 29, 1897, p.1, col.6). 6) The storm has remained nearly stationary in the East Gulf (The New York Times, Sept. 30, 1897, p.1, col.6). 7) Maximum wind velocity was N.E. 26 mph at Key West on Sept. 26 (Monthly Weather Review, Sept. 1897). 8) Track for this storm which shows the following positions: Sept. 27 (morning), lat. 24.5 N., long. 84 W.; Sept. 27 (evening), lat. 24.7 N., long. 86 W.; Sept. 28 (morning), lat. 26.3 N., long. 85.7 W.; Sept. 28 (evening), lat. 26.5 N., long. 83.5 W.; Sept. 29 (morning), lat. 27 N., long. 84.5 W.; Sept. 29 (evening), lat. 27.7 N., long. 83.3 W.; Sept. 30 (morning), lat. 28 N., long. 84.3 W.; Sept. 30 (evening), lat. 28.5 N., long. 85.5 W. The lowest pressure reported along the track was 29.82 inches in the morning of Sept. 28; pressure rose to 30.00 inches by the morning of Sept. 30 (Monthly Weather Review, Sept. 1897).

Based on a careful analysis of the information contained in the above items, the author of this study produced an approximate track for Storm 4, 1897. 7 A.M. positions along his track were as follows: Sept. 25, near 20.0 degrees N., 83.5 degrees W.; Sept. 26, near 21.0 degrees N., 84.5 degrees W.; Sept. 27, near 23.0 degrees

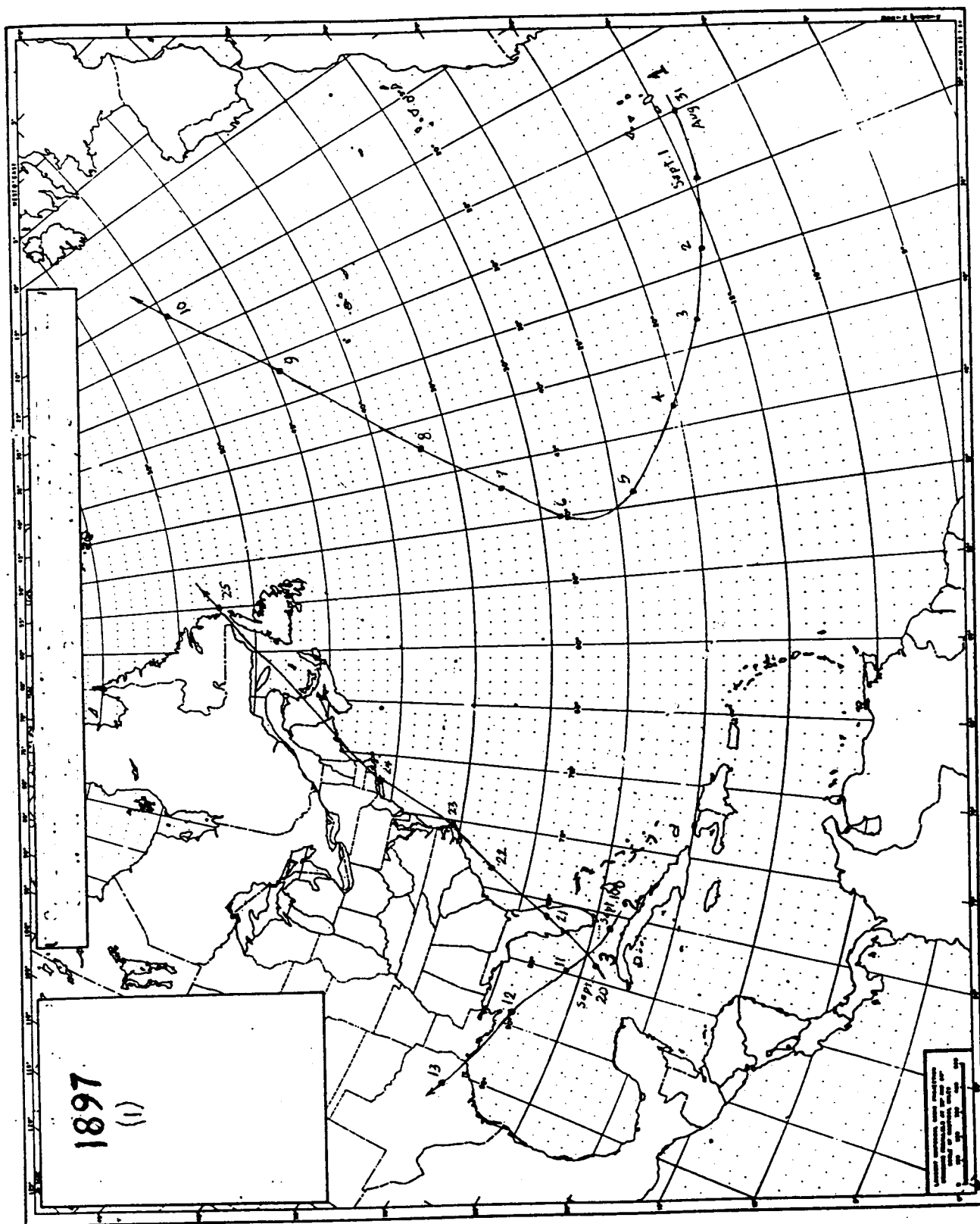


Fig. 4.

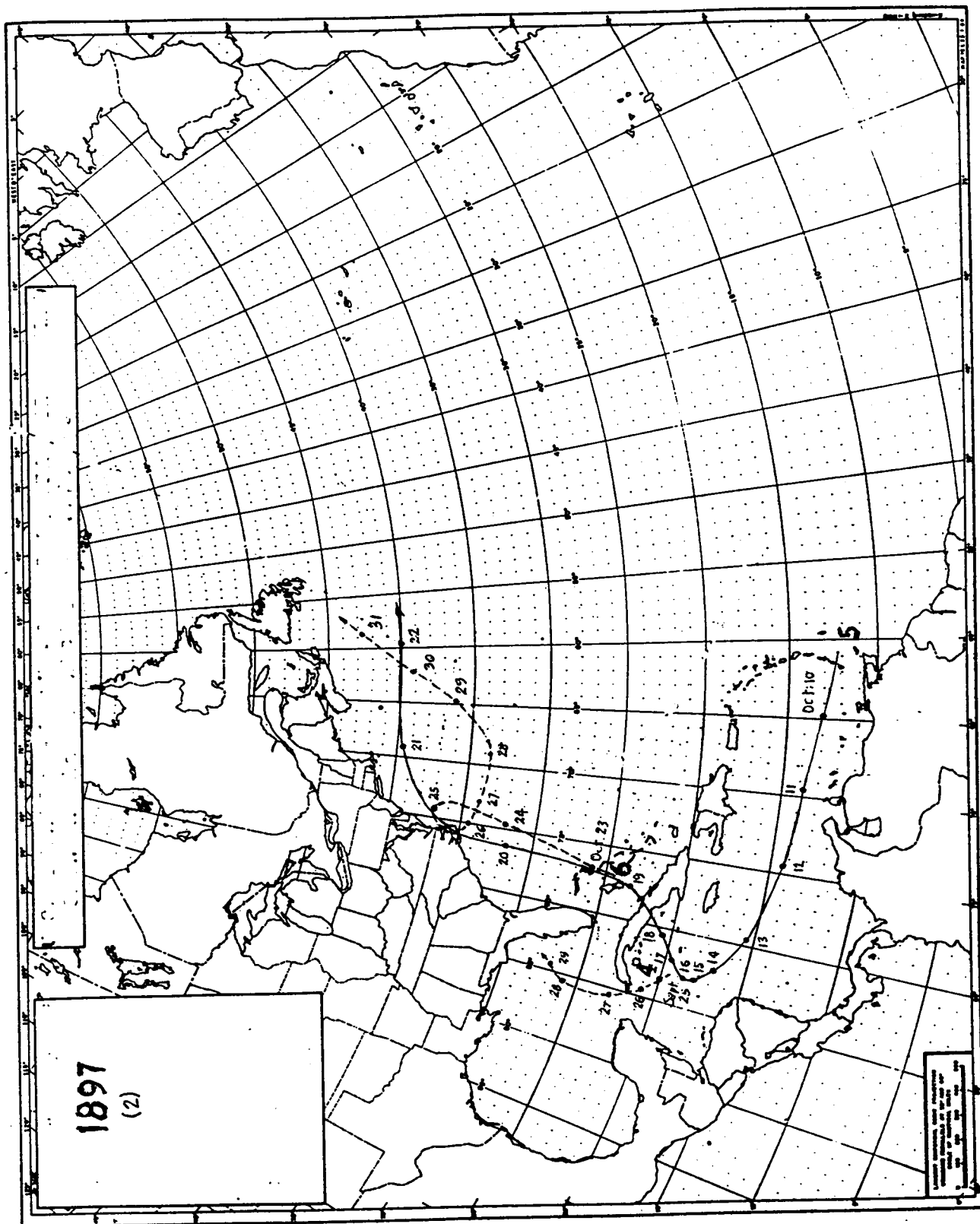


Fig. 4. (Continued).



N., 85.5 degrees W.; Sept. 28, near 26.0 degrees N., 85.5 degrees W.; Sept. 29, near 27.0 degrees N., 84.5 degrees W. The track was terminated on Sept. 29 on account that the storm apparently filled up from Sept. 28 to Sept. 30 (item 8). The author's track for Storm 4, 1897 is displayed in Fig. 4.

The author of this study believes that Storm 4, 1897 was a rather weak tropical storm.

Storm 5, 1897 (Oct. 10-22), H.

This is the same storm which Neumann et al. (1993) identify as Storm 4, 1897.

The following information was found in relation to this storm:

- 1) There are indications of a tropical storm to the S.E. of Florida which is likely to cause dangerous gales on the South Atlantic coast by Sunday, Sept. 17 (The New York Times, Oct. 16, 1897, p.1, col.6). Author's note: This statement was probably issued in the evening of Oct. 15.
- 2) The tropical storm continues to the S. of Cuba and coast stations as yet show no dangerous winds (The New York Times, Oct. 17, 1897, p.1, col.4). Author's note: This statement was probably issued in the evening of Oct. 16.
- 3) Havana, Oct. 16. The coaster steamer "Triton", from Havana to Bahia Honda, has been wrecked between Dominica and Mariel on the N. coast of Pinar del Rio province during heavy weather, grounding about 8 miles from the coast. It is said that the "Triton" had on board 200 passengers, soldiers and civilians, and it is feared that they have all perished, in addition to the 30 men members of the crew. The gunboat "Maria Cristina" and the tug "Susie" left this port but, owing to the heavy sea, the "Cristina" found it impossible to reach the scene of the disaster until tonight (The New York Times, Oct. 17, 1897, p.1, col.3).
- 4) Havana, Oct. 17. The gunboat "Maria Cristina" and the tug "Susie" arrived here at 1 P.M. this afternoon from the scene of the wreck of the steamer "Triton", the gunboat having on board 19 and the tug 23 of the members of the ship's company. The whereabouts of the others in the company are unknown. The total number of persons on board was about 230. The "Triton" stranded the rock in a heavy rain storm. The cargo shifted and 10 minutes later she sank in 120 fathoms of water (The New York Times, Oct. 18, 1897, p.1, col.6).
- 5) Oct. 17-19, 1897. A cyclone of some inntensity crossed Cuba to the east and near Tunas de Zaza in a N.E. direction. It was felt with some force on the south coast; no casualties were mentioned but there were some floods. The barometer dropped to 745 millimeters, which is equivalent to 29.33 inches (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). Tunas de Zaza is a port located on the southern coast of central Cuba about 60 miles to the S.E. of Cienfuegos.
- 6) A cyclone of weak intensity affected Las Villas province on Oct. 18-19, 1897 (Academia de Ciencias, 1970). Author's note: The words cyclone and hurricane tend to be interchangeable in Cuba. A cyclone of weak intensity is defined as a hurricane with winds between 117 and 150 kilometers per hour (about 74 to 94 mph).
- 7) The lowest pressure at Havana was 753.8 millimeters (29.68 inches) in relation to the hurricane of Oct. 15-21, 1897; that pressure was recorded on Oct.

17 (Sarasola, 1928). 8) The tropical storm continues in the Gulf and now threatens the central Gulf coast (The New York Times, Oct. 18, 1897, p.1, col.6). Author's note: The content of this statement seems to be in error. 9) The barometer continues relatively low over the Gulf of Mexico but the conditions are less threatening than they were at the morning report (The New York Times, Oct. 19, 1897, p.1, col.6). Author's note: Obviously, the above report was issued in the evening of Oct. 18. 10) There is a slight depression E. of Florida. Very heavy rains are reported from the South Atlantic States (The New York Times, Oct. 20, 1897, p.1, col.6). Author's note: This statement was issued in the evening of Oct. 19. 11) The barometer has fallen rapidly on the Middle Atlantic coast, attending a severe storm which is apparently central E. of North Carolina (The New York Times, Oct. 21, 1897, p.1, col.6). Author's note: This statement was probably issued in the evening of Oct. 20. 12) The storm was noted on the evening of Oct. 19 as a slight depression east of Florida. It moved rapidly N.E. towards the North Carolina coast, and on the morning of Oct. 20 was central south of Hatteras, causing N.E. winds of 34 and 26 mph at Hatteras and (Cape) Henry, respectively. During the day it moved slowly N.E., increasing in intensity, and on the night of Oct. 20 was apparently central off the east North Carolina coast, maximum wind velocities of S. 44 mph and N.E. 60 mph occurring at Hatteras and (Cape) Henry, respectively. Storm signals were hoisted by the observer at Hatteras at 6 A.M. Oct. 20 and at 10 A.M. the Central Office ordered storm N.E. at (Cape) Henry, Norfolk and Hampton Roads, and information signals from (Delaware) Breakwater to Nantucket. At 12:10 P.M. these latter were changed to storm N.E. and the same extended to Boston and section. Special reports of the development and progress of the storm were obtained and at 11:55 A.M. the observer at Norfolk was warned that the storm was likely to be very severe, and directed to notify all vessels that it would be dangerous to leave port. At 1 P.M. hurricane signals were ordered from Hatteras to Boston section, with the warning that the winds would probably reach hurricane velocity off the south New England and middle Atlantic coasts, and that it was dangerous for vessels to leave port. At 10 P.M. information signals were hoisted at Portland and Eastport, with the warning of severe gales on the south New England coast Thursday morning (Oct. 21), and that winds would be likely to be brisk to high off the north New England coast Thursday. On the morning of Oct. 21 the storm was central off the S.E. New England coast, whence it passed during the day beyond the region of observation. N.E. winds of 36 mph at Atlantic City, 37 mph at New York, 56 mph at Block Island and 44 mph at Nantucket occurred during the night of Oct 20 and morning of Oct. 21 (Monthly Weather Review, Oct. 1897). Author's note: Second values of N.E. 59 mph at Block Island and N.E. 49 mph at Nantucket on Oct. 21 were given in the Monthly Weather Review, Oct. 1897; the maximum velocity of N.E. 35 mph at New Haven was given for the same day. 13) The Weather Bureau reported yesterday that the storm had shunted off the coast and was central somewhere off New England (The New York Times, Oct. 22, 1897, p.7, col.4). 14) Orleans, Ma, Oct. 21. After being dismasted by the N.E. hurricane last night. the schooner "Nellie Lamper" (from St. John's, Newfoundland to New

York) was blown into the breakers of Nanset Light about noon today and in one hour was a total loss (The New York Times, Oct. 22, 1897, p.1, col.6). 15) The steamer "Kansas City" took bad weather from Tybee to Barnegat, being marked by a heavy easterly storm, with hurricanes, high seas, rain and mist (The New York Times, Oct. 22, 1897, p.7, col.4). 16) Capt. Daly of the steamship "Finance", which arrived at New York yesterday, said that the storm originated in the Caribbean Sea where he had the wind from the S.E. It veered to the W. and N.W. all the way to port. The "Finance" came up the east coast along the storm's eastern edge (The New York Times, Oct. 22, 1897, p.7, col.4). Author's note: According to The New York Times, Oct. 22, 1897, p.4, col.7, the "Finance" left Colon (Panama) on Oct. 14 and arrived at the New York bar at noon Oct. 21. 17) Storm of Oct. 10-26, 1897. Caribbean Sea, western Cuba, Florida (Tannehill, 1938). 18) A track for this storm showing morning and evening locations for each day. The morning positions were as follows: Oct. 15, lat. 21.5 N., long. 83 W.; Oct. 16, lat. 22.5 N., long. 85 W.; Oct. 17, lat. 24 N., long. 84.3 W.; Oct. 18, lat. 24.5 N., long. 83.5 W.; Oct. 19, lat. 25.7 N., long. 83.3 W.; Oct. 20, lat. 33.5 N., long. 77 W.; Oct. 21, lat. 40.5 N., long. 69.5 W. (Monthly Weather Review, Oct. 1897). 19) An Oct 1897 storm appeared at lat. 22 N., long. 83 W. and disappeared off the New England coast (Garriott, 1900). 20) A tropical cyclone was first observed at lat. 12 N., long. 61 W. on Oct. 10, 1897 and lasted 16 days; it was last observed sat lat. 60 N., long. 28 W. (Mitchell, 1924). Author's note: The track shown in Mitchell (1924) is quite similar to the one in Neumann et al. (1993) as for Storm 4, 1897 in their publication.

Although the author of this study shows a dose of skepticism about the track for Oct. 10-13 in Neumann et al. (1993) due to the lack of data in the above items to support it, he decided to keep that portion of the track unchanged. Starting on Oct. 14 some major changes were introduced to the above track in order to allow for the most likely evolution that the storm should have undergone over the western Caribbean before crossing central Cuba (items 5 and 6). Estimated 7 A.M. positions during the recurvature, which apparently took place near the 83 degrees W. meridian, were as follows: Oct. 14, near 17.0 degrees N., 82.0 degrees W.; Oct. 15, near 18.0 degrees N., 83.0 degrees W.; Oct. 16, near 18.7 degrees N., 83.0 degrees W.; Oct. 17, near 19.7 degrees N., 82.0 degrees W. The time the storm crossed Cuba could not be accurately determined from information in items 5) and 6) but, as the days in item 6) were narrowed to Oct. 18-19, it was probably during the evening and night of Oct. 18-19. Primarily on the basis of information in item 6), the author estimated 7 A.M. positions for Oct. 18-19 as follows: Oct. 18, near 20.5 degrees N., 80.5 degrees W.; Oct. 19, near 23.3 degrees N., 77.7 degrees W. These positions allowed for the storm center to have made landfall on the southern Cuban coast just E. of Tunas de Zaza and to have moved across the island in a N.E. direction (item 5). The author's 7 A.M. Oct. 20 position was estimated near 31.7 degrees N., 76.3 degrees W. on the basis of information in items 10) through 12) and space-time continuity. The 7 A.M. Oct. 21 position in Neumann et al. (1993), as for Storm 4, 1897, was adjusted by about 120 miles to the W.N.W. to near 39.7

degrees N., 69.0 degrees W. in order to better satisfy the high wind velocities at Block Island and Nantucket (item 12) by bringing the storm center closer to New England and, at the same time, to obtain a better space-time continuity along the track. The 7 A.M. Oct. 22 position in Neumann et al. (1993) was kept unchanged. The author's track for Storm 5, 1897 is displayed in Fig. 4.

The tropical storm status given to this storm in Neumann et al. (1993) as for Storm 4, 1897 was upgraded to a hurricane status by the author of this study on the basis of information contained in items 5) and 6) which indicated weak hurricane intensity when the storm crossed Cuba.

#### Storm 6, 1897 (Oct. 23-31), T. S.

This is the same storm that Neumann et al. (1993) identify as Storm 5, 1897.

The following information of meteorological interest was found about this storm: 1) There are some indications of a depression to the E. of Florida (The New York Times, Oct. 24, 1897, p.1, col.6). Author's note: This statement was issued in the evening of Oct. 23. 2) The storm was first observed in the evening of Oct. 23, the P.M. synopsis of that day stating that "there are some indications of a depression to the E. of Florida". Information signals were ordered during the afternoon for increasing N.E. winds from Hatteras to Atlantic City, and at 10 P.M., storm N.E. (signals) were hoisted at Hatteras and (Cape) Henry, with warning of a possible depression S.E. of Hatteras. During the night of Oct. 23 the storm moved northward toward the North Carolina coast, causing N.E. winds of 48 mph and 34 mph, respectively, at Hatteras and (Cape) Henry. At 10:30 A.M. Oct. 24 storm N.E. signals were ordered from Norfolk to Cape Cod section. Special noon observations showed the storm to be increasing in intensity, and at 2 P.M. hurricane signals were ordered from Hatteras to Cape Cod section. Winds of 64 mph from the N. at Cape Henry, 56 mph. from the N. at Hatteras and 38 mph from the N.E. at Atlantic City occurred during the day (Oct. 24); winds of 48 mph from the N.W. at Hatteras, 38 mph from the N. at Norfolk, 52 mph from the N.E. at Atlantic City and 48 mph from the N.E. at Block Island occurred during the night of Oct. 24 (Monthly Weather Review, Oct. 1897). Author's note: In addition, the Monthly Weather Review, Oct. 1897, stated that a maximum velocity of 60 mph from the N.E. was recorded at Kittyhawk on Oct. 24. 3) There is a tropical storm central off the North Carolina coast, attained by winds of hurricane velocity. The storm is moving slowly to the E. of N. and all coast stations to the N. of Norfolk have been previously warned its approach and probable danger to shipping interests (The New York Times, Oct. 25, 1897, p.1, col.2). Author's note: This statement was probably issued in the evening of Oct. 24. 4) On the morning of Oct. 25, it was central as a storm of great energy near the Virginia coast, the barometer reading 29.32 inches at Norfolk. At 10:50 A.M. Oct. 25 the officials at Boston, New York, Philadelphia and Nantucket were again directed to use all available means to distribute warnings of the storm and to notify postmasters in their vicinity that the storm would cause winds of hurricane velocity near the coast Monday night (Oct. 25) and

Tuesday (Oct. 26). During Oct. 25 the storm moved to the S.E., a very unusual and unexpected direction of movement for a storm of this character, and the barometer rose at the center of the disturbance. N.E. winds of 48 mph at Cape Henry, 42 mph at Atlantic City and Block Island, and 40 mph at New York occurred during Oct. 25 (Monthly Weather Review, Oct. 1897). Author's note: In addition to the above velocities, the Monthly Weather Review, Oct. 1897, stated the following maximum wind velocities as having occurred on Oct. 25: A second value of N.E. 53 mph at Atlantic City; N.E. 44 mph at Philadelphia; N.W. 38 mph at Norfolk. 5) The storm on the Atlantic coast, central near Norfolk, has apparently moved to the S.E. and is now (evening of Oct. 25), central E. of Hatteras, the pressure having increased at the center of the disturbance (The New York Times, Oct. 26, 1897, p.1, col.6). 6) At 10:50 P.M. Oct 25 signals were changed to storm N.E. from Hatteras to Cape Cod section, and observers notified that conditions were less threatening, although strong N.E. gales were probable off the south New England and middle Atlantic coast. During the night of Oct. 25 the storm decreased in energy remaining central near Hatteras, where it gradually disappeared, some effects of its presence continuing until the morning of Oct. 27 (Monthly Weather Review, Oct. 27). 7) The storm has remained nearly stationary off the Middle Atlantic coast, diminishing in intensity (The New York Times, Oct. 27, 1897, p.1, col.6). Author's note: This statement was probably issued in the evening of Oct. 26. 8) Atlantic City, Oct. 26. All kinds of wrecks were strewn along the beach today as a result of the big storm which swept the Jersey coast Sunday (Oct. 24) and last night (The New York Times, Oct. 27, 1897, p.1, col.7). Author's note: The last part of the above statement should probably read: Sunday (Oct. 24) through last night. 9) Norfolk, Va., Oct. 28. A schooner, reported as the "Helen V. Pauling" from Darien, Ga. for New York, arrived in Hampton Roads today. She reports having encountered the northeaster off Hatteras Tuesday (Oct. 26). Two of her crew were lost and all of her deck load and one mast were swept overboard (The New York Times, Oct. 29, 1897, p.1, col.6). 10) Storm of Oct. 23- Nov. 7, 1897. Atlantic. Described loop near Hatteras. Was not of much force (Tannehill, 1938). 11) A track for this storm showing morning and evening positions. Some of these positions were: Oct. 23 (evening), lat. 24 N., long. 81 W.; Oct. 24 (morning), lat. 28 N., long. 78.5 W.; Oct. 25 (morning), lat 36.5 N., long. 74.7 W.; Oct. 25 (evening), lat. 35.3 N., long. 73.5 W.; Oct. 26 (morning), lat. 35.7 N., long. 77 W.; Oct. 26 (evening), lat. 33.7 N., long. 73 W. (Monthly Weather Review, Oct. 1897). Author's note: On the basis of information in items 6) and 7), the Oct. 26 (morning) position is obviously in error. 12) A storm was first observed at lat. 25 N., long. 77 W. on Oct. 23, 1897 and lasted 15 days; it was last observed at lat. 66 N., long. 21 W. (Mitchell, 1924). Author's note: The track in this publication and the one in Neumann et al. (1993) are quite similar until about Oct. 28.

Information in the above items was found to support, in general, the track shown in Neumann et. al. (1993) as for Storm 5, 1897 and, therefore, such a track was reproduced in Fig. 4 as for Storm 6, 1897.

The tropical storm status which Neumann et al. (1993) attributed to this storm was kept unchanged. However, Storm 6, 1897 seemed to have approached hurricane intensity.

Special statement.

In addition to the storms which were discussed above, one possible case was found for 1897.

A) Case of Aug. 15, 1897.

The following information was found about this possible case:  
1) A report from Mr. M.J. Clancy , U.S. Consular Agent at Bluefields (Nicaragua) states: "On Aug. 15 a cyclone passed over the banana district on the Bluefields River and destroyed 20 percent of the plants and suckers" (Monthly Weather Review, Aug. 1897). It is not clear whether the description above actually refers to a small West Indian hurricane or to a tornado or destructive winds associated with thunderstorms. Therefore, the author of this study decided to keep this one as a possible case.