

Twelve storms were identified as having occurred in 1886. Tracks for these storms are presented in Fig. 3.

Storm 1, 1886 (Jun. 13-14), H.

The following information was found in relation to this storm:

- 1) Galveston, Tx. Morning of Jun. 13, barometer was low and continued falling during the day, brisk wind. At 11:15 P.M. it was blowing at 27 mph and continued increasing in force. Early on Jun. 14 the gale had attained 50 mph from N.E. At 8:30 A.M. Jun. 14, barometer 29.43 inches, wind from N. and veering. At 8:05 and 8:40 A.M. the wind was 50 mph from N. Owing to high E. and N.E. winds, the water rose to an extent that were fears of overflow but wind backing to N.W. cleared the bay, preventing a possible disaster. The storm was particularly dangerous to light shipping in the harbor. Along the beach, railroad lines were washed out and many bath-houses were completely demolished. Rain fell at intervals during the storm (Monthly Weather Review, Jun. 1886). Author's note: A second value of 29.47 inches for the lowest barometer was given in this publication.
- 2) Jun. 13-14, 1886. Sabine, Texas. Inundation. The hurricane passed inland near Sabine, Tx. causing an inundation extending several miles inland (Tannehill, 1938).
- 3) Jun. 14, 1886. Upper Texas coast. Minor. Center remained offshore (Dunn and Miller, 1860).
- 4) Sabine Pass, Tx. Between Taylor Bayou and this place, 8 miles of railroad tracks were washed out by the storm of Jun. 14. Several residences, warehouses and all the wharves at Sabine City were either blown or washed away. The water rose 7 feet above the ordinary high tide, submerging the entire town and the county for miles to the rear. Cattle suffered severely for fresh water, as all the inland lakes and pools were impregnated with the saline waters of the Gulf of Mexico (Monthly Weather Review, Jun. 1886).
- 5) Orange, Tx. A very heavy N.E. gale blew here all day Jun. 14, doing much damage to crops and vegetation. The storm was accompanied by heavy rainfall (Monthly Weather Review, Jun. 1886).
- 6) New Orleans, Jun. 14. A storm had been raging all day in the western part of the state. Because of prostrated wires, no information was available west of Lake Charles. At 6 P.M. it was learned that the violent wind with rain had prevailed there since 10 A.M. The lines from there to Texas are down and extremely heavy rainfall was experienced this evening but there has been no wind (The New York Times, Jun. 15, 1886, p.2, col.3).

Information in the above items supports the track shown in Neumann et. al. (1993) with the exception that items 2) and 4) do suggest a track a few miles to the west over a portion of Jun. 14 to better account for the characteristics of the flooding at Sabine Pass and vicinity. Therefore, the author of this study made the indicated adjustment by bringing the storm center almost over Sabine Pass instead of having passed about 20 miles to the S.E. of that place. The author's track is displayed in Fig. 3.

There are some clues that this storm might have existed for some days before Jun. 13 as space-time continuity along a hypothetical track backward to the S.E. and E. would fit the

following weather information: Papers which have reached Bermuda contain an account of a rain and wind storm at Jamaica. A dispatch from Morant Bay (Jun.16) indicated that on Jun. 7 the weather was most threatening and the gale reached its height on Jun. 8. The main roads are blocked from fallen trees at Chapelton and, at Clarendon, the storm was severe and unexpected. At about 11 P.M. (Jun. 7) the wind was terrific and the rain continued to pour until about 2 A.M. on Thursday, Jun. 8 (The New York Times, Jul. 15, 1886, p.1, col.6). However, the author decided not to extend the track backwards to the region near Jamaica on Jun. 7 or 8 because it was not possible for him to link in a conclusive manner the meteorological events which occurred at Jamaica and off the Texas coast.

Based on item 2), and most importantly, on the water rise to 7 feet above normal high tide reported at Sabine Pass (item 4), the author of this study believes that the storm had attained full hurricane intensity by landfall near Sabine Pass on Jun. 14. Therefore, he considered it appropriate to upgrade to a hurricane the tropical storm status indicated in Neumann et al. (1993).

#### Storm 2, 1886 (Jun. 17-24), H.

The following information was found about this storm: 1) From *Diario de la Marina, Havana, Cuba, Jun. 21, 1886*. The heavy rainstorm which prevailed during the last few days began on Jun. 17 and 18 in the immediate vicinity of the Yucatan Channel and in the adjacent east portion of the Gulf (of Mexico), where it remained about stationary during four consecutive days. The rains were copious and frequent from the central part of the island to Cape San Antonio, on the coast of Yucatan and in the Gulf States. The rain caused heavy flood, and various localities were inundated (*Monthly Weather Review, Jun. 1886*). Author's note: This information was sent to the U.S. Signal Service by Rev. Benito Vines, director of the Belen College Observatory of Havana. 2) *Havana, Jun. 28, 1886*. The heavy rain which fell in Vuelta Abajo from Jun. 17 to Jun. 24 has been unexampled in Havana during the month of June for the last 29 years (*Monthly Weather Review, Jun. 1886*). This information was also produced by Father Vines. The words Vuelta Abajo refer to Pinar del Rio province in western Cuba. 3) *Jun. 17-24, 1886*. Atmospheric perturbation of a large diameter and a rather light barometric depression caused torrential rains for 6 consecutive days over the western provinces of Cuba, resulting in a lot of damage and a number of persons drowned. Rains also reached the other provinces, with moderate winds in the periphery of the tempest (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). 4) The storm moved directly northward over western Florida causing severe southerly gales at Key West and Cedar Keys (*Monthly Weather Review, Jun. 1886*). 5) *Storm of Jun. 15-20, 1886*. Yucatan Channel, Florida. Much damage at Cedar Keys. Wind 68 mph (Tannehill, 1938). 6) Report by the Signal Service observer at Cedar Keys. At 8:35 P.M. Jun. 20 a heavy rain storm, accompanied by violent E. and N.E. wind, prevailed in this place and continued with considerable energy all night. The wind

came in squalls, blowing at times in the night at a rate of 75 to 90 mph, shaking the strongest house in the town and prostrating trees, telegraphs poles and signs. Between 10 and 11 P.M. the wind blew from E. at 68 mph; this is the highest velocity ever recorded here, but owing to the direction from which it came little damage was done (Monthly Weather Review, Jun. 1886). 7) Jun. 21, 1886. Appalachicola. Major. High tides (Dunn and Miller, 1960). 8) Dangerous E. winds prevailed along the South Atlantic coast on Jun. 20, 21 and 22. The storm moved over the South Atlantic states and moved off the Middle Atlantic coast attended by dangerous winds S. of New York. After reaching the New Jersey coast the storm apparently decreased in energy and the direction of movement changed to the eastward. It was last marked as central S. of Long Island near the 40 degrees N. parallel (Monthly Weather Review, Jun. 1886). Author's note: The storm was continued to be traced eastward from the "last marked" position indicated in this item. 9) After having passed off the U.S. coast in lat. 39 30 N. during Jun. 23, the depression continued moving due E. and was apparently central in lat. 40 N., long. 60 W. on Jun. 24, whence it dissipated to the eastward (Monthly Weather Review, Jun. 1886).

Some modifications were introduced along the track for Storm 2, 1886 which is shown in Neumann et al. (1993); these modifications were aimed at obtaining a track which conforms better with the content of most items above. The modifications required new 7 A.M. position estimates by the author of this study for Jun. 17 through Jun. 21 and also for Jun. 24. 7 A.M. positions for Jun. 22-23 in Neumann et al. (1993) were kept unchanged. Author's estimated positions were as follows: Jun. 17, 20.0 degrees N., 85.3 degrees W.; Jun. 18, 21.7 degrees N., 85.7 degrees W.; Jun. 19, 23.3 degrees N., 85.3 degrees W.; Jun. 20, 25.3 degrees N., 84.5 degrees W.; Jun. 21, 30.3 degrees N., 84.0 degrees W.; Jun. 24, 40.0 degrees N., 60.0 degrees W. Positions for Jun. 17 through Jun. 20 were primarily based on information in item 2); the Jun. 21 position was essentially based on item 6) and on space-time continuity; the Jun. 24 position was based on item 9). The author's track for Storm 2, 1886 is displayed in Fig. 3. For the period Jun. 17-21, such a track is to the east of the one shown in Neumann et al. (1993) for the period Jun. 18-21. The portion of the author's track for late Jun. 23 and for Jun. 24 represents an extension of the track displayed by the above mentioned authors.

The 75 to 90 mph maximum winds mentioned in item 6) as well as information contained in item 7) allowed the author of this study to verify the hurricane status that Neumann et al. (1993) attributed to Storm 2, 1886. However, an independent verification of the major hurricane status claimed in item 7) was not possible in the light of the remaining items above.

Storm 3, 1886 (Jun. 27-Jul. 2), H.

The following information was found in relation to this storm: 1) El Guajiro de Sancti-Spiritus states that, on Jun. 30, Capt. Charles W. Hunter arrived at the port of Zaza and made the following statement: Sailed with the English schooner "Daizy" on Jun. 26; on the evening of the same day, in lat. 19 34 N., long. 79

10 W., the wind was from the E.; at 10 A.M. Jun. 27, being W. of Jamaica, the hurricane was at its greatest force and the sea very high (Monthly Weather Review, Jun. 1886). Author's note: This information and additional one on the cyclone near and over Cuba was sent to the Chief Signal Officer by Rev. Benito Vines, director of the Belen College Observatory of Havana. Sancti-Spiritus is a town in central Cuba and El Guajiro de Sancti-Spittitus is obviously a paper published there. Zaza (Tunas de Zaza) is a port on the south-central coast of Cuba which is located to the south of Sancti-Spiritus. 2) The Diario de la Marina (published at Havana), Jun. 30, 1886, contained an extract from the Diario de Cienfuegos, Jun. 28, as follows: At 10 A.M. this morning (Jun. 28) very heavy gusts of wind from the S.E. prevailed; the wind, which was moderate in force during the first hours, increased in force up to 2 P.M., blowing from the same quarter. The "Gloria", which sailed this morning (Jun. 28) to Trinidad, reported that the wind was very severe and the sea high (Monthly Weather Review, Jun. 1886). 3) According to a dispatch received from the mayor of Batabano, dated on Jun. 28, 2:30 P.M., a very heavy wind from S.E. prevailed in that place, causing some damage to boats in the harbor (Monthly Weather Review, Jun. 1886). Author's note: Batabano is a port located on the southern coast of Havana province (Cuba). 4) Observations taken at La Coloma (Cuba) by Manuel Yago, Adjutant of Marines. Jun. 28, 5 P.M., barometer 30.12 inches, wind N. force 6 (scale 0-10), heavy squalls; 6 P.M., barometer 29.92 inches, wind N.N.W. force 6, heavy squalls; 7 P.M., barometer 29.80 inches, wind N.W. force 9, heavy squalls; 8 P.M., barometer 29.63 inches, wind W. and S.W. force 9, heavy squalls; 9 P.M., barometer 29.49 inches, wind W. force 8, heavy squalls; 10 P.M., barometer 29.57 inches, wind S.W. force 9, heavy squalls; 11 P.M., barometer 29.92 inches, wind S.S.W. force 10, heavy squalls; midnight Jun. 28-29, barometer 30.04 inches, wind S. force 10, heavy squalls; 1 A.M. Jun. 29, barometer 30.04 inches, wind S. force 6, heavy squalls; 2 A.M., wind S.S.W. force 9, heavy squalls; 3 A.M., barometer 30.04 inches, wind S.S.E. force 7,, heavy squalls; 4 A.M., barometer 30.04 inches, wind S.E. force 6, clear in second quadrant; 5 A.M., wind S.E. force 5, clear in second and third quadrants, thunder (Monthly Weather Review, Jun. 1886). Author's note: La Coloma is a port which is located on the southern coast of Pinar del Rio province (western Cuba), just to the south of the city of Pinar del Rio. Barometer readings look suspicious after midnight Jun. 28-29. 5) Jun. 28-29, 1886. A cyclone of moderate intensity passed S. of Batabano and moved across the Pinar del Rio province, causing significant damage not only due to the winds but also due to flooding (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban hurricanes by M. Gutierrez-Lanza, which is included in Sarasola (1928). 6) Havana, Jul. 3. The extreme western portion of this island was touched on Jun. 29 by a cyclone which came across the Caribbean Sea in a N.W. direction. There were rain and squalls here, but only a slight damage was done. At Vuelta Abajo the wind acquired considerable velocity and country homes were blown down and trees uprooted. Considerable damage was done at Batabano where roofs were turned, fields destroyed and several vessels injured (The New York Times, Jul. 9, 1886, p.1, col.6). 7)

Reports received from vessels and from stations in the West Indies indicate that the cyclone existed to the S. of Cuba on Jun. 27 and 28, and that it passed northward crossing the 25 degrees N. parallel near the 89 degrees W. meridian on Jun. 29 (Monthly Weather Review, Jun. 1886). Author's note: The probable location near 25 degrees N., 89 degrees W. is too far west and if it were accepted it would have implied that the storm moved at a rate of nearly 30 mph from a position to the N. of La Coloma (Cuba) at 9 P.M. Jun. 28 (which can be inferred from item 6) to the suggested position in the morning of Jun. 29, a motion which is unrealistic and is not supported by other data. 8) Tallahassee, Fl. Rain began to fall about 4 A.M. Jun. 30 and continued until midday with occasional gusts; about midday a violent S.E. gale set in accompanied by heavy rain which continued until 6 P.M. It is estimated that the wind blew at a rate of 80 mph. The damage to the town was not very great but considerable damage was done to crops in the country. At Ockockonee, 8 miles W. of Tallahassee, two large lumber sheds and a mill were demolished. The Little River Bridge on the Mobile and Pensacola Railroad was partly undermined (Monthly Weather Review, Jun. 1886). 9) Appalachicola, Fl. A very heavy gale of almost hurricane force occurred here on Jun. 30. About 10 A.M. the wind commenced to blow a light gale from S.E. and by 1 P.M. it had increased to 70 mph; at 4:30 P.M. there was a lull in the storm and the wind suddenly changed from the S.E. to the opposite direction, and blew with great force, unroofing houses, throwing down smoke-stacks and destroying frame structures. The greatest damage was done to shipping in the bay; several vessels were capsized, some were sunk and nearly every one in the harbor was more or less injured; several lives were lost (Monthly Weather Review, Jun. 1886). 10) Cedar Keys, Fl. During the afternoon of Jun. 30 the wind blew hard from E.N.E. and increased steadily in velocity until 10:30 P.M., when it veered to E. and attained the velocity of a high gale and continued blowing with great energy during the night. The damage done by the storm was light. Some injury to roads was done by high tides and one warehouse was blown from its foundation (Monthly Weather Review, Jun. 1886). Author's note: The wind at Cedar Keys should have blown mainly from S.E. and S. during the night of Jun. 30- Jul. 1. 11) Savannah, Ga. A very heavy gale and rain prevailed over southern Georgia during the afternoon and night of Jun. 30. According to the Georgia Crop Report, the storm did much damage to crops and passed over Washington, Twiggs, Brooks, Thomas and Dougherty counties, covering in its track the width of several counties in the northwestern part of the state (Monthly Weather Review, Jun. 1886). Author's note: As the above mentioned counties are in southern and central Georgia, the statement "covering in its track the width of several counties in the extreme northwestern part of the state" appears to be in error. 12) Augusta, Ga. On the morning of Jul. 1 rain fell until 10:40 A.M., accompanied from 1:30 A.M. to 6:15 AM by a strong N.E. wind which at 4:30 A.M. attained the force of 30 mph (Monthly Weather Review, Jul. 1886). 13) Fort Macon, N.C. A violent wind and rain storm, attended by thunder and lightning, prevailed during Jul. 1. The rainfall was very heavy, 6.49 inches falling in 24 hours. The wind veered from N.E. to S.E., from which point it blew

a gale of 44 mph at 11:30 A.M. (Monthly Weather Review, Jul. 1886). 14) Kittyhawk, N.C. During Jul. 1 light rain and E. wind prevailed; at 8:50 P.M. the wind had increased to a gale of 42 mph (Monthly Weather Review, Jul. 1886). 15) On the morning of Jul. 2, the storm was central near Norfolk and on that day disappeared off the coast near Chincoteague, Va. (Monthly Weather Review, Jul. 1886).

Most of the track for Storm 3, 1886 which is shown in Neumann et al. (1993) required to be modified to fit information contained in the above items. New 7 A.M. positions were estimated by the author of this study for the period Jun. 27- Jul. 1 and only their 7 A.M. Jul. 2 position was kept unchanged. The author's 7 A.M. positions were as follows: Jun. 27, near 18.3 degrees N., 79.7 degrees W., on the basis of information in item 1); Jun. 28, near 21.5 degrees N., 81.5 degrees W., based on item 2); Jun. 29, near 23.7 degrees N., 85.3 degrees W., primarily based on item 4) and on space-time continuity; Jun. 30, near 27.3 degrees N., 86.7 degrees W., primarily based on space-time continuity applied backwards using information in items 8) and 9), this position is very close to the one displayed in Neumann et al. (1993); Jul. 1, near 33.0 degrees N., 81.3 degrees W., on the basis of information in item 12), this position is about 70 miles to the N.E. of the corresponding position in Neumann et al. (1993). The author's positions as well as the 7 A.M. Jul. 2 position in the above publication were used in preparing the track for Storm 3, 1886 which is shown in Fig. 3.

On the basis of information in items 4), 5) and 8), the storm attained hurricane intensity. Therefore, the hurricane status which is attributed to Storm 3, 1886 in Neumann et al. (1993) was verified.

#### Storm 4, 1886 (Jul. 16-24), H.

The following information was found in relation to this storm:

- 1) Havana, Jul. 13, 1886. There have been indications of a cyclonic disturbance in the South Sea (the Caribbean) since the day before yesterday. It passed from the second to the third quadrant (in relation to Havana) and will pass us by the W. (Monthly Weather Review, Jul. 1886). Author's note: This and all other information about the storm in Cuba was forwarded to the Signal Service by Father Vines, director of the Belen College Observatory of Havana.
- 2) Havana, Jul. 16, 1886. The cyclonic disturbance, after having advanced slowly by the W., has passed us by the fourth quadrant and is probably moving at present in a northeasterly direction. Copious rains have fallen in Vuelta Abajo today (Monthly Weather Review, Jul. 1886).
- 3) Observations taken at Mantua. Jul. 16, 8 A.M., low clouds with violent gale in the W., rough sea, wind variable from S.E., the storm started to be felt. Jul. 17, 8 A.M., since 8 o'clock yesterday morning the weather has been thick, wind from E. to W. velocity 20 meters (per second), copious rains, cloudy horizon, light thunder, wind direction steady for 10 to 15 minutes at a time, same conditions at 10 A.M. Jul. 18, 8 A.M., dark horizon, no wind (Monthly Weather Review, Jul. 1886). Author's note: Mantua is located near the northwestern coast of Pinar del Rio province.
- 4) Observations taken at the city of Pinar del Rio.

Jul. 16, 9 A.M., cloudy, copious rains from 7:30 to 8:30 A.M. Jul. 17, 8 A.M., weather continues cloudy and rainy. Jul. 18, 9 A.M., "severe hurricane" with copious rains at 3 A.M., at this hour the weather has moderated (Monthly Weather Review, Jul. 1886). Author's note: The city of Pinar del Rio is located in the interior of the province of the same name. 5) Consolacion del Sur. Jul. 16, 4:27 A.M., aneroid barometer 29.92 inches, wind S.W., threatening weather; 8:30 A.M., aneroid barometer 29.87 inches, very threatening, rain in the S.W., squally weather. Jul. 17, 8 A.M., aneroid barometer 29.96 inches, raining since yesterday without interruption, wind S.W., very gloomy. Jul. 18, 8 A.M., aneroid barometer 29.96 inches, gloomy, raining from S.W. (Monthly Weather Review, Jul. 1886). Author's note: Consolacion del Sur is located in the interior of Pinar del Rio province, just east of the city of Pinar del Rio. 6) Observations taken at La Coloma. Jul. 17, 8 A.M., aneroid barometer 30.12 inches, fresh S.E. wind, smooth sea. Jul. 18, 8 A.M., aneroid barometer 30.12 inches, wind force 6 (Monthly Weather Review, Jul. 1886). Author's note: La Coloma is a port on the southern coast of Cuba, just to the south of the city of Pinar del Rio. 7) Observations taken at Bahia Honda. Jul. 17, 8 A.M., aneroid barometer 30.08 inches, wind S.E. slack, rainy weather. Jul. 18, aneroid barometer 30.12 inches, fresh wind, clear atmosphere (Monthly Weather Review, Jul. 1886). Author's note: Bahia Honda is a port which is located on the northern coast of Pinar del Rio province. 8) Batabano, Jul. 17, 10:30 A.M., barometer has a tendency to fall, strong E.S.E. wind and variable, heavy sea swell, gloomy, continuous rain, thunder (Monthly Weather Review, Jul. 1886). Author's note: Batabano is located on the southern coast of Havana province. 9) Cardenas. Jul. 17, 8 A.M., barometer 30.12 inches, S. wind and calm, gloomy, smooth sea. Jul. 18, 9:30 A.M., barometer 30.12, wind S., calming, squally weather, smooth sea (Monthly Weather Review, Jul. 1886). Author's note: Cardenas is located on the northern coast of Matanzas province, just to the east of the city of Matanzas. 10) Jul. 16-17, 1886. Cyclonic perturbation crossed over the South Sea (the Caribbean). It only caused torrential rains and moderate winds in Cuba (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). 11) Havana, Jul. 17, 1886. No dispatch has been received from the province of Pinar del Rio since this morning, there having been heavy thunder and squalls in the S.W. and W., where the storm seems to be far more severe than at Havana (Monthly Weather Review, Jul. 1886). 12) Extract from The New York Herald, Jul. 19, 1886: Key West, Fl., Jul. 18. The effects of the gale, which evidently passed to the westward from this place, have been severely felt during the past 24 hours. A strong southerly wind which prevailed during the night shifted to S.W. today and obtained a velocity of 52 mph and was accompanied by spiteful rain squalls. The barometer fell during the night to 29.87 inches. It rose this morning but became depressed again during the afternoon. Two steamers which should have sailed this morning are still weather-bound tonight. Shipping sustained no damage (Monthly Weather Review, Jul. 1886). 13) The development of the pressure area was first observed in the Gulf of Mexico on the morning of Jul. 18 and approximately located

as having the center of disturbance about 150 miles south of Pensacola, Fl. (Monthly Weather Review, Jul. 1886). Author's note: The storm position for the morning of Jul. 18 which was given in this item did not seem to be supported by the content of practically all other items. 14) The Jul. 19 morning map showed the storm central over Jacksonville, Fl. (Monthly Weather Review, Jul. 1886). 15) After having left northern Florida on Jul. 19, the storm moved rapidly in a generally N.E. direction across the Atlantic, passing beyond the region of observations to the west of Scotland on Jul. 24. It exhibited great energy throughout its course and was remarkable by reason of the extent of territory it traversed (Monthly Weather Review, Jul. 1886). 16) Steamship "Alpes". Morning of Jul. 18, experienced a hurricane from S.S.E., backing to S.E. at 9 P.M., to E.S.E. at 10 P.M. and E. at midnight (Jul. 18-19). On Jul. 19, the wind backed to E.N.E., N.E., N. and N.W.; lowest barometer 29.44 inches at 6 P.M. Jul. 18 in lat. 30 28 N., long. 79 10 W. When the wind shifted to N.E. it blew with hurricane force for 4 hours and then moderated and hauled to the northward. Other barometer readings were 29.64 inches at 3 P.M. Jul. 18 and 29.54 inches at 5 P.M. Jul. 18. The storm was accompanied by lightning and heavy rain; also by a tremendous sea (Monthly Weather Review, Jul. 1886). Author's note: According to The New York Times, Jul. 23, 1886, p.8, col.6, the "Alpes" left Havana for New York on Jul. 17 and should have arrived in New York on Jul. 22, the previous day to the publication of her arrival. In addition, the barometer readings seem unreliable because the lowest pressure should have occurred much later than 6 P.M. Jul. 18 as, on the basis of the reported wind directions and strength, the storm center apparently passed closest to the ship on Jul. 19. 17) Bark "Balkan". Jul. 20, lat. 33 N., long. 69 W., had a hurricane from S.W. to N.W.; lost foretopsail (Monthly Weather Review, Jul. 1886). 18) Steamship "Geiser". Jul. 21, 3:32 P.M. (Greenwich mean time), lat. 41 11 N., long. 53 18 W., barometer 29.75 inches, wind S. force 7; barometer fell and wind increased gradually with occasional rain and overcast sky; 11:30 P.M., a gale was blowing from S. with heavy gusts; 1:30 A.M. Jul. 22, lat. 41 36 N., long. 51 15 W., the wind increased to a complete hurricane from S.S.W., torrents of rain, mist and spray covered the ship making it impossible to see the bow, barometer 29.33 inches, where it remained until 2 A.M. when the wind hauled to S.W. and W. decreasing in force; the barometer rose at a rate of 0.08 per hour (Monthly Weather Review, Jul. 1886). 19) Steamship "Gellert". Jul. 21, lat. 41 02 N., long. 55 01 W., encountered a moderate S.E. gale, wind backing to E., N.E., N. and N.W. following the gale; lowest barometer 29.23 inches at 4 P.M. (Monthly Weather Review, Jul. 1886). 20) Steamship "Umbria" had a strong gale on Jul. 21 and 22. Wind set in from S.W., veered to W.N.W. and backed to S.W. during the passage of the disturbance; lowest barometer 29.59 inches at 6 A.M. Jul. 22 when in lat. 43 05 N., long. 45 50 W. (Monthly Weather Review, Jul. 1886). 21) Map showing a track for the storm. Daily positions are as follows: Jul. 14, 19 degrees N., 83 degrees W.; Jul. 15, 21.7 degrees N., 85.5 degrees W.; Jul. 16, 24.7 degrees N., 87 degrees W.; Jul. 18, 28.5 degrees N., 85.5 degrees W.; Jul. 19, 31.3 degrees N., 82 degrees W.; Jul. 20, 37 degrees N., 70 degrees W.; Jul. 21, 42 degrees N., 61 degrees W.;

Jul. 22, 44.3 degrees N., 46.5 degrees W.; Jul. 23, 48 degrees N., 32 degrees W.; Jul. 24, 55.5 degrees N., 21 degrees W. (Monthly Weather Review, Jul. 1886).

Information contained in the above items suggested the need for major changes along the track for Storm 4, 1886 which is shown in Neumann et al. (1993). Actually, an entirely new track was prepared. Information in items 1) and 2) was not considered to be enough for attempting a track prior to Jul. 16. The reason for not making such an attempt was the large uncertainty about the distance the disturbance was passing to the S.E., S., S.W. and W. of Havana and also about the degree of development of the disturbance at that time. Under these circumstances, the author of this study decided to start the track on Jul. 16 with a 7 A.M. position for that day near 22.0 degrees N., 86.7 degrees W. on the basis of the morning weather observation taken at Mantua (item 3): low clouds with a violent gale in the W. and rough seas were reported. The author's 7 A.M. Jul. 17 position was near 21.5 degrees N., 85.3 degrees W. and was based on the gale from E. to W., velocity 20 meters per second (about 45 mph), observed at Mantua at 8 and 10 A.M. Jul. 17 (item 3). Information from Key West (item 12) allowed the author of this study to estimate his 7 A.M. Jul. 18 position near 26.5 degrees N., 83.5 degrees W., and the content of item 14) was used in estimating his 7 A.M. Jul. 19 position which was near 30.3 degrees N., 81.0 degrees W. Author's 7 A.M. positions for the period Jul. 20-24 were as follows: Jul. 20, 35.0 degrees N., 70.0 degrees W., based on item 17); Jul. 21, 38.7 degrees N., 60.0 degrees W. based on items 18) and 19) and on space-time continuity; Jul. 22, 44.3 degrees N., 46.3 degrees W., based on items 20) and 21); Jul. 23, 48.0 degrees N., 32.0 degrees W., based on item 21); Jul. 24, 55.5 degrees N., 21.0 degrees W., based on item 21). The new track for Storm 4, 1886 is presented in Fig. 3.

Neumann et al. (1993) attributed hurricane status to this storm. The statement "it exhibited great energy throughout its course" (item 15) seemed to imply hurricane intensity and wind and/or pressure information in items 16) through 19) confirmed that condition. Therefore, the hurricane classification given in Neumann et al. (1993) was found to be satisfactory.

Storm 5, 1886 ( Aug. 13-21), H.

The following information was found about this storm: 1) Storm of Aug. 13-20. Eastern Caribbean, Cuba, Indianola. Very severe in Cuba, destroyed Indianola (Tannehill, 1939). 2) Schr. "Gertie M. Rickerson". Aug. 14, lat.17 40 N., long. 67 30 W., encountered a hurricane from E.S.E. to S.W. lasting 6 hours (Monthly Weather Review, Aug. 1886). 3) Capt. Kelly of the steamship "Ozama", which arrived from Santo Domingo, gave further particulars of the cyclone on Aug. 14 and 15 and its results. During the night of Aug. 14-15 the barometer fell to 29.53 inches and tremendous rain fell. The cyclone passed to the S. and W. of the city. The rain continued during the next day, flooding the city and causing a freshet in the Ozama River, which swept along at a rate of 8 mph (The New York Times, Sept. 6, 1886, p 2, col.6). Author's note: The Monthly Weather Review, Aug. 1886, also published a statement by Capt.

Kelly of the "Ozama" specifying that the barometer fell to 29.53 inches at 2 A.M. Aug. 15, after which the weather cleared with rising barometer and that the wind set in from N., changing to N.W., W., S.W. and S.E. following the passage of the disturbance. The information in the Monthly Weather Review contradicts the one given in The New York Times in the sense that Aug. 15 was a rainy day at Santo Domingo; also wind changes that allegedly occurred after the disturbance passage seemed to be suspicious. 4) Aug. 16-18, 1886. A cyclone of considerable intensity moved over Cuba east of Cape Cruz (southeastern coast) and, after crossing the eastern provinces emerged from the island near Isabela de Sagua, where the vortical calm was felt. Then it passed to the N. of Havana, where it uprooted some trees and caused some houses to collapse. There were some casualties at Santa Clara (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban hurricanes by M. Gutierrez-Lanza which is included in Sarasola (1928). 5) The damage caused by the cyclone in Cuba during Aug. 17-18 was quite severe. The storm center entered Cuba near Manzanilla (it should read Manzanillo), crossed the island and left it near Sagua (Monthly Weather Review, Aug. 1886). Author's note: A storm coming from the S.E. or E. could not have entered Cuba near Manzanillo without previously crossing some Cuban territory of Oriente province. Therefore, the storm should have entered Cuba some distance to the southeast of Manzanillo, which is in agreement with item 4). 6) Barkentine "Harriet S. Jackson", at Cardenas (Cuba), Aug. 17, reported as follows: There was in this place a moderate storm beginning early in the morning, reaching its greatest force (about 60 mph) at 3 P.M., after which it moderated to a strong breeze. The gale began from N.E. and backed to W. and S., blowing the hardest from N.W. through S.W. quadrants (Monthly Weather Review, Aug. 1886). 7) The damage caused by the cyclone of Aug. 17-18 was quite serious. In Havana the storm did but little damage and the wind attained its greatest velocity on Aug. 18 when it blew at a rate of 20 to 30 meters per second (The New York Times, Aug. 28, 1886, p.1, col.7). Author's note: The 20 to 30 mps winds, which are roughly equivalent to 45 to 70 mph, probably blew at Havana early on Aug. 18. 8) The observer at Key West reported: 7 A.M. Aug. 17, barometer 29.93 inches, falling to 29.72 inches at 3 P.M.; barometer continued nearly stationary at 29.68 inches from 5:30 P.M. until past midnight (Aug. 17-18); at 7 A.M. Aug. 18, barometer 29.82 inches. At 12:15 P.M. Aug. 17, squall of 48 mph from N.E.; at 8 P.M. the wind hauled gradually to E., followed by numerous heavy gusts of wind estimated at 60 mph; afterwards, the wind slowly hauled to S.E., blowing in very heavy squalls and dropping below gale velocity at 9:15 A.M. Aug. 18 ( Monthly Weather Review, Aug. 1886). 9) Steamship "Manhattan". Passed Alligator Reef at 4:02 P.M. Aug. 17 bound for Havana. Wind blowing strong from E.N.E., with heavy squalls of rain and very low scud flying very rapidly to westward. The ship ran to the S.W. as long as possible to get clear of the Florida reefs and then hove to on starboard tack with head eastward. It ran until 1:52 A.M. Aug. 18, when could not run longer as the wind had increased so, and the sea was so high and dangerous, with barometer down to 29.36 inches and falling, that the ship hove to head to the wind to E. by S. and E.S.E. and off E.

by N. (?), blowing very hard for 4 hours, reaching at times 75 or 80 mph, with a very high dangerous sea. At 4:22 A.M., the barometer commenced to rise and at 9:22 A.M., the vessel kept off on her course to Havana; had fresh S. winds balance of passage (Monthly Weather Review, Aug. 1886). 10) U.S. lighthouse-tender "Arbutus", at Tortugas, was on the direct track of the cyclone which passed over that position between midnight (Aug. 17-18) and 2 A.M. Aug. 18, during which time the wind attained a velocity of about 70 mph (Monthly Weather Review, Aug. 1886). 11) Steamship "Comal". Aug. 18, lat. 26 35 N., long. 80 03 W., brisk S.E. wind and clear weather (Monthly Weather Review, Aug. 1886). 12) Steamship "San Marcos". Left Galveston for New York on Aug. 18. Aug. 19, lat. 27 55 N., long. 91 22 W., barometer 29.84 inches, wind E. force 6, frequent squalls with very heavy S.E. swell; Aug. 20, lat. 27 23 N., long. 89 21 W., barometer 29.92 inches, wind S.E. by E. force 4, frequent squalls with long E.S.E. swell (Monthly Weather Review, Aug. 1886). 13) Galveston, Tx. Aug. 19, the barometer fell but did not get dangerously low, standing at 29.78 inches; the lowest noted during the storm was 29.67 inches at 7 A.M. Aug. 20. On Aug. 19, wind N.E. to E., attaining 27 mph at 2:10 P.M.. Maximum wind velocity was 53 mph at 6:40 A.M. Aug. 20, the wind decreasing very slowly and the gale ending at 10:45 P.M. The wind caused the waters in the Gulf to become very high, reaching its maximum, 4 to 6 feet, at 7 A.M. Aug. 20 and remaining nearly stationary until 9 A.M., when they rapidly subsided (Monthly Weather Review, Aug. 1886). 14) Galveston, Tx., Aug. 21. During the gale of Thursday night (Aug. 19), the schooner "Livonia Perkins" was capsized off the bar in 6 fathoms of water. All the street railways are badly damaged and the water covered a great portion of the city. Many families have lost all and are destitute (The New York Times, Aug. 22, 1886, p.2, col.4). Author's note: Similar information about the "Livonia Perkins" was published in the Monthly Weather Review, Aug. 1886, which added that two men were drowned in the accident. The Times (London), Aug. 21, 1886, p.5, col.6, also referred to an inundation of southern and southeastern Galveston. 15) Indianola, Tx. By midnight Aug. 19-20, the wind had increased to 40 mph from N.E., with barometer 29.76 inches. By daylight Aug. 20 the water in the bay commenced to rise rapidly and at this time the wind was blowing from E. at 72 mph. At 8 A.M. the barometer had fallen to 28.86 inches. The building occupied by the Signal Office observer was crushed to pieces, causing the death of the latter. The whole town was given over to the fury of the elements and not a building was left standing when the storm cleared away. About 11 A.M. the wind had moderated perceptibly and by night there was a light S. breeze (Monthly Weather Review, Aug. 1886). 16) Galveston, Tx. Aug. 22. A special from News, Corpus Christi, says that on Friday morning (Aug. 20) one of the heaviest rainstorms for years struck that city. The wind had begun to blow very hard from S.E. the evening before and changed to N.W. between 5 and 6 A.M. Aug. 20. It blew with terrific force for 2 hours, its velocity being estimated at 75 mph (The New York Times, Aug. 23, 1886, p.1, col.6). Author's note: S.E. is obviously in error; the wind direction should have been N.E. or N. at Corpus Christi in the evening of Aug. 19. The Monthly Weather Review, Aug. 1886, also published an account of the storm

at Corpus Christi. 17) Brownsville, Tx. Midnight Aug. 19-20, barometer 29.67 inches; 7 A.M. Aug. 20, barometer 29.63 inches, wind N.W. 8 mph (Monthly Weather Review, Aug. 1886). 18) Cyclone of Aug. 19-20. Entire Texas coast. Extreme. Destroyed Indianola (Dunn and Miller, 1960). 19) Seguin, Guadalupe county, Tx. At 8 A.M. Aug. 20 the wind began to increase, shifting from the N. to the N.E at 10 A.M and continuing to inncrease in velocity; from 11 A.M. to 1 P.M., it blew at the estimated rate of 88 mph (Monthly Weather Review, Aug. 1886). 20) Victoria, Tx. Aug. 21. A destructive wind storm visited the city yesterday. The wind blew a hurricane. About 75 houses were demolished and 118 were more or less damaged. At about 7 A.M. Aug. 20, the eastbound train which was standing at the station here was blown over the platform (The New York Times, Aug. 22, 1886, p.2, col.4). Author's note: The Monthly Weather Review, Aug. 1886, also published an account of the storm at Victoria. 21) Luling, Tx. Aug. 22, 1886. At about daylight Friday (Aug. 20), a terrific storm set in and continued until 7 P.M., causing great damage (The New York Times, Aug. 23, 1886, p.1, col.6). 22) Houston, Tx. The storm of Aug. 19-20 began here at 7 P.M. Aug. 19 and continued to increase in violence during the night. At 9 P.M. the wind reached its greatest velocity, breaking numerous trees but doing no damage to buildings (Monthly Weather Review, Aug. 1886). Author's note: Winds as high as that reported at 9 P.M. Aug. 19 might have occurred at Houston through the morning hours of Aug. 20. 23) Cuero, De Witt county, Tx. A severe storm of wind and rain prevailed here between 5 and 11:30 A.M. Aug. 20 (Monthly Weather Review, Aug. 1886). 24) San Antonio, Tx. The morning of Aug. 20 opened with light rain and brisk N.E. winds; at 7 A.M., barometer 29.69 inches; by 11:30 A.M. the wind had increased to a gale from N.E. and the barometer had fallen to 28.74 inches; at 12:30 P.M., barometer 28.59 inches; at 1:30 P.M., barometer 28.03 inches. At 2:40 P.M., when shortly after the building was nearly destroyed, the barometer read 28.02 inches and the wind velocity was estimated at over 80 mph. Small hail-stones fell from 2 to 2:15 P.M.; the rainfall amount was 4.40 inches. The storm unroofed several buildings, including the signal station; with the latter roof, the anemometer and wind vane were carried away (Monthly Weather Review, Aug. 1886). Author's note: The New York Times, Aug. 23, 1886, p.1, col.6, also published a note about the storm at San Antonio, stating that it was the worst storm on record at that place. 25) Abilene, Tx. The morning of Aug. 20 opened with cloudy weather and gentle wind from S.; during the day the wind increased in force attaining at night a velocity of 33 mph and backing to N.E. During the early morning of Aug. 21, the wind veered from N.E. to S.E. and continued blowing a gale, reaching a maximum velocity of 48 mph at 4 A.M., after which it began to subside, at the same time veering to S.W. (Monthly Weather Review, Aug. 1886).

On the basis of information in a number of the items above, some modifications were introduced along the track shown in Neumann et al. (1993) for Storm 5, 1886. These modifications required the author of this study to establish new 7 A.M. positions for the period Aug. 13-18, whereas corresponding positions for the period Aug.19-21 in Neumann et al. (1993) were accepted because they were found to be supported by information contained in items 12) through

25). No position was given by the author for 7 A.M. Aug. 12 and this contrasted with a location near 11 degrees N., 59 degrees W. given in Neumann et al. (1993) for that day. By eliminating a position for Aug. 12, the author supported item 1) which mentioned the storm for first time in the eastern Caribbean on Aug. 13 and, in addition, avoided the risk of having the storm formed too early and/or having it seriously misplaced. Therefore, the author's first position was near 14.5 degrees N., 62.7 degrees W. for 7 A.M. Aug. 13 and was based on backward extrapolation from his estimated position for 7 A.M. Aug. 14, which was near 16.3 degrees N., 67.3 degrees W. and was based on information in item 2). The author's 7 A.M. Aug. 15 position was near 18.3 degrees N., 71.3 degrees W. and was estimated on the basis of information in item 3). For 7 A.M. Aug. 16, the author estimated a position near 19.5 degrees N., 76.5 degrees W., after having introduced a slight deviation of the track to the left under the effect of some temporary weakening induced by the Hispaniola and also on the basis of information in items 4) and 5) which required the storm to have entered Cuba east of Cabo Cruz and to have passed near Manzanillo. The author's position near 22.5 degrees N., 79.7 degrees W. for 7 A.M. Aug. 17 was primarily based on information in items 4) and 6) and represented a slight adjustment to the south of the corresponding position in Neumann et al. (1993) in order to satisfy that the storm center emerged from the northern coast of Cuba near Isabela de Sagua (item 4) and not about 90 miles farther east as shown in the above mentioned publication. For 7 A.M. Aug. 18, the author estimated a position near 24.7 degrees N., 84.3 degrees W., primarily on the basis of information in item 10) and on space-time continuity. The author's positions for the period Aug. 13-18 and the unchanged positions in Neumann et al. (1993) for Aug. 19-21 allowed one to prepared the track which is displayed in Fig. 3.

The hurricane status which Neumann et al. (1993) attributed to Storm 5, 1886 was fully supported by many of the items above, and its classification as an extreme hurricane given in item 18) can be easily inferred from the minimum pressure of 28.02 inches recorded at San Antonio, Tx. (item 24), over 100 miles inland and more than 6 hours after landfall. The central pressure when the center crossed the Texas coast should have been below 27.50 inches and probably approaching 27.00 inches, which opens the possibility that the storm could have been a category 5 hurricane on the currently used Saffir-Simpson scale.

Storm 6, 1886 (Aug. 15-27), H.

The following information was found about this storm: 1) This cyclone of tropical origin was first reported to the eastward of Barbados under date of Aug. 15 (Monthly Weather Review, Aug. 1886). 2) A steamer from Europe reported a hurricane, lasting 8 hours, on the night of Aug. 15, 90 miles N.E. of Barbados (Monthly Weather Review, Aug. 1886). 3) Capt. Locke, of the steamship "Muriel", from Barbados, stated that a severe hurricane was experienced at the island of St. Vincent on Aug. 16, doing much damage; estimated width was 20-30 miles. It passed over the island from N.E. to S.W., the whole southern part of the island being laid waste. A number of

people were killed and many injured (Monthly Weather Review, Aug. 1886). Author's note: The Times (London), Sept. 9, 1886, p.5, col.4, also published a narrative by Capt. Locke of the "Muriel" adding that thousands of trees were destroyed as well as 5 churches, a mission house and 300 dwellings were blown down. He also stated that a number of persons were killed, 30 were injured and 1500 were rendered destitute at St. Vincent. 4) According to news from the Lt. Governor of St. Vincent, a great misfortune visited the colony in the shape of a cyclone which burst over Kingstown on the morning of Aug. 16. For 2 days after the tempest, rivers were impassable and the highways blocked with trees. Four deaths occurred and from 500 to 600 houses were destroyed (The Times, London, Sept. 8, 1886, p.3, col.4). 5) From a letter about the recent hurricane at St. Vincent dated on Aug. 29: The storm broke over the hills over us about 5 A.M. (Aug. 16). I (the sender) aroused around 6 and was informed that several trees around the house were broken and that the weather looked odd. The wind rapidly increased and we aroused the rest of the family, expecting every moment that some catastrophe would happen to the house. The galvanized roof of the bathroom was whipped off, carried in the air and lodged high on the hill above us. The wind came from all sides so that the roofs of the houses above us were carried in the opposite direction into the sea. Certainly it seemed to blow from every quarter at the same time. It was at its height from 6 to 8 A.M. The animals in the yard ran about in the greatest fear and never emerged from their hiding places till all was over at about 11 A.M. (The Times, London, Sept. 13, 1886, p.12, col.4). 6) Lloyd's agent at Barbados telegraphs that a hurricane passed over St. Vincent on Aug. 16, doing considerable damage to property. Several lives were lost (The Times, London, Aug. 21, 1886, p.5, col.6). Author's note: The fact that the Lloyd's agent does not mention that the hurricane affected Barbados tends to support the N.E. to S.W. motion attributed to the storm as it passed over St. Vincent on Aug. 16 (item 3) and its location some distance to the N.E. of Barbados reported by a ship in item 2). Indications are that the storm was a hurricane of a very short diameter (item 3) which passed to the N. of Barbados without seriously affecting that island. 7) Storm of Aug. 16-18. Grenada, Cuba (Tannehill, 1938). Author's note: The storm passed to the N. of Grenada. Curiously, no mention was given as to the storm having affected St. Vincent as it did. 8) On Aug. 17 a heavy gale from the W. veering to S.E. passed over Curacao, causing much damage on the island (Monthly Weather Review, Aug. 1886). 9) Bark "Kestrel", lat. 12 40 N., long. 69 30 W., had a heavy gale, lasting 4 hours, during which lost and split sails, cabin windows stove in and cabin flooded; lowest barometer was 28.90 inches (Monthly Weather Review, Aug. 1886). Author's note: Although no date was given, the vessel should have felt the gale late on Aug. 17. 10) Steamship "City of Para". Experienced a strong gale force 9 commencing in the morning of Aug. 19 and continuing until the afternoon of Aug. 20. Wind set in at N.E., backing to N.W., W., S.W., S., S.E. and E.S.E. during the storm; lowest barometer was 29.40 inches at 1:30 P.M. Aug. 19 when in lat. 15 36 N., long. 75 52 W. (Monthly Weather Review, Aug. 1886). 11) Steamship "Newport" experienced a storm of unusual severity on Aug.

19, soon after leaving the island of Navassa. During the afternoon the sea grew rough and rain fell in torrents while a strong wind from N.E. increased to a gale. About 6 P.M. the steamer rolled and pitched at a fearful rate. At 8 P.M. the barometer continued to fall and the vessel was headed to the eastward, away from the vortex of the storm, which by that hour had developed all the symptoms of a well-defined cyclone. The wind had increased to a hurricane and the seas were fearful. Before the morning (of Aug. 20), the center had passed to the W. and N., and the ship again laid her course for Colon (Monthly Weather Review, Aug. 1886). Author's note: Navassa is a small island located between Haiti and Jamaica. Colon is a port on the northern coast of Panama. 12) Steamship "Alvo", at Navassa, Aug. 19 and 20, had a blow from S.W. (Monthly Weather Review, Aug. 1886). Author's note: The S.W. direction seemed to be in error and it should probably read S.E. 13) Steamship "Claribel", laying in Morant Bay (southeastern Jamaica), inside reefs. Aug. 19, 8 A.M., barometer 29.75 inches, gradually falling. Several indications of a hurricane were absent until 11 P.M., when barometer was 29.48 inches. Made all preparations for standing to sea from 11 P.M. to 1:50 A.M. Aug. 20. Wind increased, blowing a terrific hurricane as the center passed to the southward; barometer 28.86 inches at 1:30 A.M.; barometer 29.16 inches at 2:30 A.M., with wind hauling rapidly to S.E.; barometer 29.36 inches at 3:30 A.M., with tremendous seas running dead on to the land. Having swung clear of the reef, the ship steamed out full speed with wind force 11 at 4:30 A.M. and stood southward until 9 A.M. Aug. 20 when barometer 29.66 inches, then bore away for Kingston. At commencement the storm set in from N.E., changing to E.N.E., E., S.E. and S. Lowest barometer 28.86 inches at 1:50 A.M. Aug. 20; force of gale at its height, over 12 on the Beaufort scale (Monthly Weather Review, Aug. 1886). Author's note: As barometer readings of 28.86 inches were given for 1:30 and 1:50 A.M. Aug. 20, it seems fair to accept that the pressure stood essentially steady over the 20-minute period in spite of the fact that the lowest pressure is stated to have occurred at 1:50 A.M. 14) Steamship "Ailsa" had a whole gale to hurricane on Aug. 19 and 20, veering from E.N.E. to S.S.E.; lowest barometer 29.48 inches at 4 A.M. Aug. 20 in lat. 18 35 N., long. 76 20 W. (Monthly Weather Review, Aug. 1886). 15) Montego Bay, Jamaica. Aug. 20, wind set in from E.N.E., with heavy rain squalls, shifting to N.N.E., N., N.W. and W.S.W.; lowest barometer was 29.61 inches at 10 A.M.; greatest wind force was from N.W. from 9:30 to 10:30 A.M. (Monthly Weather Review, Aug. 1886). 16) Lloyd's agent at Kingston telegraphed that a hurricane passed over that place on Aug. 19 and 20. Several coasting craft have been sunk or stranded. The "Northside" is supposed to have sustained damage. Communication is interrupted (The Times, London, Aug. 23, 1886, p.9, col.6). 17) A telegram from Lloyd's agent at St. Thomas stated that a hurricane has passed over Jamaica, doing considerable damage to property (The Times, London, Aug. 21, 1886, p.9, col.5). 18) Advices from Jamaica state that during the hurricane of Aug. 19 the entire pimento crop was blown off the trees, nearly all the coffee crop destroyed, several parishes of the island denuded of trees, banana plantations destroyed and ships in the harbor of Kingston damaged (Monthly

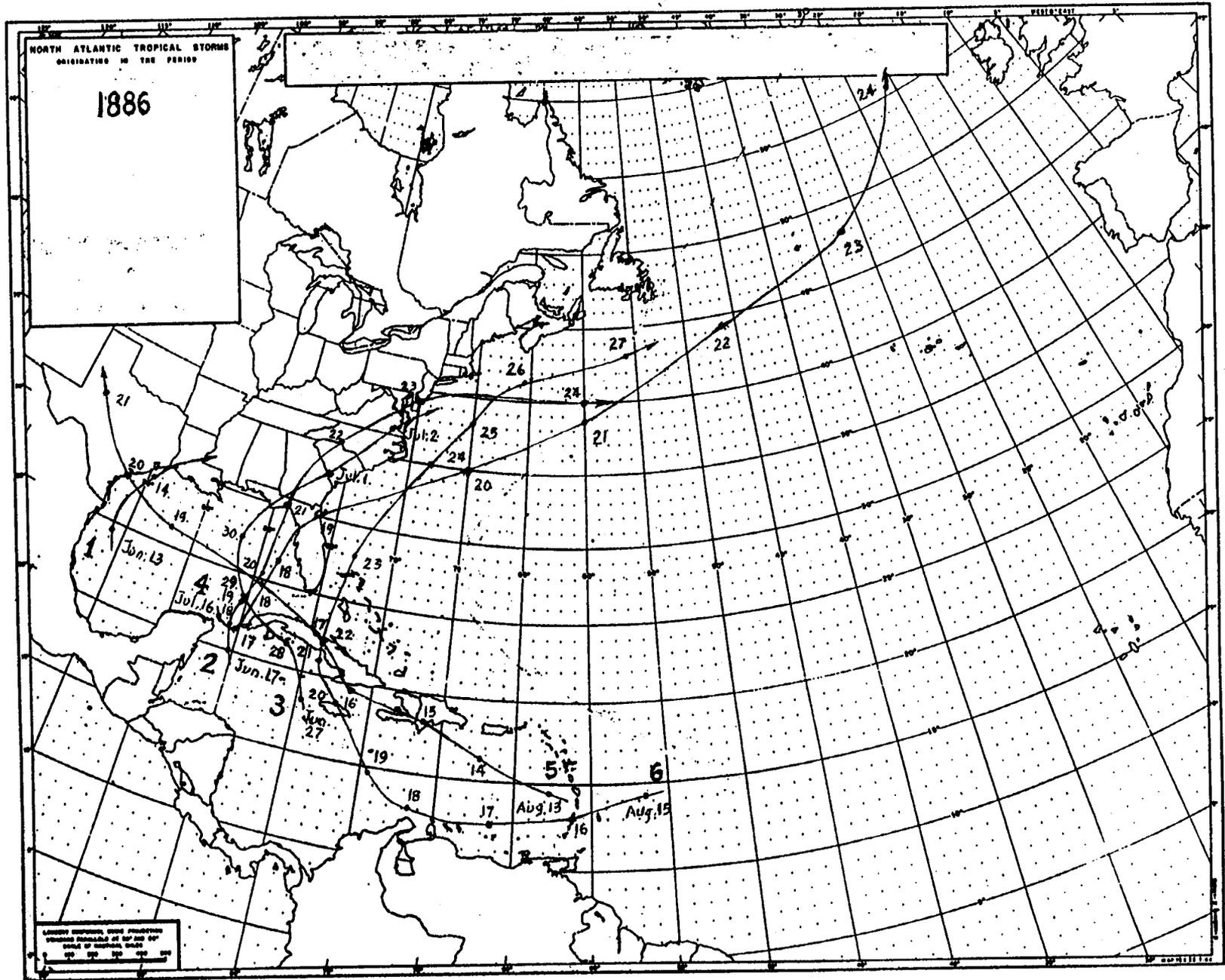


Fig. 3.

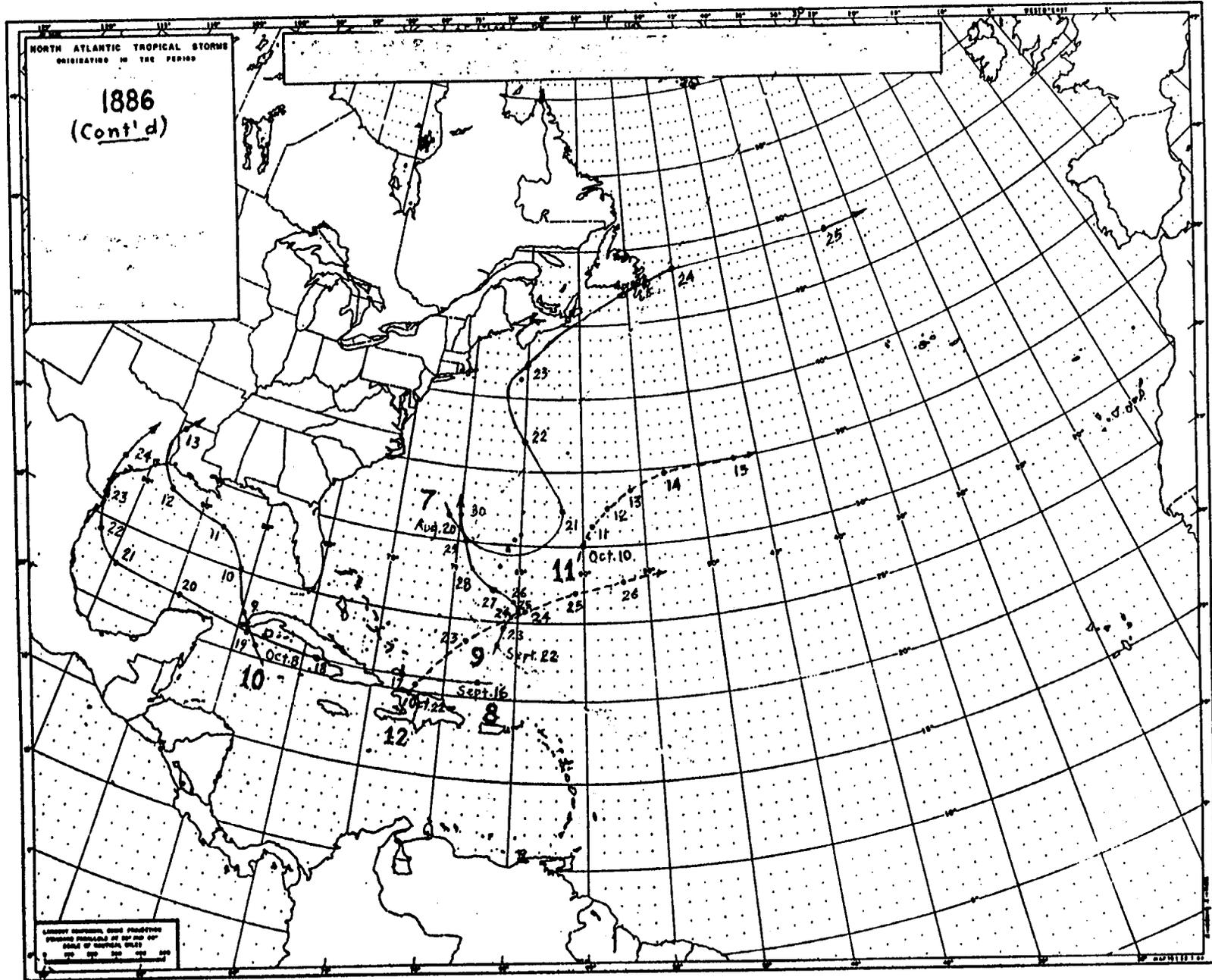


Fig. 3 (Cont'd).

Weather Review, Aug. 1886). 19) The hurricane recurved over Ensenada de Jucaro on Aug. 21 (Vines, 1895). Author's note: Ensenada de Jucaro is located on the southern coast of Cuba near the 79 degrees W. meridian. Father Vines attributed the recurvature at such an unusually low latitude for August to an interaction between this hurricane and the one which was on the Texas coast on Aug. 20 (Storm 5, 1886). 20) Aug. 21-22. Intense hurricane moved across Cuba in the vicinity of La Trocha. It devastated the municipalities of Santa Clara, Jucaro, Ciego de Avila and Moron. The cyclone came from St. Vincent, passed over Jamaica and recurved S. of Ensenada de Jucaro (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). La Trocha is a name used to designate the relative narrow portion of Cuba near long. 79 W., between the towns of Jucaro on the southern coast and Moron on the northern coast. 21) The storm passed N. over Cuba in about 81 degrees W. during Aug. 22 (Monthly Weather Review, Aug. 1886). Author's note: Long. 81 W. is definitively too far W. According to items 19) and 20), the storm crossed Cuba near long. 79 W. 22) Havana, Sept. 10. Further particulars of the damage done by the cyclone of Aug. 20-23 have been received. In Manzanillo, Jucaro, Ciego de Avila, Moron and other districts hundreds of houses were overturned and a large number of cattle were drowned. The number of trees blown down was great (The Times, London, Sept. 11, 1886, p.1, col.2). 23) A hurricane swept over the island of New Providence (Nassau) on the night of Aug. 22. The gale was from the S.E. and blew with great violence for several hours. Sailing vessels dragged their anchors and went ashore or were driven over the bar and out to sea. Reports from the Berry Islands and Andros state that the storm there was very heavy and that many sponging and fishing vessels were wrecked. Some loss of life is also reported (Monthly Weather Review, Aug. 1886). Author's note: The New York Times, Aug. 31, 1886, p.1, col.4, also published a similar narrative about the storm in the Bahamas. 24) Bark "Flash Light". Aug. 24, lat. 34 N., long. 74 W., had a hurricane from S.E. veering to W., blowing with terrific fury; considerable damage caused to the vessel (Monthly Weather Review, Aug. 1886). 25) Schr. "Gertie M. Rickerson". Aug. 24, lat. 34 N., long. 73 W., took a hurricane from S.S.E. to W., lasting 8 hours (Monthly Weather Review, Aug. 1886). 26) Bark "Newcombe". Aug. 24 and 25; lat. 36 N., long. 72 W. (at 3:30 A.M. Aug. 25), had a hurricane from S.S.E. to W., lasting 24 hours (Monthly Weather Review, Aug. 1886). 27) Bark "Mohican", in lat. 37 10 N., long. 71 24 W. (at 6 A.M. Aug. 25), had a whole gale from S.S.E. to W.S.W. (Monthly Weather Review, Aug. 1886). 28) Steamship "Canada", in lat. 40 28 N., long. 67 12 W. (at midnight Aug. 25-26), had a gale from E., backing to N., with heavy rain; lowest barometer 29.44 inches (Monthly Weather Review, Aug. 1886). 29) Schr. "L.A. Plummer". Aug. 25, lat. 40 50 N., long. 69 10 W. (at 8 P.M.), had a hurricane from E.N.E. backing to N.W. (Monthly Weather Review, Aug. 1886). 30) Ship "Emily F. Whitney". Aug. 25, lat. 39 48 N., long. 69 15 W. (at noon), had a hurricane from S.E. commencing at 10 P.M. with heavy seas; hurricane continued on Aug. 26, lat. 39 29 N., long. 69 51 W. at noon, backing to E., N.E. and N.W. and moderating at 6 P.M.; barometer at noon Aug. 26: 29.85

inches (Monthly Weather Review, Aug. 1886). Author's note: The barometer reading appears to be too high. In addition, ship's positions are highly suspected because they are only about 30 miles apart, implying that the ship sailed at only 2-3 knots. 31) Bark "Benj. F. Hunt, Jr." Aug. 25, lat. 34 22 N., long. 69 48 W. (at noon), had a terrific gale from S. commencing at 10 P.M. and continuing on Aug. 26, the wind shifting to W. and N.W. and moderating after 4 P.M. (Monthly Weather Review, Aug. 1886). Author's note: At least the latitude given by this vessel seems to be in error. 32) Bark "John H. Pearson" had a heavy gale from E., backing to N. on Aug. 25 in lat. 40 40 N., long. 68 20 W. (Monthly Weather Review, Aug. 1886). 33) Bark "Harvester". Aug. 25, lat. 40 33 N., long. 66 08 W. (at noon). At 7 P.M., strong S.E. breeze with very heavy thunder and lightning and rain. Aug. 26, 9 A.M., gale increased; wind S.E. with a very heavy sea and also a heavy sea coming up from W.S.W.; at 1 P.M. the gale increased to hurricane force with very heavy sea, W.S.W., breaking. The hurricane lasted about 8 hours, gradually drawing to the W. and from there to the N.W., in a strong gale, decreasing in violence; lowest barometer 29.20 inches (Monthly Weather Review, Aug. 1886). Author's note. The meaning of a few of the statements above is not clear. 34) Steamship "Camellia". Aug. 25, in lat. 39 20 N., long. 69 42 W., had a very strong E.N.E. gale, shifting to N. and lasting from noon until 8 P.M.; barometer 29.48 inches; heavy squalls of wind and rain and heavy seas (Monthly Weather Review, Aug. 1886).

On the basis of a large number of the items above, some modifications along the track for Storm 6, 1886 in Neumann et al. (1993) were introduced for the period Aug. 15-22. However, positions for the period Aug. 23-27 were found to be either in agreement with the marine information available for Aug. 24 and 25 or impossible to be verified because of insufficient or non-existing information; in both cases the positions in Neumann et al. (1993) were kept unchanged. Consequently, the author of this study estimated new 7 A.M. positions for the days as follows: Aug. 15, near 14.3 degrees N., 56.5 degrees W., on the basis of information in items 1) and 2); Aug. 16, near 13.0 degrees N., 61.3 degrees W., primarily based on information in item 3); Aug. 17, 12.5 degrees N., 66.5 degrees W., based on space-time continuity and information in items 8) and 9), this position is slightly to the W. of the one in Neumann et al. (1993); Aug. 18, near 13.0 degrees N., 71.7 degrees W., primarily based on space-time continuity using information in items 9) and 10); Aug. 19, near 14.7 degrees N., 74.5 degrees W., on the basis of item 10) and space-time continuity; Aug. 20, near 18.5 degrees N., 77.3 degrees W., based on information in items 13) through 15); Aug. 21, near 21.0 degrees N., 79.0 degrees W., based on information in item 20); Aug. 22, near 22.0 degrees N., long. 79.0 degrees W., chiefly based on item 20). The above mentioned positions for Aug. 15-22, as well as the positions for Aug. 23-27 in Neumann et al. (1993) which were kept unchanged, were used to prepare the storm track which is displayed in Fig. 3.

The hurricane status given to Storm 6, 1886 in Neumann et al. (1993) was found to be fully supported by the content of a number of the above items, including the barometer readings of 28.90

inches reported by the "Kestrel" (item 9) and 28.86 inches reported by the "Claribel" (item 13). It is even possible that the storm might have been a major hurricane as suggested by the nomenclature used in item 20).

Storm 7, 1886 (Aug. 20-25), H.

This storm represents a new case in the sense that it is not included in Neumann et al. (1993). However, the Monthly Weather Review, Aug. 1886, has referred to this storm before, and even indicated a probable tropical origin and offered a track for it.

Documentation of this storm case was based on the following information: 1) Bark "Argyll". Aug. 20, lat. 32 10 N., long. 71 50 W., had a gale from S., hauling around by E. to N.W. and going around the compass 3 times in two and a half hours, blowing with terrific force, accompanied by vivid lightning, terrific thunder and torrents of rain, the sea being one mass of foam, breaking in all directions; the storm passed S.E., leaving the ship with a hard gale from the N.E. (Monthly Weather Review, Aug. 1886). 2) Bark "Edwin Reed". Aug. 21, lat. 33 N., long. 62 25 W., encountered a hurricane from E. veering to N. to S.S.E., which blew with special fury for 4 hours, injuring two of the crew and causing considerable damage to the vessel; lowest barometer 28.40 inches at 11 A.M. (Monthly Weather Review, Aug. 1886). 3) Bark "Theresina". Aug. 21, lat. 33 50 N., long. 63 W., had a hurricane from E.S.E. veering to N. (Monthly Weather Review, Aug. 1886). 4) Steamship "Victoria". Aug. 21, lat. 34 47 N., long. 62 29 W., encountered a hurricane; wind set in from E., changed to N. during and to S.S.W. following the passage of the disturbance; lowest barometer 28.45 inches at midnight Aug. 21 (Monthly Weather Review, Aug. 1886). 5) Ship "Coringa". Aug. 22, lat. 40 30 N., long. 67 W., experienced a hurricane, wind S.S.W. changing to E. and N.W.; lowest barometer at 4 P.M. (Monthly Weather Review, Aug. 1886). 6) Bark "Toivo". Aug. 22, lat. 41 01 N., long. 66 21 W. (at 3 P.M), had a hurricane, wind set in from E. and backed to N.W.; the hurricane was preceded by very heavy sea from S.W., accompanied by very heavy chopped sea and torrents of rain; lowest barometer 29.25 inches at 3 P.M. (Monthly Weather Review, Aug. 1886). 7) Steamship "The Queen". Strong gale commenced from S.E. at 10 A.M. Aug. 22 and ended at midnight the same day; wind veered to N.; lowest barometer 29.60 inches at 11 P.M. (Monthly Weather Review, Aug. 1886). Author's note: No position was given. 8) Steamship "Servia". Aug. 22, had a strong gale from N.E., veering to S.; lowest barometer 29.59 inches in lat. 40 44 N., long. 65 15 W. at 4 P.M; from 7 A.M. to 6 P.M. had constant and heavy rain with very thick weather (Monthly Weather Review, Aug. 1886). 9) Steamship "Normandie". Aug. 22, lat. 40 45 N., long. 66 20 W., had a hurricane from noon to 8 P.M.; wind set in from N.E. and hauled slowly to the S.W. passing by E., S.E. and S. with force 10 of 12 (on the Beaufort scale). The sea was monstrous and cross, coming from N.E. and S.E. at the same time. The barometer fell to 29.02 inches and rose from 8 P.M. as the wind abated. Very heavy rain fell during the hurricane (Monthly Weather Review, Aug. 1886). 10) Steamship "Rhyndland". Had a whole gale on Aug. 22 and 23, from N.E. backing to N.W.; lowest barometer 29.17

inches at midnight Aug. 23 (it should read midnight Aug. 22-23) in lat. 41 12 N., long. 67 W. (Monthly Weather Review, Aug. 1886). 11) Steamship "St. Ronans". Aug. 22 at 9 P.M. in lat. 42 N., long. 62 45 W., had a terrific gale; wind hauled to S. and S.W. at 10 P.M. (Monthly Weather Review, Aug. 1886). Author's note: Long. 62 45 W. seems to be too far east if "Aug. 22 at 9 P.M." were correct. 12) Steamship "Persian Monarch". Aug. 23, lat. 44 N., long 62 W. (at 4 P.M.), had a strong gale from S., veering to N.W.; lowest barometer 29.70 inches (Monthly Weather Review, Aug. 1886). 13) Gloucester, Ma., Aug. 26. Several vessels from the George and Grand Banks arrived here and reported a severe storm on Aug. 23 (it should read Aug. 22 and 23). Schr. "David Sherman" was struck by the cyclone Sunday morning (Aug. 22) at George Bank. The "Joseph Garland" was thrown on her beam ends. The "Gatherer" took the gale off Cape Sable and the "A.T. Gifford" had sails blown to pieces and her foreboom broken. The gale was reported to have been the worst over the Banks in many years (The New York Times, Aug. 27, 1886, p.5, col.3). 13) Halifax, Aug. 29. The bark "Naomi", from New York for Settin, put into this port this morning disabled. She was out in the terrific storm of Sunday last (Aug. 22) during which her deck was swept and her cabin completely destroyed (The New York Times, Aug. 30, 1886, p.1, col.4). 14) Halifax, Sept. 3. The brigantine "P.J. Palmer" (from Portland, Me. to Buenos Aires, Argentina), encountered a strong gale on Saturday (it should read Sunday) Aug. 22, which by night veered to S. and increased to a terrific hurricane, causing a tremendous sea (The New York Times, Sept. 4, 1886, p.2, col.6). 15) Halifax, Sept. 3. The schooner "Elizabeth Foster" was in a heavy gale on Sunday Aug. 22 (The New York Times, Sept. 4, 1886, p.2, col.6). 16) Steamship "Anchoria". Aug. 24, lat. 42 N., long. 63 W. (at 2 P.M.), had a fresh gale from S.W. to N.W.; lowest barometer 29.79 inches at 2 P.M. (Monthly Weather Review, Aug. 1886). Author's note: This information might not be related with this particular storm. 17) Steamship "Canada". Aug. 24, lat. 42 16 N., long. 61 30 W., had a fresh gale from S.S.W. veering to N.W.; lowest barometer 29.83 inches at 4 P.M. (Monthly Weather Review, Aug. 1886). Author's note: This information might not be related to this particular storm either. 18) Map showing a track for the storm. Daily positions were read off the map as follows: Aug. 20, 32.5 degrees N., 70.7 degrees W; Aug. 21, 33.3 degrees N., 61.7 degrees W.; Aug. 22, 40 degrees N., 65 degrees W., Aug. 23, 44 degrees N., 65 degrees W.; Aug. 24, 48.5 N., 50 degrees W.; Aug. 25, 48.3 degrees N., 33.3 degrees W. The track was ended at 50 degrees N., long. 29 degrees W. (Monthly Weather Review, Aug. 1886).

Based on information in item 1), the author of this study estimated a 7 A.M. Aug. 20 position near 31.7 degrees N, 71.0 degrees W. and then started a track oriented to the S.E., the E. and the N.E. to avoid the island of Bermuda by having the storm passed about 175 miles to the S. in compliance with the fact that, according to Tucker (1982), no gale of tropical origin affected that island in 1886. The author's position for Aug. 21 was near 32.3 degrees N., 61.7 degrees W. and was based on items 2) and 3). A careful analysis of the information contained in items 4) through 10) allowed the author to estimate a 7 A.M. Aug. 22 position near

37.0 degrees N., 65.0 degrees W. The author's estimated position for Aug. 23 was near 42.3 degrees N., 65.0 degrees W. and was primarily based on the content of items 10) and 12). Positions for 7 A.M. Aug. 24 and 7 A.M. Aug. 25 were taken from item 18). These positions were near 48.5 degrees N., 50.0 degrees W. and near 48.3 degrees N., 33.3 degrees W. for Aug. 24 and for Aug. 25, respectively. The author's track for Storm 7, 1886 is displayed in Fig. 3.

Information contained in a number of the above items clearly indicated that the storm attained hurricane intensity and the fact that barometer readings as low as 28.45 inches and 28.40 inches were reported by the "Victoria" (item 4) and the "Edwin Reed" (item 2), respectively, strongly suggested that Storm 7, 1886 was a major hurricane.

#### Storm 8, 1886 (Sept. 16-24), H.

This is the same storm which Neumann et al. (1993) identify as Storm 7, 1886.

The following information was found about this storm: 1) Steamship "Edith Godden". Sept. 15, from lat. 21 N., long. 74 18 W. to lat. 30 N., long. 75 30 W., had moderate and strong E. gales and high easterly sea. Noon Sept. 16, barometer 29.85 inches; at 4 and 8 P.M. and at midnight (Sept. 16-17), barometer 29.79 inches; 8 A.M. Sept. 17, barometer 29.74 inches; at noon, in lat. 23 06 N., long. 74 30 W., the barometer had risen slightly; 3:30 P.M., heavy and frequent squalls and every appearance of bad weather; 4 P.M., barometer 29.73 inches; 6 P.M., barometer 29.70 inches, moderate E. gale, high sea, heavy squalls, gale moderating during the evening, wind continued easterly; 8:30 P.M., barometer 29.73 inches, squalls getting heavier and more frequent; 11:30 P.M., barometer 29.70 inches, moderate E. gale, high sea from E. and heavy squalls (Monthly Weather Review, Sept. 1886). 2) Steamship "Ozama". Sept. 16 commenced with fresh S.S.E. wind and cloudy sky; noon, wind refreshed with high sea; 6 P.M., barometer 29.85 inches, wind increased to a storm, with tremendous sea, hove ship to, heading E., riding easy; 4 A.M. Sept. 17, lat. 23 30 N., long. 70 45 W., barometer 29.82 inches; 6 P.M., barometer rising. During the past 24 hours tremendous squalls. Noon Sept. 18, arrived at Turk's Island. The wind during the storm was S.E. to N.E. 3) A fairly well-defined depression apparently passed westward S. of Haiti and Cuba during Sept. 16-18 and entered the southern portion of the Gulf (of Mexico) on Sept. 19 (Monthly Weather Review, Sept. 1886). Author's note: A cyclone passing to the S. of Haiti seems to be too far south to have produced the gales, and specially the relatively low barometer readings, reported in items 1) and 2). 4) Storm of Sept. 15-25. Martinique, Jamaica, Brownsville. In 1886, a hurricane which had previously passed near Martinique and Jamaica crossed the coast near Brownsville (Tannehill, 1938). Author's note: It is hard to explain the weather conditions described in items 1) and 2) as resulting from a hurricane which passed as far south as Martinique and Jamaica. Only a strong hurricane of an unusually large diameter could have caused such an event and this is unlikely to have been the case. It looks more plausible to believe that the storm passed

just N. of Hispaniola and not south of that island as implied in accepting a Martinique-Jamaica track. 5) Brownsville, Tx. During the night of Sept. 21-22, E. winds prevailed, attaining at 10 P.M. a velocity of 24 mph. Fresh and high E winds prevailed during Sept. 22. At 1:30 P.M. the barometer began falling rapidly, reading 29.54 inches at 3 P.M. and 29.15 inches at 11 P.M. During the afternoon the wind increased in force, attaining at 9:30 P.M. a velocity of 68 mph from E. The gale prevailed until 12:30 A.M. (Sept. 23) when the wind lulled and the barometer began to rise. At 2 AM the wind veered to W. and began blowing hard, attaining between 3 and 9:45 A.M. (Sept. 23) the force of a gale; maximum velocity was 39 mph. During the four days that the storm prevailed (Sept. 20-23), 25.98 inches of rain fell (Monthly Weather Review, Sept. 1886). 6) Storm of Sept. 23-24. Lower Texas coast. Minimal, 25.98 inches of rain near Brownsville (Dunn and Miller, 1960). 7) Philadelphia, Sept. 29. A great storm raged over S.E. Texas during the past week. During Sept. 21-23, 26 inches of rain fell at Brownsville. The wind reached the velocity of 100 mph and more than 200 houses in Brownsville were blown down (The Times, London, Sept. 30, 1886, p.3, col.6). 8) Corpus Christi, Tx. At 3 P.M. Sept. 24 (it should read Sept. 23) the gale attained a velocity of 68 mph from N.E. and was accompanied by very heavy rain. The tide was very high, overflowing the lower part of the town and carrying away thousands of ties from the Mexican-National and the Aransas Pass railways (Monthly Weather Review, Sept. 1886) 9) Galveston, Tx. At 1:20 P.M. Sept. 22, an E. gale of 27 mph set in; heavy rain and gale continued throughout the night. Light rain fell during Sept. 23; at 11:35 P.M. a S.E. gale set in and continued until 9:40 A.M. Sept. 24; maximum velocity was 34 mph (Monthly Weather Review, Sept. 1886).

Based on information in some of the items above, the author of this study proposed a series of modifications along the track shown in Neumann et al. (1993) prior to Sept. 22 and as for Storm 7, 1886 in their publication. After a careful analysis, he decided to weight heavily the content of items 1) and 2) and to discard a trajectory Martinique-Jamaica passing to the S. of Haiti which was suggested in items 3) and 4). By so doing, the possibility of having had two different storms moving simultaneously along almost parallel tracks just a couple hundred miles apart (one to the north and the second to the south of Hispaniola) was also discarded as an event of extremely unlikely occurrence. The author then started a track passing to the N. of Haiti, crossing eastern Cuba and then continuing south of this latter island to enter the Gulf of Mexico through the Yucatan Channel. Author's estimates for 7 A.M. positions were as follows: Sept. 16, 21.0 degrees N., 67.7 degrees W., based on information in item 2) and backward extrapolation; Sept. 17, 21.0 degrees N., 73.0 degrees W., primarily based on information in item 1); Sept. 18, 21.0 degrees N., 79.0 degrees W., based on information in item 1) and on space-time continuity; Sept. 19, 21.5 degrees N., 84.3 degrees W., based on space-time continuity and on information in item 3); Sept. 20, 22.3 degrees N., 89.7 degrees W., essentially based on space-time continuity; Sept. 21, 22.5 degrees N., 94.7 degrees W., essentially based on space-time continuity along a smooth track after allowing for a

slight deceleration to fit the 7 A.M. Aug 22 position shown in Neumann et al. (1993). Because the 7 A.M. positions for the period Sept. 22-24 which are shown in the above publication were found to be supported by information in items 5), 8) and 9), such positions were kept unchanged. All positions above were used in the process of preparing the track for Storm 8, 1886 which is shown in Fig. 3.

Indications are that the storm was not strong in the vicinity of Hispaniola and Cuba: it is not mentioned by Sarasola (1928) and Martinez-Fortun (1942) who have published catalogs of Cuban cyclones. However, the hurricane status which Neumann et al. (1993) attribute to this storm was verified by the barometer reading of 29.15 inches (lowest pressure should have been lower than this value) reported as having been obtained at Brownsville at 11 P.M. Sept 22 (item 5) and by that, according to item 7), the wind reached 100 mph at that place.

#### Storm 9, 1886 (Sept. 22-30), H.

This is the same storm that Neumann et al. (1993) identify as Storm 8, 1886.

The following information was found in connection with this storm: 1) Bark "Mary". Sept. 22, at noon, lat. 24 40 N., long. 66 W., had a hard gale from E.S.E. veering to N.E., with terrific squalls of wind and rain and dangerous sea from E.S.E. to N.E.; Sept. 23, lat. 25 20 N., long. 66 20 W. (at noon); 2 A.M., hard gale, barometer falling, terrific squalls of wind and rain; 8 A.M., blowing a hurricane with very hard rain, very heavy cross sea, wind N.E., barometer falling to 29.25 inches; 1 P.M., barometer slightly higher, terrific hurricane with rain; 8 P.M., wind backing to N., heavy squalls, barometer 29.40 inches; midnight (Sept. 23-24), moderating, squally with rain; Sept. 26, lat. 25 17 N., long. 67 59 W. (at noon), had very heavy sea from N.E., N. and N.W.; midnight (Sept. 26-27), hard gale, barometer 29.60 inches, frightful sea; Sept. 27, lat. 25 17 N., long. 67 30 W. (at noon), had a hard gale with heavy rain and frightful sea, barometer 29.50 inches; vessel shipped sea fore and aft, tearing off all bulwarks; 6 A.M., barometer 29.45 inches, hard gale, clouds breaking, wind W. by N.; the appearance of the weather at this time was very peculiar, with a slaty gray. Noon (Sept. 28), barometer 29.60 inches, weather clearing to the S.W. (Monthly Weather Review, Sept. 1886). 2) Brigantine "Pearl". Sept. 24, lat. 25 40 N., long. 63 45 W., barometer falling, weather gloomy and threatening; noon position, Sept. 25, lat. 26 38 N., long. 64 11 W.; 4 P.M., heavy S.W. swell running through a S.S.E. swell; 6 P.M., violent squalls; at night, bluish lightning in the form of balls and big flashes, commencing in the S.W. and ending in the E.N.E.; 11 P.M., St Elmo's light at the yard-arms and royal trucks, with heavy rain, barometer falling all day; noon position, Sept. 26, lat. 26 38 N., long. 65 31 W., barometer 29.72 inches; day commenced with a N.E. wind of great violence and heavy rain, moderating at 6 P.M. to a severe gale; at 8 P.M., the sea began to run very high, breaking heavily; Sept. 27, severe gale throughout the day, wind hauling from E.N.E. to S. with heavy rain, compelled to use oil bags to save the vessel. Experienced heavy weather until Sept. 30, in lat. 32 N., long. 68

W. (Monthly Weather Review, Sept. 1886). Author's note: The barometer reading of 29.72 inches at noon Sept. 26 is obviously too high. 3) The dismasted brig "Elche", from Demerara, reported that on the morning of Sept. 25 at lat. 26 N., long. 66 W. ran into a hurricane which began from S.E. and veered to N.W. and then backed to S.E.. The storm continued for 72 hours and everything was washed from the decks by heavy seas (The New York Times, Oct. 17, 1886, p.14, col.1). 4) Bark "Reindeer" arrived from Antigua and reported having encountered a terrific gale on Sept. 30, in lat. 32 06 N., long. 68 40 W. (The New York Times, Oct. 11, 1886, p.8, col.1).

Based on the content of the above items, the author of this study felt that it was possible to prepare an entire track which was more accurate than the one on Neumann et al. (1993) as for Storm 8, 1886. Therefore, he estimated 7 A.M. positions as follows: Sept. 22, near 23.5 degrees N., 66.5 degrees W., based on item 1); Sept. 23, near 24.7 degrees N., 66.0 degrees W., also based on item 1); Sept. 24, near 25.3 degrees N., 65.5 degrees W, primarily on the basis of interpolation between positions on the previous and the next day; Sept. 25, near 25.7 degrees N, 65.0 degrees W., primarily based on item 2); Sept. 26, near 26.3 degrees N., 65.3 degrees W., based on item 2); Sept. 27, near 27.0 degrees N., 67.0 degrees W., based on items 1) and 2); Sept. 28, near 28.3 degrees N., 68.7 degrees W., primarily based on space-time continuity (along a smooth curve) to the Sept. 30 estimate; Sept. 29, near 30.0 degrees N., 69.3 degrees W., based on space-time continuity with the Sept. 30 estimate; Sept. 30, near 31.7 degrees N., 70.0 degrees W., based on information in items 2) and 4). The author's track for the storm is displayed in Fig. 3.

There are indications that this storm was incorporated into the circulation of a developing extratropical system off New England and Nova Scotia on Oct. 1. Barometer readings as low as 29.16 inches reported by the steamer "Adriatic" at 9:30 A.M. Oct. 1 in lat. 42 N., long. 63 15 W. and as low as 29.23 inches reported by the steamer "Etruria" at 1:40 P.M. Oct. 1 in lat. 42 50 N., long. 60 20 W. (Monthly Weather Review, Oct. 1886), were likely related to this merging storm.

The hurricane status given in Neumann et al. (1993) was confirmed by the barometer reading of 29.25 inches and the hurricane condition reported by the "Mary" at 8 A.M. Sept. 23 as well as by the "N.E. wind of great violence" reported by the "Pearl" on Sept. 26, while Storm 9, 1886 was at tropical latitudes.

Storm 10, 1886 (Oct. 8-13), H.

This is the same storm that Neumann et al. (1993) identify as Storm 9, 1886.

The following information was found about this storm: 1) The steamship "Professor Morse" encountered a hurricane on Oct. 8 in lat. 20 30 N., long. 85 20 W., during which oil bags were used on the weather side with good effect (Monthly Weather Review, Oct. 1886). 2) Havana, Oct. 7, 10 A.M. Since yesterday indications of the cyclonic movement have been observed at sea, but up to the present time it has shown itself of very small intensity; the

center of the storm is at the third quadrant, to S.S.W. (Monthly Weather Review, Oct. 1886). Author's note: This information as well as other information about the storm in Cuba was forwarded to the Signal Service by Rev. Benito Vines, S.J., director of the Belen College Observatory. 3) Havana, Oct. 8, noon. During last evening, the storm increased somewhat in intensity, and has, it appears, passed us by the W.S.W.; so it is at this time crossing the western extremity of the island (Monthly Weather Review, Oct. 1886). 4) Havana, Oct. 9, 10 A.M. During last evening and night the entire storm advanced slowly, passing by the west, which will prove, it seems, that the recurve entered the extreme west of the island, causing the vortex at this time (to be) at about 150 miles distance from here (Monthly Weather Review, Oct. 1886). 5) The barometer (at the Belen College Observatory, Havana) fell up to 4 A.M. Sunday (Oct. 10) at which hour it read 29.71 inches, corrected and reduced to sea level, with gusts of wind reaching at times 56 mph; dark sky, wind currently (10 A.M. Oct. 10) from S., oscillating slightly to S.S.W., diminishing little by little in intensity (Monthly Weather Review, Oct. 1886). 6) Vinales, Oct. 11, 1886. On Thursday Oct. 7, at 5 P.M. a breeze set in; later in the evening changed to S. and continued with heavy showers. At 9 P.M., the wind and rain grew heavier (Monthly Weather Review, Oct. 1886). Author's note: Vinales is a town located in the interior of Pinar del Rio province, to the N. of the city of Pinar del Rio. Unfortunately, no weather remarks from Oct. 8 on were given in this item. 7) Sabalo, Oct. 11, 1886. A cyclone with heavy wind and rain commenced during Oct. 7 and ended yesterday at daybreak. The winds commenced by the N. and ended by the W., the strongest being from the S. According to information received from Guane, great damage has occurred from the overflow of the Cuyaguasteje River (Monthly Weather Review, Oct. 1886). Author's note: Sabalo and Guane are towns located in the southwestern portion of Pinar del Rio province. 8) Oct. 8-9, 1886. A cyclone of good intensity, which formed near the southern part of Pinar del Rio province, caused considerable damage on the western end of Cuba, especially at Guane and Mantua. Torrential rains and gusty winds were felt at Pinar del Rio and, to a lesser extent, at Havana (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). Author's note: Mantua is a town near the northwestern coast of Pinar del Rio province. 9) New York, Oct. 9. A dispatch received from Cuba stated that a cyclone has passed over the western portion of the island (The Times, London, Oct. 11, 1886, p.6, col.3). 10) Report from the Signal Service observer at Key West, Fl. On Oct. 8 cyclonic conditions were observed; the weather was threatening and hazy with very brisk E. winds; barometer falling slowly; light sprinkling or misty rain. Oct. 9, rain in heavy squalls until 10:40 P.M., thunderstorm in the evening, moving from S.E. to N.W., wind E. with gale velocity at times in the evening, two gusts of 60 mph, barometer falling all day to 29.79 inches at 11 P.M., wind hauled slowly from E. to S.E. Oct. 10, gale continued, with wind hauling to S. and S.W. in heavy squalls; barometer 29.72 inches at 7 A.M.; between 1 and 2 P.M. wind hauled to S. and weather brightened; barometer remained stationary until 6 P.M., after which it rose and the weather

cleared (Monthly Weather Review, Oct. 1886). 11) Sandford, Fl. Heavy rains began falling at 12:15 P.M. Oct. 10 and continued until 3:15 P.M. Oct. 11. Total precipitation was 4.24 inches. The barometer fell slowly on Oct. 10 and rose on Oct. 11. Brisk E. winds prevailed on both days (Monthly Weather Review, Oct. 1886). 12) Steamship "Manhattan". Gale came on at 1 A.M. Oct. 9 from N.N.E. with very heavy squalls and slowly falling barometer. Wind backing very slowly to N. and continued to back around to S.W.; lowest barometer 29.26 inches in lat. 22 15 N., long. 87 18 W. at 4 P.M. On Oct. 10, at 11:20 A.M., kept course to the E.N.E., very heavy sea running from all points of the compass, with ugly, threatening-look weather, glass going up slowly all the time; arrived at Havana at 2 P.M. (Monthly Weather Review, 1886). 13) Steamship "Madrid". Oct. 10, 5 A.M., barometer 29.26 inches, wind E.S.E. force 10; 7 A.M., lat. 24 45 N., long. 84 22 W., barometer 29.08 inches, wind S.E. force 11; 9 A.M. to noon, wind in gusts blowing at times with hurricane force, swell from E.S.E. to S., waves 30 feet in height, air thick; noon, barometer 29.16 inches, wind S. force 12, wind began to moderate from S. shortly after midday (Monthly Weather Review, Oct. 1886). 14) Schr. "Aura B. Hutchison", from Chagres (Panama) to New York, encountered a terrific hurricane from E.N.E. to N. and W., 140 miles N. of Cape San Antonio on Oct. 10. The vessel was thrown on her beam ends and was under bare poles for 6 hours. On Oct. 14, 50 miles S. of Dry Tortugas picked up the captain and 4 sailors of the bark "Tres Auroras" (from Barcelona to Havana) which had sunk on Oct. 10 (The New York Times, Oct. 19, 1886, p.1, col.4). 15) Bark "Stormy Pettel", from St. Thomas for Mobile in 16 days, was in the hurricane of Oct. 8, 9 and 10 and ran before it under bare poles (The New York Times, Oct. 16, 1886, p.1, col.5). 16) The schooner "Joseph Farwell", from Laguna (Mexico) for New York, encountered a hurricane on Oct. 9 and 10, 80 miles N.W. of Dry Tortugas (The New York Times, Oct. 16, 1886, p.1, col.5). 17) Steamship "San Marcos". Oct. 9, 5:40 P.M., lat. 26 N., long. 86 30 W., barometer 29.90 inches and falling, wind N.E. by N. force 5, sky obscured and cloudy, heavy sea running from S.E. as well as from the quarter of the wind; ship sailed from above position 36 miles E. by S. and at 2 A.M. Oct. 10, barometer 29.60 inches, wind had increased and rain became constant; from thence the drift of the ship was about 3 mph S.W.; the barometer fell rapidly to 29.10 inches (?) at 10:40 A.M. and the wind had hauled to N. blowing with irresistible force for about 2 hours; at 12:30 P.M., barometer 29.15 inches, wind a heavy gale only blowing from N.W. for about 4 hours, then W.S.W. and S.W. for about 8 hours, or until 8:40 P.M., when clouds broken somewhat and wind went down to a gentle gale (Monthly Weather Review, Oct. 1886). Author's note: The barometer reading of 29.10 inches seems to be too low for 10:40 A.M. Oct. 11 because, according to wind observations, the ship seemed to have been closer to the storm center at 12:30 P.M. when a barometer reading of 29.15 inches was reported. In addition, winds from W.S.W. and S.W. should have lasted for 4 hours instead of for 8 hours in order for the stremer to have had diminishing winds and broken clouds at 8:40 P.M. as indicated. 18) Steamship "El Paso". Oct. 10, lat. 27 N., long. 87 40 W., had a gale from E.N.E., barometer 29.75 inches; Oct. 11,

lat. 27 N., long. 86 15 W., wind of hurricane force, backing slowly from E.N.E. to S.W. (Monthly Weather Review, Oct. 1886). 19) Steamship "Colorado". Morning of Oct. 11, encountered a terrific hurricane from N.E. which continued to rage for 9 hours, when the wind changed to N.W. and continued in that direction for 10 hours; morning of Oct. 12, wind changed to E. and continued for 12 hours, when it came from an easterly point with a velocity of 90-100 mph, rising a terrific cross sea; barometer 29.05 inches at lat. 27 10 N., long. 89 W. (Monthly Weather Review, Oct. 1886). Author's note: No time was given for the barometer reading which probably represents the lowest pressure encountered by the "Colorado". 20) Mobile, Oct. 15, The bark "Scotia", from Ship Island to Mobile, went ashore at Horn Island (The New York Times, Oct. 16, 1886, p.1, col.5). 21) New Orleans, La. Oct. 11, a wind storm from the E. began at 8:15 P.M.; maximum velocity 38 mph from N.E. at 11:35 P.M.; the high wind continued until 4 P.M. Oct. 12. At the Mississippi quarantine station the storm was very severe, the wind blowing at 36 mph from N.E. In the parish of Plaquemines, the waters of the Gulf (of Mexico) were backed up over the rice fields for a distance of 35 miles inland. At Port Eads the wind blew hard on Oct. 10 and by the morning of Oct. 11 had increased in force, attaining at noon the velocity of a high gale. Port Eads and the surrounding country were completely submerged to a depth of two and a half feet (Monthly Weather Review, Oct. 1886). Author's note: The New York Times, Oct. 13, 1886, p.1, col.6, also published a note about the storm in the New Orleans area, adding that the water from Lake Pontchartrain covered many miles of the rear portion of the city. 22) Mobile, Oct. 12. The storm last night was heavy along the coast and vessels were detained from sailing (The New York Times, Oct. 13, 1886, p.1, col.6). 23) Galveston, Tx. The barometer fell slowly during Oct. 11 and morning of Oct. 12, accompanied by brisk N.E. winds. During the afternoon of Oct. 12, the wind backed from the N. to N.W. and increased in force, attaining at 10:45 P.M. a velocity of 55 mph; at that time the tide was very high and the lower part of the city overflowed although the usual effect of a N.W. wind is to lower the water on the bay. After 11 P.M. Oct. 12, the wind decreased in force and at 7 A.M. Oct. 13 was blowing from S.W. at a rate of 16 mph (Monthly Weather Review, Oct. 1886). Author's note: The New York Times, Oct. 13, p.1, col.6, also published a note about the storm in Galveston, adding that at 6 P.M. Oct. 12 the wind was blowing from N.W. at 45 mph and that the barometer had fallen 60 points since 7 A.M., indicating that the storm was near the city. 24) Storm of Oct. 8-13, 1886. Western Cuba and extreme East Texas. Center passed near Sabine Pass. Johnson's Bayou and Sabine Pass inundated. Overflow extending 20 miles inland. 150 lives lost. Nearly every house moved from its foundation (Tannehill, 1938). 25) Cyclone of Oct. 12, 1886. Texas Upper coast. Minimal. Tidal wave drowned 100 at Sabine (Dunn and Miller, 1960). 26) New York, Oct. 15, evening. According to the latest intelligence from Sabine Pass, the missing person number is 101, of which 90 are known to have drowned. The Gulf (of Mexico) seems to have moved over land in one high unbroken wall of water. The water dashed against the lighthouse in the bay in solid walls 50 feet high. Almost the entire coast of Cameron Parish, La. was

inundated by the Gulf waters (The Times, London, Oct. 16, 1886, p.6, col.2). 27) New Orleans, Oct. 13. The town of Sabine Pass was totally destroyed by the overflowing of the Sabine River. It is known that 65 lives were lost. Last night a hotel containing 15 or 20 persons was swept out into the bay and all the occupants were drowned (The New York Times, Oct. 14, 1886, p.1, col.6).

Information in the above items was found to support, in general, the storm track which is displayed in Neumann et. al. (1993) as for Storm 9, 1886. Therefore, no modifications were introduced along that track, which is presented as for Storm 10, 1886 in Fig. 3.

The hurricane status that Neumann et al. (1993) gave to this storm was fully verified by the information contained in many of the above items.

#### Storm 11, 1886 (Oct. 10-15), T.S.

This is a new storm case in the sense that it is not included in Neumann et al. (1993). However, without assigning a tropical origin to it, the Monthly Weather Review, Oct. 1886 took note of this system and, independently, Vines (1895) referred to it as a cyclone.

Documentation of this storm was based on the following information: 1) Citing Summary and Review of International Observations for the Month of October 1886 (published by the U.S. Signal Service in Dec. 1887) as the source, Father Vines of Havana stated that there was a cyclone near 30 degrees N., 60 degrees W. on Oct. 10 and indicated that, in his opinion, the presence of such a cyclone was responsible for the westward deviation which was observed along the track of a hurricane that was recurving in the eastern Gulf of Mexico on the same day (Vines, 1895). Author's note: It is obvious that Vines was referring to Storm 10, 1886. 2) The storm was first charted in lat. 35 degrees N., long. 53 W. on Oct. 14, from which position it passed eastward to lat. 35 N., long. 47 W. by Oct. 15. It was accompanied by strong gales and exhibited a central pressure about 29.50 inches (Monthly Weather Review, Oct. 1886). Author's note: The fact that the Monthly Weather Review stated that the storm was first chartered on Oct. 14 is not in contradiction with the existence of the storm on Oct. 10, 1886 as indicated about one year later in the U.S. Signal Service publication cited by Vines (item 1).

Based on the information given in item 1), the author of this study used 30.0 degrees N., 60 degrees W. for his 7 A.M. Oct. 10 estimated position. 7 A.M. positions for the period Oct. 11-13 were essentially determined by interpolation to the author's estimated position for Oct. 14, after allowing for a slight acceleration towards the end of the period; these positions were as follows: Oct. 11, 31.3 degrees N., 59.3 degrees W.; Oct. 12, 32.5 degrees N., 58.0 degrees W.; Oct. 13, 33.7 degrees N., 56.0 degrees W. The author's 7 A.M. Oct. 14 position was 34.7 degrees N., 53.0 degrees W., which is slightly different from the position mentioned in item 2) for that day. Finally, the author used 35.0 degrees N., 47.0 degrees W. (item 2) for his 7 A.M. Oct. 15 position. The author's track for Storm 11, 1886 is shown in Fig. 3.

No evidence of hurricane startus was found and, therefore, the author decided to classify this system as a tropical storm. It can not be ruled out, however, that the storm might have shown some subtropical characteristics.

Storm 12, 1886 (Oct. 22-26), T.S.

This is the same storm that Neumann et al. (1993) identify as Storm 10, 1886.

The following information was found in connection with this storm: 1) Scattering vessel reports indicated the presence of a cyclonic disturbance in the vicinity of Haiti on Oct. 22 (Monthly Weather Review, Oct. 1886). 2) Storm of Oct. 22-23, 1886. Santo Domingo (Tannehill, 1938). 3) Oct. 22-23, 1886. Perturbation of great area but slight energy crossed S. of Santiago de Cuba and reached a position to the S. of Camaguey, then recurving to the N.E. There was no important damage. Showers and gusty winds from N. were felt from Havana eastward (Sarasola, 1928) Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). Although the vast disturbance is said to have crossed over eastern Cuba, the storm itself could have developed farther east within the large envelope of the disturbance, which would be in accordance with information in items 1) and 2) and would also fit a better space-time continuity with information in the remainig items. 4) Steamship "L. & W. Armsrong". Oct. 22, lat. 21 11 N., long. 64 20 W. (at noon); at 22 hours, barometer falling slowly, heavy cloud bank lying from S.E. to S.S.W. ; noon barometer 29.70 inches, wind S.S.E. force 6. Oct. 23, lat. 23 50 N., long. 64 54 W.; at 3 hours, barometer 29.60 inches, wind S.S.E. force 7, sea rising, rain squalls; 5 hours, heavy rain squalls with thunder and lightning, barometer falling slowly, wind force 7, sea high but regular; 10 hours, barometer 29.51 inches, wind S.S.E. force 7, heavy sea and squally; 12 hours, wind S.S.E. force 7 to 8, heavy rain keeping the sea down, barometer 29.50 inches; 15 hours, barometer 29.40 inches, wind S.S.E. force 8 to 9, high sea but regular; 15 hours and 20 minutes, after a heavy rain squall with thunder and lightning, the wind hauled to S.W. after a few moments lull. We had been steering N., hoping to clear the storm-track, now we had to steer N.E., finding the S.E. sea dangerous; at 16 hours and 30 minutes, hove to on starboard tack, barometer 29.30 inches; 18 hours, slight breaking away of clouds to the eastward, a heavy, dark bank of clouds in the westward extending from S. to W.N.W., clear overhead, wind hauled to S.S.W. and W., barometer rose slowly, sea going down and wind decreasing (Monthly Weather Review, Oct. 1886). Author's note: It is obvious that the hours mentioned were counted starting at noon each day. The vessel appears to have been very close to the center of the storm from 15 hours 20 minutes counted after midday Oct. 23 (3:30 A.M. Oct. 24) to the last observation taken at 18 hours after midday Oct. 23 (6 A.M. Oct. 24). The barometer readings reported by the "L. & W. Armstrong" appear to be a bit too low. 5) Bark "Essex" Oct. 23, in lat. 26 17 N., long. 64 58 W. (at noon), had a strong gale from E.S.E. with rain and squalls; wind backed to N.E. at 8 P.M. with heavy rain squalls and moderated at

midnight Oct. 23-24 (Monthly Weather Review, Oct. 1886). 6) Ship "Magellan". Oct. 24, lat. 27 49 N., long. 62 31 W., had a heavy gale from E. to N.E., barometer 29.45 to 29.80 inches; lightning all around the compass; gale lasted, with heavy rain and sea, 24 hours (Monthly Weather Review, Oct. 1886). 7) Bark "Lilian B. Jones". Oct. 25, in lat. 25 38 N., long. 58 07 W. (at noon); at 2 A.M., a brisk gale began from S.S.W., increased to a hard S.S.W gale with heavy sea; 5 P.M., a heavy squall struck the vessel and hove her on beam ends, hard gale continued, shifting to N. at 9 A.M. Oct. 26; noon Oct. 26, lat. 25 38 N., long. 58 33 W., brisk gale continued until midnight, then moderated; lowest barometer 29.78 inches at 4 P.M. Oct. 25 (Monthly Weather Review, Oct. 1886).

Major modifications along the track for this storm, which is shown in Neumann et al. (1993) as for Storm 10, 1886, were implemented by the author of this study. The modifications suggested by the content of the above items were of such an extent that the author decided to prepare an entirely new track. Therefore, the author estimated 7 A.M. positions as follows: Oct. 22, near 20.5 degrees N., 72.0 degrees W., based on information in items 1) and 2); Oct. 23, near 23.7 degrees N., 68.7 degrees W., primarily on the basis of information in items 4) and 5) and on space-time continuity; Oct. 24, near 25.7 degrees N., 64.5 degrees W., chiefly based on information in item 4) and, to a lesser extent, on information in items 5) and 6); Oct. 25, near 27.0 degrees N., 60.7 degrees W., based on information in items 6) and 7) and on space-time continuity; Oct. 26, near 27.7 degrees N., 57.0 degrees W., on the basis of item 7) and on space-time continuity. The author's track for Storm 12, 1886 is presented in Fig. 3.

There was no evidence that the storm had reached hurricane intensity in spite of the barometer reading of 29.30 inches reported by the "L. & W. Armstrong" (item 4), which is probably too low. Therefore, the classification as a tropical storm given in Neumann et al. (1993) was accepted.

#### Special statement.

The author of this study strongly believes that more than 12 storms did form in 1886. According to Vines (1895), that year offered an uninterrupted series of cyclones and cyclonic perturbations which extended from May to late October. And Father Vines added: "only the ones which I observed were about 20, out of which 14 or 15 were true cyclones" (Vines, 1895).

The author of this study took note of three possible cyclones in addition to the twelve which were previously discussed. However, the information which was available to him about these systems was insufficient to fully verify their existence and/or to determine a reliable evolution for them. Consequently, these possible cases were not included in the present study.

The cases were as follows:

A) Case of Jul. 6-7, 1886. Information about this system near western Cuba was found in the Monthly Weather Review, Jul. 1886 and also in The New York Times, Jul. 15, 1886, p.8, col. 2. It was obvious that Father Vines, of Havana, was the source of the

information contained in both publications. It was stated that the alleged storm apparently approached Cuba in the evening of Jul. 6, 1886 but then moved over Yucatan.

B) Case of Sept. 7, 1886. Tannehill (1938) mentioned this storm as having occurred at Pinar del Rio (western Cuba). On the other hand, the catalog of Cuban cyclones by M. Gutierrez Lanza, which is included in Sarasola (1928), stated that it was a weak cyclone which passed S. of Pinar del Rio, causing only showers.

C) Case of Oct. 1-14, 1886. Vessel reports indicated the presence of a cyclonic area over the western Caribbean on Oct. 1-2, but were not sufficiently numerous to accurately locate a center. By the morning of Oct. 3, the depression had passed N. of the West Indies and was central near lat. 29 N., long. 76 W. (at a good distance to the east of northern Florida). From this position, it moved northeastward to lat. 37 degrees N., long. 65 degrees W. on Oct. 7 and then continued to the vicinity of the British Is. on Oct. 14 (Monthly Weather Review, Oct. 1886). The author of this study is skeptical about the linkage between the disturbance in the western Caribbean and the one to the east of N. Florida and, according to his own analysis, he believes that the latter disturbance formed along a cold front. According to him, such a front extended to the S.W. from a low pressure area of 29.40 inches located near Boston early on Oct. 1 (Monthly Weather Review, Oct. 1886), was apparently met by the "City of Washington" off the coast of Delaware about 6:30 A.M. Oct. 1 and produced a N. veering to N.E. gale on board the "River Ettrick" on the same day (Monthly Weather Review, Oct. 1886). Based on the author's interpretation of the observations taken by the bark "Mary" (Monthly Weather Review, Oct. 1886), the cold front seemed to have reached the vicinity of lat. 32 N., long. 72 W. by the evening of Oct. 2. In the author's opinion, it would not be easy to determine if the low pressure area which apparently formed along the front ever acquired tropical characteristics.