YEAR 1908

Nine storms were found to have occurred in 1908. Tracks for these storms are presented in Fig. 4.

It should be noted that 1908 exhibited the characteristic of apparently being the only one on record showing two hurricanes in the Atlantic hurricane before Jun. 1.

Storm 1, 1808 (Mar. 6-9), H.

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Mar. 6, ship near 25.5 N., 58 W., S.E. f. 8, 29.91; ship near 24.5 N, 64 W., N. f. 9, 29.94; ship near 22.8 N., 54 W., S.S.E. f. 6; ship near 18.5 N., 61 W., N.N.W. f. 3; ship near 15.5 N., 58 W., W. f. 3; San Juan, N. f. 5, 29.98; Mar. 7, ship near 19 N., 60 W., S.W. f. 7; San Juan, N. f. 4, 30.01; Martinique, S.S.E. f. 4, 29.92. Mar. 8, San Juan, N.E. f. 6, 29.92; ship near 17 N., 66 W., N.E. f.3, 29.91; ship near 16 N., 60 W., S.E. f. 5, 30.06 (probably too high); ship near 15 N., 60 W., S.E. f. 4, 29.91; Martinique, S.E. f. 6. 29.93. Mar. 9, San Juan, E. f. 6, 30.08; ship near 17 N., 65 W., E. f. 7; ship near 16 N., 62 W., E.N.E. f. 2; Martinique, N. f. 6, 30.00; ship near 16 N., 60 W., E.N.E. f. 6 (Historical Weather Maps, Mar. 1908). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Data extracted from an article by John T. Quin, St. Croix, Danish West Indies, May 20, 1908: The St. Christopher Advertiser (a newspaper published at St. Kitts) on Mar. 10 contained a list of about 24 sloops and boats that had been driven ashore in the early morning of Mar. 8 and been either entirely destroyed or badly damaged. The storm was at its height there at 2 A.M. (Mar. 8), when the barometer at Basseterre (St. Kitts) stood at 29.28 inches. In regard to the rainfall from this disturbance, we learn from reports of Mr. Shepherd that in the N. of St. Kitts the fall was 8 inches, at Basseterre it was 4 inches and in Nevis (an island a few miles S.E. of St. Kitts) it was 3 inches. It became possible to say just where the cyclone center had passed through the Caribbean chain of islands (while moving roughly on a S.W. course), namely between St. Christopher on the S.E. and St. Eustatius on the N.W. This is manifest from the fact that at St. Christopher and Nevis all the small craft lying on the westward or lee side of the islands were driven ashore while at St. Eustatius the vessels (also on the lee side) were driven out to sea. A schooner navigated by the mate and a couple of hands arrived at St. Thomas, and reported having been driven off from St. Eustatius by the storm, and "a Curacao sloop named the "Sea Hawk" was picked up off Arroyo (Puerto Rico) on Mar. 20, abandoned and stripped of mast and sails", and subsequently it turned out that the sloop had broken away from her anchorage at St. Eustatius during the storm, all hands being on shore at the time. Before reaching the channel between St. Eustatius and St. Kitts, the center had passed near to St. Bartholomew, where some damage was done to buildings, among others to the Anglican Church. In St. Martin considerable damage was done to the tents of the peasants and to the cotton crop. The news from that island contained information that the wind went around through E., showing that St. Martin was on the N.W. side of the storm. At Antigua, away from the center to the eastward, the barometer stood at 29.62 inches at 2 A.M. (Mar. 8); at St, Thomas the lowest barometer was 29.80 inches at 3 A.M. and at St. Croix it was 29.83 inches at 4 A.M. The "Barbadian" reached St, Thomas from Liverpool in the morning of Mar. 7 and reported having encountered a S.W. gale on Mar. 5 changing to a S.W. gale on Mar.6. The schooner "Hattie C. Luce", which arrived at St. Thomas on Mar. 10, reported having met with a

hurricane in the neighborhood of Sombrero, with the consequent loss of some of her sails. The steamship "Parima" of the Quebec Line, arriving at St. Thomas on Mar 7, reported bad weather "all the way out" (Monthly Weather Review, May 1908). 3) St. Thomas, Mar. 9. A heavy gale visited St. Kitts on Saturday night (Mar. 7), accompanied by torrential rains. Small craft were driven ashore, and the crops were seriously damaged (The times, London, Mar. 10, 1908, p.5, col.4). 4) Paris, Mar. 24. A telegram from Basse Terre (Guadeloupe) states that the islands of St. Martin and St. Barthelemy have been devastated by storms . The Governor M. Ballot has sent assistance from Basse Terre (The Times, London, Mar. 26, 1908, p.5, col.5).

Information contained in the above items was found to support, in general, the track for Storm 1, 1908 which is displayed in Neumann et al. (1993). Therefore, the author of this study decided to reproduce such a track in Fig. 4.

The lowest barometer reading of 29.28 inches at Basseterre, St. Kitts (item 2), apparently taken outside the center of the storm, was found to support hurricane intensity, confirming the hurricane status which Neumann et al. (1993) gave to this off-season storm.

Although a rare event in the Leeward Islands for Mar., this off-season storm is not unique in that area since a second hurricane known as "Alice" visited the same islands on Jan. 2, 1955.

Storm 2, 1908 (May 24-31), H.

This storm is not included in Neumann et al. (1993) and from this point of view it can be considered as a new case. However, the storm has been mentioned before as a tropical system in the literature. Ortiz-Hector (1975) mentioned the case as an off-season tropical storm of great intensity, Historical Weather Maps (May 1908) clearly showed its evolution and The New York Times announced its presence by publishing corresponding advices issued by the Weather Bureau and ship reports filed by captains. Even tracks for this storm were presented in Ortiz-Hector (1975) and the Monthly Weather Review (May 1908). Therefore, the author of this study has just investigated the case and decided to incorporate it to the storms of 1908.

Documentation of this storm was based on the following information: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: May 24, Turks Is., E.S.E. f. 2, 29.92; Port-au-Prince, S.W. f. 1, 29.86; ship near 23 N., 74 W., N.N.E. f. 4 (or 6), 29.97; ship near 26 N., 75 W., N.N.E. f. 5; ship near 27 N., 72 W., E.N.E. f. 5. May 25, ship near 25 N., 77 W., N.N.E. f. 4; Turks Is., S. f. 4, 30.01; ship near 29 N., 74 W., N.E. f. 6, 30.08; ship near 21 N., 74 W., S.W. f. 2, 29.88; center near 24 N., 73.5 W. inferred from curvature of isobars. May 26, ship near 26 N., 74 W., S.S.W. f. 7; ship near 28 N., 75.7 W., E.N.E. f. 6, 29.77; ship near 29 N., 77.7 W., N.N.E. f. 6, 29.94; Jupiter, N.N.W. f. 3, 29.89; center placed 26.5 N., 77 W., but around 27 N., 76 W. seems to be a better location. May 27, Jupiter, W. f. 3, 29.88; Jacksonville, N.N.W. f. 3, 29.87; Charleston, E.N.E. f. 4, 29.88; Wilmington, E. f. 2, 29.94; ship near 32.5 N., 75 W., S.E. f. 5, 29.97; ship near 31.7 N., 74, S.E. f. 4, 29.97; ship near 30 N., 79 W., S.E. f. 6, 29.71; center placed 29.5 N., 79 W., a little far E., 29.5 N., 79.5 W. seems to be a better location. May 28, Jacksonville, N.N.W,. f. 2, 29.90; Charleston, N. f. 4, 29.86; Wilmington, E. f. 4, 29.91; Hatteras, S.E. f. 3, 29.97; ship near 31.8 N., 76 W., S.S.E. f. 10 (or 12); ship near 30.8 N., 78.5 W., S.E. f. 11 (ship position is doubtful); center placed 30.7 N., 77.3 W.; however 31.7 N., 78.3 W. looks a much better location. May 29, Charleston, N. f. 3, 29.92; Wilmington, N.W. f. 4 (speed not clearly read off the map; Hatteras, S.E. f. 5, 29.78; ship near 34.8 N., 74 W., E.S.E. f. 7, 29.71 (not clearly read off the map); ship near 33 N., 75 W., S.S.E. f. 10; ship near 30 N., 78 W., S.W. f. 2, 30.00; center placed near 33 N., 75

W.; however, off Cape Lookout appears to be a much better location. May 30, Hatteras, W. f. 4, pressure could not be read; ship near 34.7 N., 73.5 W., W.S.W. f. 9, 29.71; Norfolk, N.W. f. 4, 29.73 (not clearly read); Atlantic City, E. f. 3, 29.75; ship near 34.7 N., 73.5 W., W.S.W. f. 9, 29.71; center placed near 37.2 N., 74 W.; extratropical low over the Great Lakes region. May 31, extratropical low placed 47 N., 71 W; however, data suggested center was near 45.5 N, 69 W. (Historical Weather Maps, May 1908). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Washington, May 26. The disturbance central Sunday (May 24) near Santo Domingo is now apparently off the E. Florida coast (The New York Times, May 27, 1908, p.12, col.7). Author's note: This and other weather statements published in The New York Times were probably issued the evening before their publication. 3) Washington, May 27, 1908. The tropical disturbance that was sighted near Santo Domingo on Sunday (May 24) has advanced to a position off the South Atlantic coast (The New York Times, May 28, 1908, p.9, col.7). 4) Washington, May 29. The recent tropical disturbance is now central near Hatteras and moving northward, attended by rains (The New York Times, May. 30, 1908, p.10, col.7). 5) Washington, May 30. The tropical storm of the last week was central this evening near New York City (The New York Times, May 31, 1908, p.13, col.7). 6) May 24-31, 1908. Cyclonic perturbation of great intensity was first observed near the Dominican Republic on May 24. During May 25-27 it moved to the N.W. over the seas off the Bahamas. The steamship "Mexico" encountered the storm off the U.S. southeast coast on May 28 (and 29). Her captain stated: "that day (May 28) we had a W.N.W. breeze which lasted until midnight. Starting about 10 P.M., the wind increased in force and continued until 4 A.M. (May 29). From 4 A.M. to noon (May 29), the gale increased to hurricane force, with the wind shifting to W. and heavy showers. The ship hove from 8 A.M. to midday ". The storm passed Cape Hatteras on May 29. At midnight May 29-30, the steamship "Bayamo" in latitude 36.2 N., 74.7 W. registered a lowest pressure of 993.9 millibars (29.35 inches) with strong wind from S.E. to S.W. The storm skirted the east U.S. coast, passed near Eastport, Me., on May 31, and dissipated near the mouth of the St. Lawrence River (Ortiz-Hector, 1975). Author's note: The above publication contains a map showing a track for this storm, starting just N. of the eastern portion of the Dominican Republic on May 24 and ending near Eastport, Me., on May 31. 7) Nassau, Jun. 3. The crew of the schooner "Nara" has arrived here. The "Nara" sank in the Bahama Channel on May 26 (Diario de la Marina, Havana, Jun. 4, 1908, morning edition, p.1, col.2). Author's note: This accident was probably related to the storm but there is no way to ascertain that this was indeed the case. 8) The Ward liner "Mexico" arrived from Havana one day late. She ran into the storm on Friday (May 29), between Cape Lookout and Frying Pan Shoal, and for 26 hours she was running through a gale which tore apart lashings and ripped the fixtures from the deck. Within a few hours the wind, according to Capt. Knight, had attained a velocity of 80 mph. For 5 hours the vessel kept under headway. In the afternoon the "Mexico" buried her nose into an unusually high sea, did not recover in time, and a torrent of water went sweeping over her and tore open the doors leading to the saloon and staterooms. In an instant a flood of water poured into the interior of the vessel. Twenty six stewards were told off to form a bucket brigade and for some time they bailed to keep saloon deck and gang ways clear. The wireless equipment was stripped from the mast and the system crippled. The covers were ripped from the boats, ventilators bent and other minor damage was done (The New York Times, Jun. 1, 1908, p.3, col.3-4). 9) The full force of the storm was felt by the steamer "Camaguey". She arrived from Santiago (de Cuba) and reports to having been through much the same experience as the "Mexico" (The New York Times, Jun. 1, 1908, p.3, col.4). 10) The fruit steamer "Bradford" got in late from Port Antonio. She passed

through the cyclone, and Capt. Oertel reports that at 4 P.M. Saturday (May 30) he passed the schooner "Charles S. Hirsch", from Savannah to this port, apparently disabled (The New York Times, Jun. 1, 1908, p.3, col.4). 11) Chatham, Ma., May 30. An unknown steamer went ashore on Nanslett Beach shortly before 11 P.M. tonight. A S.E. gale is blowing and there is a high sea, making her position a very dangerous one (The New York Times, May 31, 1908, p.1, col.6). 12) Boston, May 31. As a result of the S.E. gale and angry sea along the coast of Southern Massachusetts and Rhode Island last night and this morning two schooners, the "Carrie C. Ware" and the "Belle Halliday", went ashore. It is thought both vessels may be floated after their cargoes are lightened. Their crews remain on board (The New York Times, Jun. 1, 1908, p.3, col.4). 14) Some maximum velocities associated with this storm were as follows: Hatteraas, N.W. 54 mph on May 29; Cape Henry, N. 58 mph on May 30; Norfolk, N.W. 40 mph on May 30; Providence, R.I., S.E. 34 mph on May 30; Boston, S.E. 36 mph on May 30 (Monthly Weather Review, May 1908). 14) The minimum pressure recorded at Hatteras was 29.19 inches (Weather Bureau, 1910). Author's note: Indications are that the above value was not corrected to sea level, in which case the sea-level pressure would be higher than indicated. 15) Map showing a track for this storm. The track was started near 20.5 N., 70.5 W. in the morning of May 24, the storm having reached a position near 31 N., 78 W. by the morning of Sept. 28. Then the storm is shown to have turned to the N.N.E. and was placed practically over Cape Hatteras in the evening of May 29, with a central pressure of 29.20 inches. By the evening of May 30, it was placed near the eastern tip of Long Island, N.Y. and near Eastport, Me. by the morning of May 31, at which time the center had merged with an extratropical low that was identified over the Great Lakes region the day before (Monthly Weather Review, May 1908). Author's note: Except in the vicinity of Hatteras, this track was found to be 75-100 miles to the W. of the one published in Ortiz-Hector (1975); both tracks were found to differ very little near Hatteras. On the basis of information contained in the above items, particularly in item 1), the author of this study prepared a track for Storm 2, 1908. 7 A.M. positions along the author's track were as follows: May 24, near 21.0 degrees N., 71.7 degrees N.; May 25, near 24.0 degrees N., 73.5 degrees W.; May 26, near 26.7 degrees N., 76.3 degrees W.; May 27, near 29.5 degrees N., 79.5 degrees W.; May 28, near 31.7 degrees N., 78.3 degrees W.; May 29, near 34.0 degrees N., 76.5 degrees W.; May 30, near 37.3 degrees N., 74.0 degrees W.; May 31, near 45.5 degrees N., 69.0 degrees W. The author's track for this storm is shown in Fig. 4.

On the basis of the lowest pressures of 29.19 and 29.20 inches at Hatteras stated in items 14) and 15), on the wind of 80 mph or hurricane force reported by the steamship "Mexico" (items 6 and 9) and on a possible wind of force 12 read off the morning weather map for May 28 (item 1), the author of this study decided to classify Storm 2, 1908 as a hurricane of minimal intensity. Therefore, the author introduced hurricane intensity along the portion of his track from early May 28 to early May 30. Prior to early May 28 and during most of May 30, tropical storm status was denoted along the author's track. The extratropical stage was introduced in the early morning of May 31.

The storm motion over the Gulf Stream starting on May 27 should have significantly contributed to its intensification to hurricane status, making of this system the second hurricane of 1908 in the Atlantic during the pre-season months of that year. This is apparently a unique event on record since no other year is known to have had two hurricanes prior to the so-called beginning of the hurricane season on Jun. 1.

Storm 3, 1908 (Jul. 24- Aug.3), H.

This storm corresponds to Storm 2, 1908 in Neumann et al. (1993).

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Jul. 24, Charleston, E. f. 7, 30.09; Jacksonville, N. f. 2, 30.00; Jupiter, W. f. 2, 29.99; ship near 27 N., 79 W., N.N.W. f. 3; ship near 31 N., 78 W., E. f. 7; ship near 32 N., 74 W., E. f. 4, 30.06; ship near 26.7 N., 74.7 W., calm, 29.94; center placed 29 N., 76.5 W., probably too far N. and W., around 27.5 N., 75 W. looks a better position. Jul. 25, ship near 31 N., 78.5 W., E.N.E. f. 6, 30.06; Charleston, E. f. 5, 30.10; Jacksonville, N.E. f. 2, 30.04; Jupiter, W. f. 2, 30.03; ship near 26 N., 78 W., W. f. 1, 29.94; center placed 29 N., 76.5 W. Jul. 26, Charleston, N.E. f. 3, 30.03; Jacksonville, N.N.W. f. 2, 29.96; Jupiter, W. f. 4, 29.94; ship near 26.7 N., 78 W., W. f. 4, 29.94; ship near 31.7 N., 76 W., E. f. 5; center placed 29 N., 77.5 W. Jul, 27, Jacksonville, N.E. f. 3, 29.96; ship near 30 N., 78 W., E. f. 4, 29.86; Charleston, N.E. f. 4, 30.03; ship near 32 N., 77 W., E. f. 5, 30.03, showers; ship near 32 N., 74 W., E.S.E. f. 5, 30.00; ship near 28 N., 79 W., N.E. f. 2, 29.88; Jupiter, W. f. 3, 29.89; ship near 25 N., 76 W., W. f. 4; center placed 29.7 N., 74.7 W., wrong position, near 27.7 N., 78.5 W. seems to be a much better location. Jul. 28, Jupiter, N.N.W. f. 3, 29.80; Jacksonville, N.N.E. f. 3, 29.92, rain; ship near 28 N., 78 W, N.N.E. f. 4, 29.88; ship near 26.5 N., 77.5 W., N.W. f. 6, 29.80; ship near 26 N., 74 W., S. f. 5, 29.91; center placed 28 N., 76.5 W., probably a little far N. and E., near 27.3 N., 77 W. appears to be a better position. Jul. 29, Jacksonville, N. f. 3, 29.89; Charleston, N. f. 2, 30.00; Hatteras, E. f. 3, 30.01; ship near 31 N., 71 W., S.S.E. f. 7, 29.77; ship near 29 N., 80 W., N. f. 7, 29.77; Jupiter, W. f. 3, 29.81; ship near 26 N., 79 W., N.W. f. 6, 29.83; center placed 28.5 N., 76.3 W., too far E., near 29.5 N, 78 W. would be much better. Jul. 30, ship near 33.5 N., 77.8 W., N.E. f. 6, pressure could not be read; Hatteras, E. f. 4, 29.86; Charleston, N.N.W. f. 5, 29.73; ship near 30.8 N., 78.8 W., W. f. 7; Jacksonville, N.N.W. f. 2, 29.93; ship near 34.7 N., 73.7 W., E. f. 10, 29.83; ship near 32.7 N., 72.7 W., S.E. f. 10; center near 32.3 N., 77.5 W., maybe a bit far E. Jul. 31, Wilmington, W. f. 6, 29.59; Hatteras, S. f. 6, 29.64; center on the coast, probably just W. of Cape Lookout (Historical Weather Maps, Jul. 1908). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Aug. 1, ship near 34.3 N., 72.5 W., W.N.W. f. 8, 29.59; Hatteras, N.N.W. speed could not be read, 29.65; ship near 36 N., 70 W., S. f. 7, 29.71; center placed 35.7 N., 73 W., too far W., near 36.5 N., 71.7 W. appears to be a better location. Aug. 2, center placed 39.5 N., 65.5 W., there were some ships around the low but they were quite far from the center. Aug. 3, extratropical low placed near central Newfoundland (Historical Weather Maps, Aug. 1908). Author's note: as indicated before, wind forces (f) are on Beaufort scale and pressures are in inches. 3) A shallow barometric depression advanced from the Caribbean Sea to the Gulf of Mexico from Jul. 21 to Jul. 23. Pressure continued low over the Gulf of Mexico until Jul. 25 when two centers of disturbance began to form, one over the West Gulf and the other near the east coast of Florida. The disturbance in the West Gulf drifted slowly northward over the coast line without developing marked intensity. The disturbance near the Florida coast gradually deepened until Jul. 29 when a northward movement began and on the morning of Jul. 30 a storm of marked intensity was central off the North Carolina coast. During Jul. 30 the depression deepened rapidly and at 4:20 P.M. a reading of 29.18 inches was reported at Wilmington, N.C. and at the regular evening report of that day a reading of 29.22 inches was reported at that station. Storm advices had been sent to Atlantic ports for several days and storm warnings were displayed on Jul. 30 from Wilmington, N.C. to Cape Cod. Based upon the 4:20

P.M. special report hurricane warnings were ordered from Hatteras to Norfolk. During Jul. 31 the center of disturbance moved slowly northward and at the evening report had passed N. of Hatteras where the barometer at the time of the regular evening observation was 29.32 inches. The subsequent course of the storm was N.E.near the Middle Atlantic and New England coasts and it disappeared over Newfoundland the night of Aug. 2 (Monthly Weather Review, Jul. 1908). Author's note: Part of the information above was also published in Tannehill (1938). The statement that Storm 3, 1908 formed from a center associated with the shallow depression which allegedly moved from the Caribbean Sea to the Gulf of Mexico was found to be doubtful. 4) The Evening Metropolis, Jacksonville, Fl., Jul. 30, 1908 commented as follows: The storm that the Weather Bureau has been watching for 3 or 4 days has at last shown itself, and this morning is approaching the coast line near Wilmington, N.C. At 7 A.M. the wind velocity at North Carolina stations was between 40 and 50 mph from the E. and N.E. No doubt the disturbance has been giving some sailing vessels a hard time. The fact that the storm has at no time been near land, and yet located daily with almost absolute accuracy, shows the exactness with which the Weather Bureau makes its predictions. There are a number of vessels that delayed sailing on account of the display of storm warnings, and they now appreciate the wisdom of their conduct... (Weather Bureau, 1910). Author's note: The Monthly Weather Review, Jul. 1908, also published the note which appeared in the Evening Metropolis. 5) The Virginia Pilot, Norfolk, Va., Aug. 2, 1908 remarked as follows regarding warnings issued in connection with this storm: "It was due to the significant work of the Weather Bureau that there were no wrecks along the coast. Many hours before the storm developed any great strength the Bureau sent warnings along the coast to notify mariners that there was a blow off the Florida coast and advised caution about proceeding south. These warnings were sent to several wireless stations, which transmitted them to vessels at sea having the wireless apparatus, so that the news was flashed down the line" (Weather Bureau, 1910). 6) Washington, Jul. 30. The shallow depression that appeared over the Caribbean Sea last week has developed a center of marked strength that is located on the North Carolina coast this evening with reported pressure of 29.22 inches at Wilmington. Hurricane warnings are ordered from Hatteras to Norfolk (The New York Times, Jul. 31, 1908, p.7, col.7). 7) Washington, Jul. 31. The center of the coast storm has advanced to just N. of Hatteras with a barometer reading of 29.32 inches at 8 P.M. and a maximum wind velocity of 42 mph. The future course of this storm will be northerly near the coast line (The New York Times, Aug. 1, 1908, p.7, col.7). 8) Washington, Aug. 1. The coast storm has continued N. and N.E. and is apparently central tonight near the Southeastern New England coast. But little rain has attended this storm during the last 24 hours and high winds occurred at very few places (The New York Times, Aug. 2, 1908, p.7, col.7). 9) Washington, Aug. 2. The Atlantic coast storm has passed beyond the Canadian Maritime Provinces, without unusual incident (The New York Times, Aug. 3, 1908, p.10, col.7). 10) The steamer "Finance", from Panama, reported a strong gale on Friday, Jul. 31 (The New York Times, Aug. 3, 1908, p.5, col.2). 11) The steamer "Madonna", from Naples, buffeted into the storm on Saturday (Aug. 1) when she was 80 miles E. of Nantucket (The New York Times, Aug. 3, 1908, p.5, col.2). 12) The "City of Savannah" left Savannah 3 days ago and for 36 hours she ran into the hurricane. The wind at first came up under her stern but as the storm passed around it came out of the N. She was buffeted by waves which broke against her bow with terrific force (The New York Times, Aug. 3, 1908, p.5, col.2). 13) Some maximum velocities associated with is storm were as follows: Wilmington, N.C., N.E. 48 mph on Jul. 30; Hatterass, N.W. 58 mph on Jul. 31; Cape Henry, 46 mph on Aug. 1 (Monthly Weather Review, Jul. 1908 and Aug. 1908). 14) Minimum pressure at Wilmington (not corrected to sea level) was

29.06 inches and at Hatteras was 29.32 inches (Weather Bureau, 1910). Author's note: Because the barometer was 73 feet above sea level at Wilmington, the correction to sea level was not negligible at that station, resulting in the reading of 29.18 inches indicated in item 2). 15) Map showing a track for this storm as follows: off the Florida coast from the morning of Jul. 25 through the evening of Jul. 29; near 32.5 N., 77.5 W. in the morning of Jul. 30; near 35 N., 75.5 W. in the morning of Jul. 31 and near 35 N., 74 W. in the evening of Jul. 31 (Monthly Weather Review, Jul. 1908). Author's note: Most positions shown along this track were found to be quite inaccurate. This track was apparently continued on a map for the storms of Aug. 1908 (Monthly Weather Review, Aug. 1908), showing a low center near Atlantic City in the morning of Aug. 1 and near Halifax in the morning of Aug. 2, positions which were found to be much too far to the north. 16) A storm was first observed near 22 N., 69 W. on Jul. 27, 1908 and lasted 8 days; it recurved near 29 N., 79 W. and it was last observed near 63 N., 51 W. (Mitchell, 1924). Author's note: A track in Tannehill (1938) was found to be very similar to the one in the publication above. However, the track for this storm (as for Storm 2, 1908) in Neumann et al. (1993) was entirely different, since it was started just E. of Cape Canaveral on Jul. 25, and it described a clockwise loop before turning northward on Jul. 28.

On the basis of information contained in the above items, particularly in items 1) through 3), the author of this study introduced a number of modifications along the storm track shown in Neumann et al. (1993). The author's track was started one day earlier than in the above publication, his 7 A.M. Jul. 24 position being estimated near 27.5 degrees N., 75.0 degrees W., based on a ship observation reporting calm and the lowest pressure for that day in item 1). 7 A.M. positions as estimated by the author for subsequent days were as follows: Jul. 25, near 28.7 degrees N., 76.3 degrees W.; Jul. 26, near 29.0 degrees N., 77.5 degrees W.; Jul. 27, near 27.7 degrees N., 78.5 degrees W.; Jul. 28, near 27.3 degrees N., 77.0 degrees W.; Jul. 29, near 28.5 degrees N., 78.0 degrees W.; Jul. 30, near 32.5 degrees N., 78.0 degrees W.; Jul. 31, near 34.7 degrees N., 77.0 degrees W.; Aug. 1, near 36.5 degrees N., 71.7 degrees W.; Aug. 2, near 39.5 degrees N., 65.5 degrees W.; Aug. 3, near 48.5 degrees N., 56.5 degrees W. Differences between the above positions and the respective ones in Neumann et al. (1993) as for Storm 2, 1908 were found to range from about 225 miles on Aug. 2 to a few miles on Jul. 26 and Jul. 31. It should be mentioned, however, that the confidence the author has in his track is lower prior to Jul. 28 than from that day on. The reason for his low confidence during the early stages is that he believes it could have been possible a sort of reformation of the center to the S.E. instead of the pure motion which is denoted by his loop track. The author's track for Storm 3, 1908 is displayed in Fig. 4.

Although no winds of hurricane intensity were reported in any of the items above, the author of this study decided to keep the hurricane status that Neumann et al. gave to this storm as for Storm 2, 1908; the author's decision was based on the fact that the lowest pressure (corrected to sea level) of 29.18 inches reported at Wilmington, N.C. at 4:20 P.M. Jul. 30 (item 3) was low enough to have supported hurricane winds. Hurricane intensity was introduced along the author's track early on Jul. 30 and prior to that time the storm was kept as a tropical storm in spite of that the author recognizes that that status was likely to be reached over only a portion of the Jul. 24-29 period. The extratropical stage was introduced along the author's track around noon Aug. 2 as the storm passed the 41 N. parallel and moved away from the warm waters of the Gulf Stream.

Storm 4, 1908 (Aug. 30- Sept. 2), T. S.

This is the same storm that Neumann et al. (1993) identify as Storm 3, 1908.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Aug. 30, Hatteras, N.E. f. 6, 30.10; ship near 34 N., 76 W., N.N.E. f. 6; ship near 31.8 N., 71 W., S.W. f. 4, 30.09, rain; frontal low placed 33 N., 72.5 W. Aug. 31, Hatteras, N.E. f. 4, 30.09; Wilmington, N. f.3, 30.11; ship near 31.8 N., 78 W., N.W. f. 6; ship near 31 N., 76 W., W.S.W. f. 4, 30.09; low placed 33 N., 74 W., a position near 33 N., 76 W. would be much better (Historical Weather Maps, Aug. 1908). Author's note: Wind forces (f) are on Beaufort scale and pressures are in inches. The same is true for item 2). 2) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Sept. 1, Hatteras, S.E. f. 3 (speed could not be easily read), 29.90; Wilmington, N.W. f. 4, 30.06; ship near 32.7 N., 77.2 W., W.N.W. f. 5; ship near 32.7 N., 74 W., W. f. 3 (speed could not be easily read); ship near 35.8 N., 74 W., N.W. f. 8, wind direction probably wrong; center 1010 millibars (29.83 inches) placed 33.5 N., 74.5 W. (too far E., center seems to be on the coast S.W. of Hatteras). Sept. 2, ship near 39 N., 71.7 W., N. f. 6, 29.77; Nantucket, S. f.4, 29.91; ship near 36 N., 72.5 W., W.N.W. f. 4, 29.97; ship near 36 N., 69 W., S. f.6, 30.12; center not placed on map, but it could be inferred near 38.5 N., 70.7 W.; cold front which extended from Maine to the S.W. to just W. of New York City was shown on the map. Sept. 3, center was absorbed in the cold front and could not be identified any longer. 3) Washington, Sept. 1. A storm off the coast of North Carolina is causing high winds on the Virginia and North Carolina coasts and rains in Virginia, Delaware and eastern North Carolina (The New York Times, Sept. 2, 1908, p.13, col.6). 4) The maximum wind velocity at Hatteras was W. 45 mph on Sept. 1 (Monthly Weather Review, Sept. 1908). 5) The minimum pressure at Hatteras in Sept. 1908 was 29.80 inches (Weather Bureau, 1910). Author's note: It is very likely that this pressure occurred in connection with this storm. Even if this were not the case, the minimum pressure related to this storm would have been between 29.80 and 29.90 inches, which is quite high. 6) Map showing a track for this storm. The track was started just to the S.W. of Hatteras in the morning of Sept. 1 and the center was placed near 39 N., 70 W. in the morning of Sept. 2, near Portland, Me., in the evening of that day and near the west coast of Newfoundland in the morning of Sept. 3 (Monthly Weather Review, Sept. 1908).

On the basis of information in the above items, the author of this study introduced a number of modifications along the track shown in Neumann et al. (1993) as for Storm 3, 1908. By mostly using information in items 1) and 2), the author estimated his 7 A.M. positions as follows: Aug. 30, near 33.0 degrees N., 72.5 degrees W.; Aug. 31, near 33.0 degrees N., 76.0 degrees W.; Sept. 1, near 35.0 degrees N., 76.3 degrees W.; Sept. 2, near 39.0 degrees N., 70.7 degrees W. The difference between these positions and the corresponding ones in Neumann et al. (1993) was found to range from about 120 miles on Sept. 2 to a few miles on Aug. 30. The author's track for Storm 4, 1908 is shown in Fig. 4.

The maximum wind velocity (5 minute average) of 45 mph reported at Hatteras (item 4) was found to support the tropical storm status given to this system by Neumann et at (1993) as for Storm 3, 1908. Therefore, tropical storm status was denoted along the author's track for the entire period Aug. 30- Sept. 2, and was changed to the extratropical stage late on Sept. 2, before terminating the track in compliance with information for Sept. 3 in item 2).

Storm 5, 1908 (Sept. 7-19), H.

This storm corresponds to Storm 4, 1908 in Neumann et al. (1993).

The following information was found in relation to this storm: 1) On the morning of Sept. 9 there was evidence of storm formation near the Leeward Islands and during the afternoon and night of that date the center of the disturbance past on a N.W. course near and to the eastward of Puerto Rico. By the morning of Sept. 10 the storm center had advanced to a position N. of Puerto Rico and by the morning of Sept. 11 had past to the westward of Turks Is., where wind velocities estimated at 80 or more miles an hour caused destruction to life and property. Continuing on a N. of W. course during Sept. 12-13, the center of the storm recurved N. on Sept. 14 and past to the eastward of Nassau, Bahamas. From this region the disturbance moved N.E. between Bermuda and the American coast during Sept. 15-16, past S. of the Canadian Maritime Provinces during Sept. 17 and disappeared east of Newfoundland after Sept. 18, and apparently merged into an extensive area of low barometer that extended southward from Iceland. The exceptional severity of the storm during its westward passage over the Bahamas and attending the subsequent N.E. course over the Atlantic is shown by reports of vessels that were caught within the vortex (Monthly Weather Review, Sept. 1908). Author's note: The above material was extracted from an article by E.B. Garriott. 2) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Sept. 7-8, storm center could not be easily identified, some S. winds were reported to the S.E. of Barbados. Sept. 9, ship near 16 N, 61.2 W., N.N.W. f. 3, 29.88, rain; Dominica, S. speed was not given but very light; ship near 14 N., 60 W., S.S.W. f. 3; ship near 13 N., 58.7 W., S.W. f. 3, 29.88; center not placed on map, but probably near 16.3 N., 60 W. Sept. 10, San Juan, W.S.W. f. 5, 29.74; ship near 20.7 N., 67 W., N.E. f. 8; ship near 17.8 N., 67 W., N.N.W. f. 6, 29.90; center placed 19.5 N., 66.7 W. Sept. 11, Cap Haitien, N.N.W. f. 8, 29.38, rain; Turk Is., S.E. f. 10, 29.78; Santo Domingo, S.W. f. 6; Port-au-Prince, E. f. 2, 29.75; ship near 19 N., 74 W., N.N.W. f.4, rain; center just off Cap Haitien, probably near 20.3 N., 72 W. Sept. 12, no data near center; center placed on the northern Cuban coast near 75 W. (too far S.). Sept. 13, ship near 21 N., 74 W., S.S.W. f. 4, 29.56; ship near 25 N., 74.2 W., E. f. 5 (speed not easily read), rain; ship near 26 N., 78 W., N.N.E. f. 6, 29.65; ship near 27 N., 71 W., S.E. f. 7, 29.77; Jupiter, N.E. f. 4, 29.78; center placed 24.2 N., 74.2 W. (too far E., near 24 N., 76 W. would be much better. Sept. 14, ship near 28 N., 73 W., E. f. 7, 29.59; ship near 26 N., 75 W., N.W. f. 7, 29.44; ship near 22 N., 73.8 W., S.W. f. 4, 29.65; Jupiter, N. f. 3, 29.70; center placed 26.7 N., 74.2 W. Sept. 15, ship near 31 N., 71 W., E.N.E. f. 11, 29.32; ship near 32 N., 70 W., E. f. 8, 29.62; ship near 30 N., 66 W., S.S.E. f. 9; ship near 27.7 N., 65 W., S. f. 7; ship near 25 N., 74 W., W.N.W. f. 5, 29.74; center placed 29.2 N., 69.7 W. (too far E., around 30 N., 71 W. seems to be better). Sept. 16, ship near 38 N., 66 W., E.N.E. f. 12, 29.91; ship near 33.7 N., 67.8 W., N.E. f. 10; ship near 33.7 N., 70 W., N.N.W. f. 10; ship near 31 N., 70 W., N.W. f. 6, 29.77; ship near 30 N., 67 W., W.S.W. f. 5; ship near 29 N., 63 W., S.S.W. f. 4, 29.83; ship near 31 N., 61 W., S.S.W. f. 6; center placed 33.5 N., 65.5 W. (too far E., near 33.5 N., 67.5 W. would be a much better position). Sept. 17, ship near 40 N., 66 W., N.N.E. speed could not be read; ship near 39.8 N., 63.5 W., S.S.W. f. 9; other data difficult to read; center placed 39.7 N., 65.2 W., probably a bit N. and W. Sept. 18, ship near 43.7 N., 60 W., E. f. 4 or higher, pressure could not be read; ship near 43 N., 59.5 W., S.E. f. 6, 29.32, rain; ship near 42 N., 63 W. N. f. 6 or higher; center placed 42.5 N., 60.7 W. Sept. 19, extratropical low placed 54 N., 46.5 W. (Historical Weather Maps, Sept. 1908). Author's note: Wind forces (f) are on Beaufort scale and pressures are in inches. 3) Belen College Observatory, Sept. 10. At 9 A.M. today we have sent to Washington the following cablegram: "Perturbation passed early this morning N. of St. Thomas on a course towards the Bahamas" (Diario de la Marina, Havana, Sept. 11, 1908, morning edition, p.4, col.3). 4)

National Meteorological Observatory, Sept. 10, 1:30 P.M. The following cablegram was received from the Weather Bureau: "There is a perturbation to the N. of Puerto Rico, moving to the N.W.The barometer at the capital of that island is 29.74 inches with a moderate S.W. wind" (Diario de la Marina, Havana, Sept. 11, 1908, morning edition, p.4, col.3). 5) Washington, Sept. 11. The center of the tropical hurricane was reported this morning in the vicinity of Turks Is. and was then moving N.E. (it should read N.W.). It is considered dangerous for vessels in that region during the next 2 or 3 days (The New York Times, Sept. 12, 1908, p.9, col.7). 6) National Meteorological Observatory, Sept. 11, 2 P.M. A cablegram received from the Weather Bureau stated that at 1:15 P.M. the hurricane center was W. of Turks Islands, moving to the N.W. At 8 P.M., the Observatory gave to this newspaper, via telephone, the following data: Santiago de Cuba, 3 P.M. (Sept. 11). Barometer 29.76 inches, wind N.W. 6.3 meters per second or about 14 mph (Diario de la Marina, Havana, Sept. 12, 1908, morning edition, p.4, col.3). 7) Belen College Observatory, Sept. 12. Yesterday (Sept. 11) at 1 P.M. we sent to New York a message announcing that the center of the cyclone was to the N.E. and near Great Inagua; the sad news that is published in the cable section of the local press this morning agrees with that forecast (Diario de la Marina, Havana, Sept. 12, 1908, evening edition, p.4, col.6). 8) Belen College Observatory, Sept. 12, 6 P.M. The center of the cyclone was to the N.E. and near Nuevitas at 2 P.M. and we have sent that information, via cable, to the Weather Bureau of Washington and some of our provinces. By 5:30 P.M. it had moved a little to the W., and between tonight and tomorrow its influence will commence along the coast of the 4 westernmost provinces. Washington announced at 3:30 P.M. that hurricane signals were placed at Key West and Jupiter (Diario de la Marina, Havana, Sept. 13, 1908, morning edition, p.4, col.3). Author's note: The center of the cyclone proved to be not as close to the Cuban coast as stated in the bulletin above. 9) Belen College Observatory, Sept. 14, 11 A.M. According to our advisory given to the local press Sept. 12 6 P.M. the center was at 2 P.M. (that day) to the N.E. and near Nuevitas. At 8 A.M. Sept. 13, the center was between Nuevitas and the island of "Espiritu Santo" (one of the Bahamas). At 6 A.M. this morning we have sent to Washington a special cablegram placing the center of the cyclone to the W. of Andros Island. Today the hurricane is moving faster than during the two previous days and is moving away from us (Diario de la Marina, Havana, Sept. 14, 1908, evening edition, p.4, col.1). Author's note: The location given is too far to the W. because, in reality, the hurricane had already recurved to the E. of Nassau by Sept. 14, in accordance to ship data in item 2). 10) Washington, Sept. 14. The tropical storm has apparently recurved northward over the western Bahamas (The New York Times, Sept. 15, 1908, p.12, col.6). Author's note: Actually, the storm had already recurved over the central Bahamas, to the E. of Nassau, in accordance with ship data in item 2). 11) Washington, Sept. 15. There were high N.E. winds on the Virginia and North Carolina coast Monday night and Tuesday (Sept. 14-15) due to the tropical storm which have passed N.E. off the Atlantic coast (The New York Times, Sept. 16, 1908, p.11, col.7). 12) Grand Turk Is., Sept. 11. The hurricane reached here at 9 P.M. last night. At 4 A.M. this morning the hurricane had reached nearly 100 mph and was blowing from the N.E. Much damage has been done to property here and the streets are today a mass of wreckage. The sloop "Telegraph", which had taken shelter at Hawks Nest, foundered with all hands (The New York Times, Sept. 12, 1908, p.4, col.3). 13) San Juan, P.R., Sept. 15. The steamer "Arcadia" has arrived here from New Orleans in a damaged condition from the effect of the hurricane which she encountered 10 miles off Turks Is. Capt. Griffiths said that the "Arcadia" ran into the storm the night of Sept. 10 (The New York Times, Sept. 16, 1908, p.1, col.6). 14) The "Orinoco" left Kingston, Jamaica, Sept. 12 at 8 A.M. On Sunday (Sept. 13),

about 5 P.M. the wind began to blow from the S. until 2 A.M. Sept. 14 when it was blowing a gale (The New York Times, Sept. 19, 1908, p.18, col.1). 15) For 8 hours the "Pretoria" was buffeted by the wind which tried to strip her. The "El Siglo" encountered the gale between Jupiter and Hatteras. The "Mineola" on Sept. 15-16 spent 48 hours running before the gale (The New York Times, Sept. 19, 1908, p.18, col.1). 16) Colon (Panama), Sept. 18. The "Colon" left New York on Sept. 10. She encountered the hurricane at a point 40 miles N. of Watling (San Salvador). The wind blew 100 mph and tremendous seas were soon sweeping over the vessel (The New York Times, Sept. 19, p.18, cols.1-2). Author's note: News about the encounter of the "Colon" with the hurricane were also published in Diario de la Marina, Havana, Sept. 19, 1908, morning edition, p.1, col.2. 17) The liner "Sibiria" got in yesterday bringing first news of the practical destruction of Mathewtown (Great Inagua). by the hurricane on Sept 13 (it should read Sept. 11). She was lying there when the storm reached its greatest fury. "It was impossible for us to make out what houses had been destroyed but a long continued storm would result in the destruction of all property along the coast. There was no sign of life that we could sea, and it is probable that the inhabitants had fled to the open". Four times the course was changed to avoid the fury of the storm (The New York Times, Sept. 201908, part 2, p.7, col.5). 18) The "Parima" left St. Thomas on Sept. 12. The storm struck her on Tuesday afternoon (Sept. 15). It (the wind) came from the S. and around to the N.W. At 4 o'clock Tuesday night (probably 4 A.M. Sept. 16) the storm moderated (The New York Times, Sept. 20, 1908, part 2, p.7, cols.6-7). 19) Nassau, Sept. 22. Long Island was swept by the seas and inundated, the vegetation was destroyed, houses swept away and people today are living in caves. No authentic reports have been received from other islands (The New York Times, Sept. 23, 1908, p.4, col.5). Author's note: Similar information was also published in Diario de la Marina, Havana, Sept. 23, 1908, morning edition, p.1, col.3). 20) New York, Sept. 20. The steamer "Prinz Willem" has arrived here bringing the crew of the "Yumuri" which was picked up as Castle Islannd. Capt. Engebretten and 14 sailors described the hard time they went through when their vessel was lost and, in addition, the horrible damage caused by the cyclone in the Bahamas (Diario de la Marina, Havana, Sept. 21, 1908, evening edition, p.4, col.5). 21) Nassau, Sept. 24. Long Island is the only one for which all coherent reports have been received. There the gale blew for two days with excessive fury, Clarence Town having only 5 houses left standing. There is not doubt that the loss of live is very heavy and that the country side even as far as Cat Island is scalded and burned, and that at the islands which got the full force of the gale not a trace of green vegetation is to be found (The New York Times, Sept. 29, 1908, p.4, col.5). 22) Sept. 12-14, 1908. A cyclone in the Bahama Channel was felt with some force on the northern coast of eastern Cuba. There was damage to vessels and inland (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). 23) Map showing a partial track for the storm. The track was started in the morning of Sept. 11 near Turks Is., it had the storm recurved just to the E. of Nassau on Sept. 14 and then moved to the N.E.; the last position shown was in the morning of Sept. 18 to the S. of the Canadian Maritime Provinces (Monthly Weather Review, Sept. 1908). 24) A storm was first observed near 12 N., 60 W.on Sept. 8, 1908 and lasted 12 days; it recurved near 24 N., 77 W. and it was last observed near 57 N., 40 W. (Mitchell, 1924). Author's note: A track shown in Tannehill (1938) was found to be quite similar to the corresponding track for this storm in Mitchell (1924). Except for the period Sept. 7-9 during which the track in Neumann et al. (1993) was much farther N. than the one in Mitchell (1924), the two tracks just mentioned showed some similarities.

On the basis of information contained in the above items, the author of this study

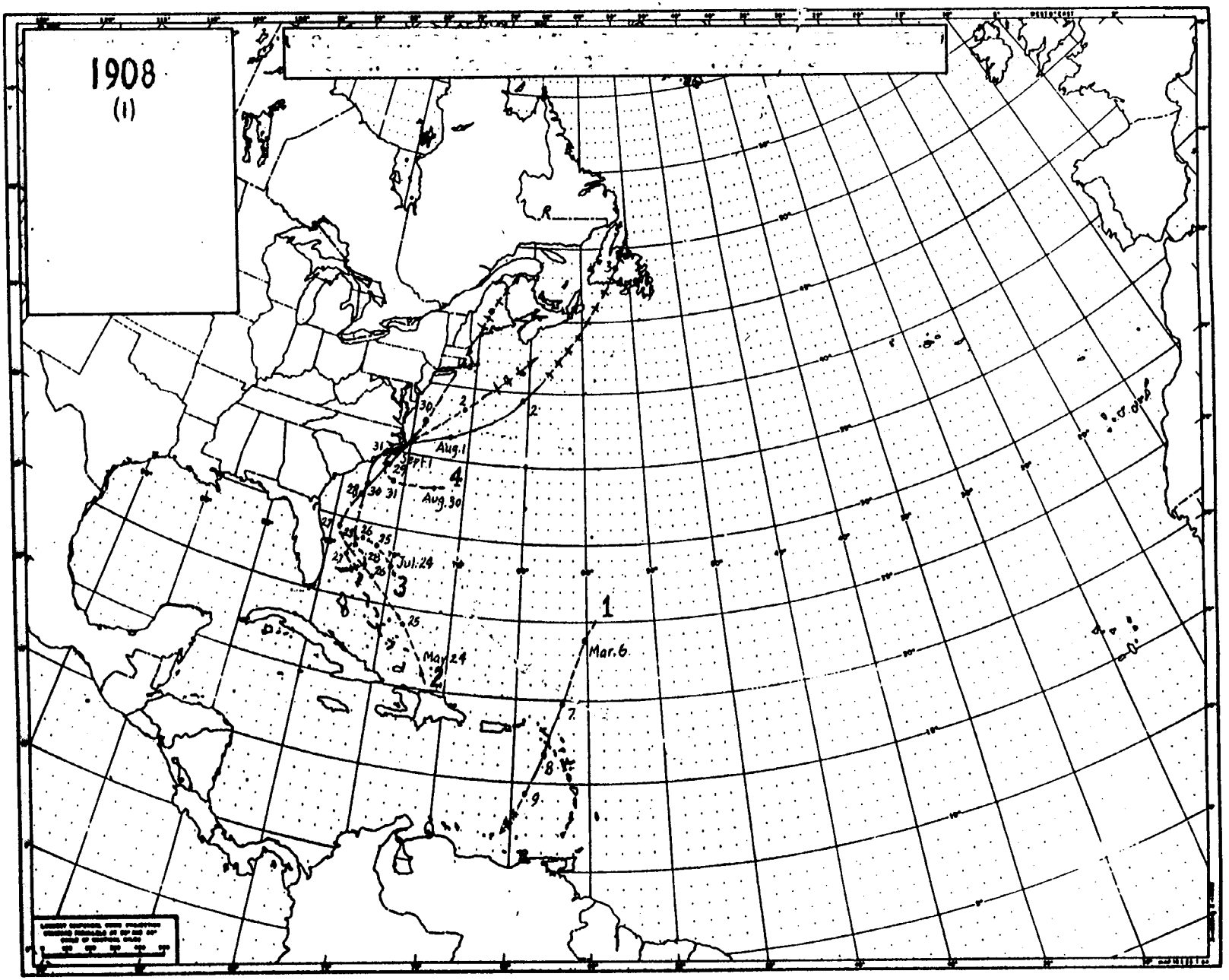

Fig. 4

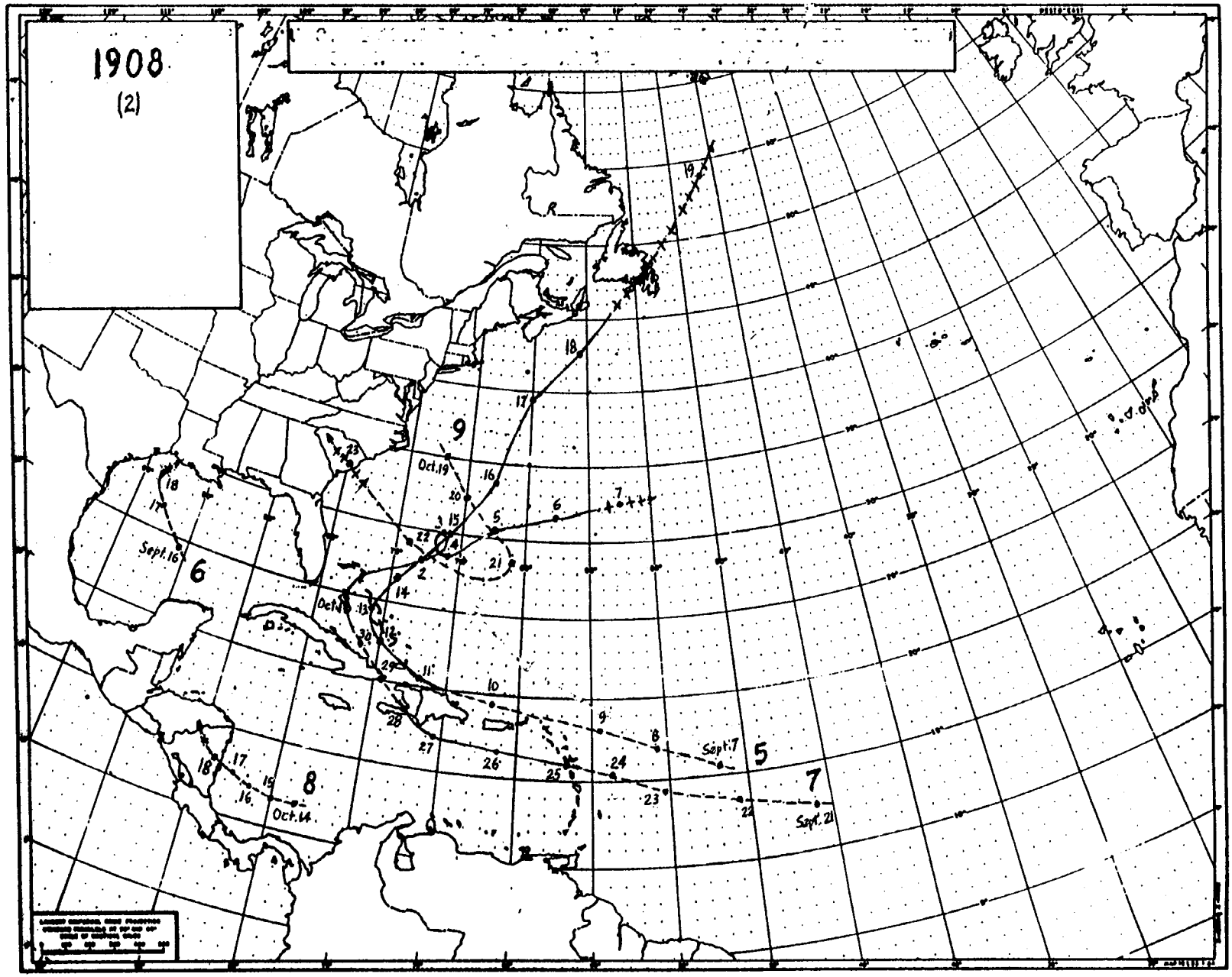

Fig. 4 continued

introduced some modifications along the track shown in Neumann et al. (1993) as for Storm 4, 1908. No modifications were introduced for the period Sept.7-10 because either there was no information to check the positions or the available information, particularly in item 2), was found to support, in general, the 7 A.M. positions in the above publication. The 7 A.M. Sept. 11 position in Neumann et al. (1993) was adjusted by about 60 miles to the W.S.W. to near 20.5 degrees N., 72.0 degrees W. in order to fit information in items 2), 7) and 12) for that day. The 7 A.M. Sept. 12 position was adjusted to the W. by about 40 miles to near 22.5 degrees N., 75.0 degrees W. in order to allow for Long Island to be on the E. side of the center track, accounting better for the tremendous damage reported there (items 19 and 21). The 7 A.M. Sept. 13 position was kept unmodified because it was found to agree with information for that day in item 2). The 7 A.M. Sept. 14 position was, however, adjusted a short distance to the S.W. to near 26.7 degrees N., 74.5 degrees W. in order to fit better information for that day in item 2). Adjustments introduced in the 7 A.M. positions for the period Sept. 15-19 resulted in the following author's estimates: Sept. 15, near 30.0 degrees N., 71.0 degrees W.; Sept. 16, near 33.7 degrees N., 67.7 degrees W; Sept. 17, near 39.5 degrees N., 65.0 degrees W.; Sept. 18, near 42.7 degrees N., 60.7 degrees W.; Sept. 19, near 54.0 degrees N., 46.5 degrees W. The above adjustments were made on the basis of information in item 2) for the respective days, and the differences between the author's 7 A.M. positions and the corresponding ones in Neumann et al. (1993) were found to range from about 240 miles on Sept. 19 to just a few miles on Sept. 16. The author's track for Storm 5, 1908 is displayed in Fig. 4.

Information contained in a number of the above items confirmed the hurricane status that Neumann et al. (1993) gave to this storm as for Storm 4, 1908. At least moderate hurricane intensity and the possibility of a major hurricane were suggested by information in some of the items. As in Neumann et al. (1993) for Storm 4, 1908, the author of this study denoted hurricane intensity along his track starting early on Sept. 10 and ending it late on Sept. 18 to allow for the storm to have crossed Newfoundland as an extratropical system. Prior to Sept. 10, tropical storm intensity was denoted along the author's track.

Storm 6, 1908 (Sept. 16-18), T. S.

This storm corresponds to Storm 5, 1908 in Neumann et al. (1993).

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Sept. 16, ship near 23 N., 88 W., S.W. f. 1, 29.91; Port Eads, N.E. f. 4, 29.96; ship near 27.8 N., 93 W., N.N.E. f. 5, 29.97; ship near 28 N., 87 W., E.N.E. f. 5, 29.94; center placed 24.5 N., 90.5 W. Sept. 17, Galveston, N. f. 7, pressure could not be clearly read
but probably 29.83; ship near 26.7 N., 90 W., S.E. f. 6, 29.91; center 1005 millibars (29.68) placed 27.2 N., 92.8 W. Sept. 18, New Orleans, N.E. f. 5, 29.88; Galveston, N.E. f. 4, 29.79; ship near 26 N., 91 W., S.S.E. f. 4; Corpus Christi, N.W. f. 2, 29.81; center placed 27 N., 93.5 W. (too far S.). Sept. 19, New Orleans, N.E. f. 2, 29.89; Port Eads, S.E. f. 2, 29.86; Galveston, E. f. 2, 29.80; ship near 27 N., 91 W., W.S.W. f. 5, 29.88; center placed 27 N., 94 W., but center , if a closed circulation (and not an E.-W. trough existed, should has been on the central Louisiana coast (Historical Weather Maps, Sept. 1908). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) This disturbance was attained by a wind velocity of 64 mph at Galveston (Monthly Weather Review, Sept. 1908) Author's note: In a separate table the Monthly Weather Review (Sept. 1908) indicated that the maximum wind

velocity at Galveston was N.E. 62 mph on Sept. 17.

Information in the above items, particularly in item 1) was found to support, in general, the track shown in Neumann et al. (1993) as for Storm 5, 1908; however some consideration was given to the possible extension of that track to Sept. 19, resulting in a negative decision due to uncertainties about the existence of a closed cyclonic circulation on that day (item 1). Therefore, the track in Neumann et al. (1993) for Storm 2, 1908 is reproduced in Fig. 4 as for Storm 6, 1908.

The tropical storm status given to this storm in Neumann et al. (1993) was confirmed by the maximum wind velocities ranging from 62 to 64 mph at Galveston (item 2) and by the drawing of a closed isobar of 1005 millibar (29.68 inches) on the Sept. 17 morning map (item 1). Following Neumann et al. (1993) as for Storm 5, 1908, tropical storm status was denoted along the Sept. 16-17 track and the tropical depression (dissipation) stage was introduced around noon Sept. 18.

Storm 7, 1908 (Sept. 21- Oct. 7), H.

This is the same storm which Neumann et al. (1993) identify as Storm 6, 1908.

The following information was found in relation to this storm: 1) On Sept. 24 West Indian stations were advised of the presence of a cyclonic disturbance east of the Lesser Antilles in latitude about 15 N. On the following morning West Indian ports and Atlantic and Gulf shipping interests were informed that a disturbance of marked intensity near the Leeward Islands was moving in a westerly direction. During the succeeding two days the hurricane center moved on a W.N.W. course and at 6 A.M. Sept. 28 past near Port-au-Prince with a reported minimum barometric reading at that place of 29.24 inches. Continuing on a W.N.W. course the vortex of the storm advanced over or near the Great Bahama Bank by the close of the month and recurved then northward over the western Bahamas by Oct. 1, with reported minimum barometric pressure 28.68 inches at 10 A.M., and a wind exceeding 80 mph from the S. at Nassau. Assuming a N.E. course the storm then advanced over the Atlantic in the direction of Bermuda (Monthly Weather Review, Sept. 1908). Author's note: The Monthly Weather Review, Oct. 1908 added to the description above that during Oct. 3-4 severe gales were experienced on the N.E. coast of Cuba and that on Oct. 6 a disturbance that was probably a continuation of the Bahamas hurricane past near Bermuda with a reported barometric pressure of 29.22 inches. 2) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Sept. 21, center 1010 millibars (29.83) placed 11 N., 45.5 W.; no data in the vicinity; location appears to be too far S. Sept. 22, ship near 15 N., 47 W., S.S.E. f. 6; center placed 12.5 N., 50.5 W.; however, near 13.5 N., 50.5 W. seems to be a better location. Sept. 23, ship near 16 N., 54 W., E. f. 8, 29.83; ship near 17 N., 53 W., E. f. 5, 29.86, showers; ship near 14 N., 58 W., N.E. f. 5, 29.83; center placed 11.5 N., 53 W., too far S., near 14 N., 54.5 W. would probably be much better. Sept. 24, Barbados, W. f. 2, 29.87; ship near 12 N., 58 W., S. f. 5, 29.86, showers; ship near 17 N., 57 W., E. f. 7, 29.83; center placed 14 N., 56 W., but near 15.3 N., 58.3 W. appears to be a much better location. Sept. 25, Martinique, S. f. 4, 29.79; Dominica, S.W. no speed but very weak; 29.75; ship near 17 N., 61 W., E. f. 7, 29.77; center placed 13 N., 64.5 W., wrong location, between Guadeloupe and Dominica appears to be the correct one. Sept. 26, ship near 19 N., 64 W. E. f. 4, 29.80; San Juan, E. f. 5, 29.79; Santo Domingo, N.E. f. 6; Port-au-Prince, W.N.W. f. 2, 29.71; center placed 15.5 N., 68 W., but around 16.7 N., 66.3 W. appears to be a better location. Sept. 27, San Juan, S.E. f. 3, 29.86; Santo Domingo, E. f. 8; Port-au-Prince, E. f. 2, 29.69; center placed

17 N., 72.5 W., too far W., 17 N., 70.5 W. is a much better location. Sept. 28, Port-au-Prince, E. to S.E. f. 3, 29.57; Turks Is., E. f. 5, 29.86; Santo Domingo, E. f. 7; Kingston, S.W. f. 2, 29.78; Puerto Plata or ship nearby, E. f. 4, 29.77 (difficult to read); center placed 18.5 N., 73.5 W., probably a bit far W. Sept. 29, Port-au-Prince, E.S.E. to S.E. f. 2, 29.72; ship near 19.7 N., 74.7 W., W. f. 5, 29.59; center placed near 19.7 N., 74.5 W., too far W., near the eastern tip of Cuba appears to be a better location. Sept. 30, no data near the center; ship near 18.7 N., 78 W., W.N.W. f. 3, 29.65; Kingston, N.W. f. 1, 29.77; Port-au-Prince, calm, 29.75; Santo Domingo, S. f. 5; Turks Is., E. f. 3, 29.86; ship near 23.7 N, 74 W., E. f. 4, 29.83; ship near 24.7 N.,76 W., N.E. f. 3; center placed 20 N., 76.5 W., but near 22 N., 76.3 W. looks to be a better location (Historical Weather Maps, Sept. 1908). Author's note: In this item and in item 3), wind forces (f) are on Beaufort scale and pressures are in inches. 3) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Oct. 1, Jupiter, N.E. f. 6, 29.74; ship near 25 N., 76 W., E.N.E. f. 10, 29.53; ship near 25 N., 74 W., S.E. f. 6, rain; ship near 22 N., 74 W., S. f. 4, 29.86; center placed near 23.7 N., 76.5 W.; however, a short distance to the S.W. of Nassau is known to be the right location. Oct. 2, Jupiter, N. f. 4, 29.83; Turks Is., S. f. 3, 29.90; ship near 25.7 N., 75 W., N.N.W. f. 6; ship near 29.9 N., 70 W., S.E. f. 5, 29.80; ship near 25 N., 72.8 W., W.S.W. f. 9, 29.65; center placed 28 N., 73 W. Oct. 3, ship near 30.7 N., 74 W., N.E. f. 7, 29.83; ship near 32.5 N., 74 W., N.E. f. 7, 29.86; ship near 30 N., 67 W., S.E. f. 6, 29.86; ship near 27.7 N., 71 W., S.W. f. 10; center placed 30 N., 71.5 W. Oct. 4, ship near 30 N., 73 W., N. f. 8, 29.77; ship near 28 N., 73 W., N.N.W. f. 7; ship near 27 N., 67 W., S.S.W. f. 6, 29.88; ship near 28 N., 66 W., S. f. 6, pressure could not be read; ship near 34 N., 70 W., N.E. f. 7; ship near 34 N., 68 W., E.N.E. f. 7, drizzle; center placed 28.5 N., 70 W., probably a bit far E. Oct. 5, ship near 31 N., 68 W., N. f. 6, 29.18 (probably too low); ship near 31.8 N., 65.2 W., E. f. 5, 29.68; ship near 30 N., 63 W., S. f. 7, pressure could not be read; center 990 millibars (29.24) placed 29.7 N., 68.7 W., maybe too far S. and W. Oct. 6, ship near 33 N., 63.7 W., E.N.E. f. 5, barometer could not be read; ship near 34 N., 58 W., E.N.E. f. 5, S.S.W. f. 5, 29.83; ship near 27 N., 66 W., N. f. 3, 30.00; ship near 26 N., 62 W., S.W. f. 5, 29.97; center placed 31.5 N., 62.7 W. Oct. 7, center of extratropical low placed 34 N., 60 W.; however, ship near 35 N., 56 W., E. f. 8, 30.09 suggested that a better location for the center would be near 32.5 N., 57.5 W. (Historical Weather Maps, Oct. 1908). 4) Belen College Observatory, Sept. 24, 2 P.M. The cyclonic perturbation that we announced yesterday (Sept. 23) and that was approaching the Windward Islands from the Atlantic was this morning at 8 A.M. closer to the islands and at 2 P.M. has not yet passed into the Caribbean Sea. The Weather Bureau of Washington sent us this information this afternoon: "Cyclonic perturbation E. of the Windward Islands near 15 N., moving to the W." L. Gangoiti, S.J. (Diario de la Marina, Havana, Sept. 25, 1908, morning edition, p.4, col.3). Author's note: The National Meteorological Observatory published in the same issued the same advisory sent by the Weather Bureau of Washington. 5) Washington, Sept. 24. There are indications of a cyclonic disturbance moving westward, east of the Leeward Islands, near latitude 15 N. (The New York Times, Sept. 25, 1908, p.13, col.7). 6) Washington, Sept. 25. The cyclonic disturbance reported Thursday (Sept. 24) east of the Lesser Antilles was central Friday afternoon S. and near the island of St. Kitts and it was moving on a W.N.W. course (The New York Times, Sept. 26, 1908, p.9, col.7). 7) Belen College Observatory, Sept. 26, 8 A.M. The cyclonic perturbation has entered in full into the Caribbean Sea and this morning at 8 A.M. its center is located to the S.S.E. of Ponce, Puerto Rico. Its forward motion is now slow and between this afternoon and tonight its influence will be felt over the eastern portion of Santo Domingo. L. Gangoiti, S.J. (Diario de la

Marina, Havana, Sept. 26, 1908, evening edition, p.4, col.1). 8) Washington, Sept. 26. The hurricane in the West Indies continues its westward course and at 4 P.M. Saturday its center was near the E. end of Santo Domingo (The New York Times, Sept. 27, 1908, p.5, col.7). 9) Washington, Sept. 27. The hurricane in the West Indies continues to move on a W.N.W. course and Sunday afternoon (Sept. 27) its center was apparently near and S. of the west of Santo Domingo (The New York Times, Sept. 28, 1908, p.14, col.7). 10) Belen College Observatory, Sept. 6, 6 P.M. The center of the cyclone should enter our island tonight near its eastern tip. During Tuesday night (Sept. 29) and all day Wednesday (Sept. 30) it will be closest to Havana. L. Gangoiti S.J. (Diario de la Marina, Havana, Sept. 29, 1908, morning edition, p.4, col.5). 11) National Meteorological Observatory, Sept. 28. The U.S. Weather Bureau announced that at 11:46 A.M. the center of the hurricane was near the eastern tip of Cuba and recurving to the N.W. It is dangerous for all shipping in the Bahamas and off the Florida coast during the next 2 or 3 days (Diario de la Marina, Havana, Sept. 29, 1908, morning edition, p.4, col.5). 12) Washington, Sept. 28. The West Indian hurricane appears to be central this evening off the east coast of Cuba, moving N.W. It will be dangerous to all vessels in Bahamian waters during the next few days (The New York Times, Sept. 29, 1908, p.16, col.7). 13) Belen College Observatory, Sept. 29, 8 A.M. The center of the tempest is now over land in the vicinity of Guantanamo; in spite of that we are far away it is affecting our atmosphere; it is moving slowly due to the resistance offered by the mountains. L. Gangoiti, S.J. (Diario de la Marina, Havana, Sept. 29, 1908, evening edition, p.4, col.2). 14) Washington, Sept. 29. The West Indian hurricane is still centered near the east coast of Cuba, having moved very slowly. It is apparently recurving towards the N. (The New York Times, Sept. 30, 1908, p.9, col.7). 15) Belen College Observatory, Sept. 30, 8 A.M. This morning at 8 A.M. it is observed from the observatory the cirrus arc corresponding to the hurricane with its highest point over the horizon towards the E.S.E. At 7:30 A.M. the vortex was between Gibara and Nuevitas as it was indicated in our cablegrams sent to Key West and Washington. L. Gangoiti, S.J. (Diario de la Marina, Havana, Sept. 30, 1908, evening edition, p.4, col.6). 16) National Observatory, Sept. 30, 10 A.M. The center of the perturbation is apparently over the Bahamas to the N.E. of Nuevitas, moving N.W.; therefore, there is no danger to Cuba, but there is danger to shipping to the N. (Diario de la Marina, Havana, Sept. 30, 1908, evening edition, p.4, col.6). 17) Washington, Sept. 30. The West Indian hurricane was central this afternoon near the Grand Bahama Island and continues to move W.N.W. Hurricane warnings have been issued to Florida ports (The New York Times, Oct. 1, 1908, p.4, col.7). Author's note: The position near the Grand Bahama Island proved to be in error; it probably meant Great Bahama Bank. 18) Washington. Oct. 1. The tropical storm has recurved northward off the Florida coast. At 9:40 Thursday a barometer reading of 28.82 inches and wind of 80 mph from the S. were reported at Nassau, Bahamas (The New York Times, Oct. 2, 1908, p.13, col.7). 19) Washington, Oct. 2. The West Indian hurricane will pass near and N. of Bermuda early Saturday (Oct. 3) and will reach the Banks of Newfoundland Sunday (The New York Times, Oct. 3, 1908, p.15, col.7). 20) Point-a-Pitre, Guadeloupe, Sept. 27. The gale started Thursday night (Sept. 24) and was as its height Friday morning. No great damage was done at Point-a-Pitre but the country districts suffered heavily. Many trees were uprooted, sugar factories were offroofed and the sugar cane was severely damaged. One coastal steamer was wrecked. Communications of all kinds were badly interrupted (The New York Times, Sept. 28, 1908, p.1, col.6). 21) Santiago de Cuba, Sept. 29, 9 P.M. It is raining since 2 P.M.; the cyclone appears to be moving away (Diario de la Marina, Havana, Sept. 30, 1908, morning edition, p.8, col.1). 22) Santiago de Cuba, Sept. 30, 8:35 P.M. The bad weather

continues, it has rained all day, indicating the proximity of the cyclone. The port continues closed. The "Martin Saenz" attempted to leave port but it had to return (Diario de la Marina, Havana, Oct. 1, 1908, morning edition, p.8, col.2). 23) Sept. 30- Oct. 2, 1908. Moderate cyclone affecting the province of Santiago de Cuba and the northern coast of Camaguey. Damage of some consideration was done (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). 24) Taken from The Guardian, Nassau, New Providence, Bahamas, Oct. 3, 1908: The first intelligence that another hurricane had made its appearance reached us Saturday (Sept. 26) when we were informed by cable from Washington that a storm was central near and S. of Puerto Rico, moving W.N.W. This information was confirmed by telegrams from the same source, dated on Sept. 28, Sept. 29 and Sept. 30, stating that the hurricane was central near the eastern extremity of Cuba, and finally that the hurricane was central near the Great Bahama Bank moving W.N.W. These statements were entirely borne out by the weather here on Sept. 30, which throughout the day wore an exceedingly threatening aspect... By 8 A.M. of Oct. 1 the barometer had fallen to 28.80 inches while the wind S.E. had risen to an estimated velocity of 80 mph -estimated because at 7:45 the wind-recording instruments at the Observatory were blown away. At this time squall succeeded squall wuth rapidly increasing velocity from the S.E., the rain falling in continuous torrents , being driven by a force that the few adventurous persons who were out found positively blinding... Although much damage was done on land, interest centered on the shipping in the harbor much of which was in sore straits... At 10 A.M. the barometer reached a minimum of 28.68 inches with wind from the S. at an estimated velocity of 60 de 80 miles an hour. At noon the barometer had risen to 29.10 inches (Monthly Weather Review, Oct. 1908). Author's note) A similar description was published in Weather Bureau (1910). 25) In reference to the work of C.L. Mitchell, we do not know why he did not place the cyclone of late Sept. 1908 among the true hurricanes. He stated that the storm was of doubtful intensity, but ships such as the "Bismark", the "Maria Cristina", the "Montevideo" and others felt the storm with great violence. The barometer at Nassau dropped to 28.68 (inches) with wind from the S. at a velocity of 60-80 mph (Sarasola, 1928). 26) The "F. Bismark", from Hamburg, arrived at 9:30 P.M. Saturday (Oct. 3). She encountered bad weather when entering the Bahama Channel Thursday night (Oct. 1). For this reason she arrived with a delay of 14 hours (Diario de la Marina, Havana, Oct. 5, 1908, evening edition, p.5, col.4). 27) At the closing time of this edition, the steamship "Montevideo" was arriving at Havana harbor from Cadiz, Spain (Diario de la Marina, Havana, Oct. 2, 1908, evening edition, p.4, col.1). Author's note: The "Montevideo" is one of the ships mentioned as having encountered the hurricane. 28) Capt. Antonio Fernandez of the "Reina Maria Cristina" stated that at 2 P.M. Oct. 1, the first signals of the hurricane were encountered, having the center of the storm to the S.W. (of the ship). The barometer was dropping rapidly and the wind was increasing from the S.E. At this time the "Reina Maria Cristina" was 70 miles from Abaco. These conditions continued until 4 P.M.. when maneuvers were taken to pass through the storm as easily as possible. The ship motion was slowed down and then the barometer continued its depression but slower. Around 6 hours the wind attained hurricane force from the S., with very heavy seas from the S. and S.W., continuing these conditions until about 10 P.M. when the hurricane began to move away from the ship. At midnight (Oct. 1-2), the wind shifted to S.W., with barometer stationary. At 16 hours (4 A.M. Oct. 2) the wind started to diminish and the heavy sea from the S. moderated. The ship was on due course around 5 A.M. and moving at full speed about 6 A.M. (Diario de la Marina, Havana, Oct. 5, 1908, evening edition, p.2, cols.3-4). 29) The steamship "La Navarre" started to encounter bad weather on Oct. 2. The ship was

coming from St. Nazaire, Santander and Coruna. At 2 A.M. (Oct. 2), the wind was blowing with hurricane force from the S.. and the captain ordered to moderate the ship's motion. The wind blew from the S., the S.W. the W. and then from the N. By afternoon (Oct. 2) conditions had improved and the captain ordered to put heading to the Providence Channel. The ship passed the Abaco Light and other points as Great Isaac Light, encountering thunder, lightning and much rain (Diario de la Marina, Havana, Oct. 5, 1908, evening edition, p.2, col.5). 30) Nassau, Oct. 4. The steamer "Hesleyside", which left St. Michaels for Key West, was thrown on the reefs of Abaco Island on Oct. 1. The ship was a total loss but the crew survived (Diario de la Marina, Havana, Oct. 5, 1908, evening edition, p.10, col.5). 31) San Juan, P.R., Oct. 9. The steamer "Philadelphia", from New York, arrived here with a delay of several days. She encountered the cyclone on Monday (Oct. 5) leaving the vessel off her course near Bermuda (Diario de la Marina, Oct. 10, 1908, morning edition, p.1, col.2). 32) A storm was first observed near 12 N., 50 W. on Sept. 21, 1908 and lasted 15 days; it recurved near 25 N., 78 W. and it was last observed near 33 N., 62 W. (Mitchell, 1924). Author's note: A track for this storm in Tannehill (1938) was found to be very similar to the corresponding track which is shown in Mitchell (1924). The track in Neumann et al. (1993) as for Storm 6, 1908 was also found to be similar, in general, to the track in Mitchell (1924).

On the basis of information contained in the above items, the author of this study introduced very many modifications along the track for this storm which Neumann et al. (1993) identify as Storm 6, 1908. 7 A.M. positions as estimated by the author of this study were as follows: Sept. 21, near 12.5 degrees N., 46.0 degrees W.; Sept. 22, near 13.5 degrees N., 50.7 degrees W.; Sept. 23, near 14.3 degrees N., 55.3 degrees W.; Sept. 24, near 15.3 degrees N., 58.7 degrees W.; Sept. 25, near 16.0 degrees N., 61.7 degrees W.; Sept. 26, near 16.5 degrees N., 66.3 degrees W.; Sept. 27, near 17.0 degrees N., 70.5 degrees W.; Sept. 28, near 18.5 degrees N., 72.7 degrees W.; Sept. 29, near 20.0 degrees N., 74.5 degrees W.; Sept. 30, near 22.0 degrees N., 76.3 degrees W.; Oct. 1, near 24.7 degrees N., 78.0 degrees W.; Oct. 2, near 28.0 degrees N., 73.0 degrees W.; Oct. 3, near 30 degrees N., 71.5 degrees W.; Oct. 4, near 28.5 degrees N., 71.0 degrees W.; Oct. 5, near 30.5 degrees N., 67.5 degrees W.; Oct. 6, near 31.5 degrees N., 62.7 degrees W.; Oct. 7, near 32.5 degrees N., 57.5 degrees W. The above positions were based on daily information in items 2) and 3) but, in addition, on information in item 20) for Sept. 25, information in item 1) for Sept. 28, information in items 12) and 21) for Sept. 29; information in items 15) and 16) for Sept. 30, and information in item 24) for Oct. 1. The difference between the above 7 A.M. positions and the corresponding ones in Neumann et al. (1993) was found to range from about 240 miles on Sept. 21 to just a few miles on Sept. 24. The author's track for Storm 7, 1908 is displayed in Fig. 4.

Information contained in a number of the above items was found to support the hurricane status which Neumann et. al. (1993) gave to this storm as for Storm 6, 1908. In fact, the pressure reading of 28.68 inches taken at Nassau, outside the eye of the hurricane (items 1, 24 and 25), suggests the possibility of a central pressure below 28.50 inches and, had this been the case, major hurricane intensity. On the basis of the damages described to have occurred at Guadeloupe (item 20),the author of this study decided to introduce hurricane intensity along his track as the storm was approaching that island around midnight Sept. 25-26. Because the pressure of 29.24 inches reported to have occurred at Port-au-Prince at 6 A.M. supported minimal hurricane intensity, the author of this study decided to keep the storm as a hurricane during its travel over the Caribbean Sea until after making landfall on the southern coast of Haiti in the early morning hours and passing near Port-au-Prince about 6 A.M. that day. The storm should have quickly

become a tropical storm under the direct influence of the mountains of southern Haiti and the author decided not to reinstate hurricane intensity until the storm cleared the northern Cuban coast about midday Sept. 30. Then, hurricane intensity was maintained until early Oct. 7, when the extratropical stage was introduced. Tropical storm intensity was denoted along the author's track from Sept. 21 to around midnight Sept. 24-25, and from late in the morning of Sept. 28 to around noon Sept. 30.

Storm 8, 1908 (Oct. 14-18), H.

This storm corresponds to Storm 7, 1908 in Neumann et al. (1993).

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Oct. 14, ship near 14.7 N., 76 W., E. f. 5, 29.88; ship near 11.7 N., 81 W., N. f. 2, 29.91; ship near 10.7 N., 80 W., N. f. 2, 29.91. Oct. 15, ship near 15.7 N., 82 W., N.N.E. f. 6, 29.91; ship near 15.7 N., 77 W., E. f. 6, 29.86; Honduran station or ship near 15.7 N., 84 W., N.E. f. 3. Oct. 16, ship near 11 N., 81 W., S.S.W. f. 9 (Historical Weather Maps, Oct. 1908). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Belen College Observatory, Oct. 24. The evening newspapers are delivering the following news: "New Orleans, Oct. 24. A brief dispatch which was received here from Bluefields, Nicaragua, indicates that a hurricane has swept the Nicaraguan coast from Point Pearl to Cape Gracias a Dios from Oct. 16 to Oct. 18. This news agrees with what we stated on Oct. 16: Today at 7 A.M. we have some indication of another revolving storm to the S.W. and quite far from Jamaica. On Oct. 19 we stated "it was at 7 A.M. this morning to the S.W. one quarter to the W. of Jamaica and somewhat nearer (than on Oct. 16)". L. Gangoiti, S.J. (Diario de la Marina, Havana, Oct. 24, 1908, evening edition, p.4, col.4). 3) New Orleans, Oct. 24. A cable from Bluefields, Nicaragua, under date Oct. 21 says: A disastrous hurricane swept the coast of Nicaragua last Friday to Sunday (Oct. 16-18), destroying the towns of Rio Grande and Prinzapolca and doing considerable damage in the interior. Only meager advices have been brought here by schooner, but it appears that the entire coast from Pearl Cays to Cape Gracias was swept, and there was much loss of life. The fruit steamer "Dictator" is here safe an uninjured (The New York Times, Oct. 25, 1908, section C, p.3, col.6). 4) A storm was first observed near 12 N., 81 W. on Oct. 17, 1908 and lasted less than one day; it was last observed near 13 N., 84 W. (Mitchell, 1924). Author's note: A track shown in Tannehill (1938) was found to be very similar to the track included in Mitchell (1924). A second track in Neumann et al. (1993) was significantly longer and extended from Oct. 15 to Oct. 18; this track also has some similarities with the track in Mitchell (1924). On the basis of information in the above items, the author of this study introduced a number of modifications along the track in Neumann et al. (1993) as for Storm 7. 1908. The author's 7 A.M. positions were estimated as follows: Oct. 14, near 11.7 degrees N., 78.5 degrees W; Oct. 15, near 11.7 degrees N., 80.0 degrees W.; Oct. 16, near 12.0 degrees N., 81.5 degrees W.; Oct. 17, near 12.5 degrees N., 82.7 degrees W.; Oct. 18, near 13.0 degrees N., 84.0 degrees W. It should be indicated that the author's track was started one day earlier than the track in Neumann et al. (1993). The author's track was terminated on Oct. 18 in spite of that the analysis of data on weather maps for subsequent days hinted the possibility that, as a weakening depression, this weather system could have existed for several more days and described a possible loop track over the Bay of Honduras, finally heading back towards Honduras; however, the sparsity of data prevented to ascertain that this was indeed the case. The author's track for Storm 8, 1908 is displayed in Fig. 4.

Information in items 2) and 3) allowed one to confirm the hurricane status that Neumann et al. (1993) gave to this storm as for Storm 7, 1908. Hurricane intensity was introduced along the author's track late on Oct. 16 and was maintained until the morning of Oct. 18. Then the system was allowed to rapidly weaken, and tropical storm and depression (dissipation) stages were introduced. Prior to late Oct. 16, tropical storm intensity was denoted along the author's track in spite of that the author believes that the intensity of the weather system was below that of a tropical storm over the early portion of the Oct. 14-16 period.

Storm 9, 1908 (Oct. 19-23), T. S.

This storm corresponds to Storm 8, 1908 in Neumann et al. (1993).

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Oct. 19, extratropical low, about 1010 millibars (29.83) placed near 35 N., 72 W. and supported by ship reports. Oct. 20, low becoming tropical; ship near 34.7 N., 68.5 W., N.E. f. 2, 29.88, temp. 72 F; ship near 33.5 N., 72 W., N.E. f. 6, 29.80, temp. 74 F; ship near 32 N., 68.7 W., S.W. f. 4, showers; ship near 32 N., 75 W., N.E. f.5, 29.88, temp. 76 F; ship near 26 N, 74 W., W. f. 2, 29.83, temp. 75 F., showers; ship near 30 N.,, 72 W., S. f. 2; ship near 27 N., 68.7 W., S.W. f. 3, 30.06; center near 32.5 N., 72 W., probably too far W. Oct. 21, low placed 28 N., 72 W., too far W., near 28.5 N., 66 W. appears to be a better location; ship near 30 N., 65 W., E. f. 4, 29.88, temp. 74 W., ship near 27 N., 66 W., W. f. 3, 29.94, temp.80 F; ship near 23.7 N., 66 W., N.W. f. 1, 29.83; Turks Is., N.W. f. 2, 29.99. Oct. 22, low placed 27.5 N., 75 W., but near 29 N., 74 W. would be better; ship near 30 N., 75 W., N.E. f. 4, 29.77; ship near 31 N., 72 W., E.S.E. f. 6; ship near 28.5 N., 70.3 W., S.E. f. 3, 29.94; ship near 27 N., 71 W., S.W. f. 3, 29.86; ship near 25 N., 71.7 W., S.W. f. 4, 29.88; ship near 25 N., 76.7 W., W.N.W. f. 2; ship near 29 N., 79 W., N.N.E. f. 7; ship near 33 N., 71 W., E. f. 8, 30.06; ship near 32.5 N., 78 W., N.E. speed could not be read, 29.97. Oct. 23, center N. of Charleston; Charleston, W. f. 3, 29.88, temp. 63 F; other data around the low could not be read; low loosing all tropical characteristics as it was moving in a cooler environment (Historical Weather Maps, Oct. 1908). Author's note: Wind forces (f) are on Beaufort scale and pressures are in inches; temperatures in degrees Fahrenheit are sometimes indicated. 2) A storm was first observed near 26 N., 52 W. on Sept. 18 and lasted 5 days; it was last observed near 34 N., 80 W. (Mitchell, 1924). Author's note: A track shown in Tannehill (1938) was found to be similar to the one in Mitchell (1924). The track displayed in Neumann et al. (1993) as for Storm 8, 1908 was started near 28 N., 68 W, on Oct. 21 and was, therefore, shorter than the one in Mitchell (1924).

On the basis of information in item 1), the author of this study introduced some modifications along the track in Neumann et al. (1993) for Storm 8, 1908. The author's 7 A.M. positions were estimated as follows: Oct. 19, near 35.0 degrees N., 72.0 degrees W.; Oct. 20, near 32.5 degrees N., 70.0 degrees W.; Oct. 21, near 28.5 degrees N., 66.0 degrees W.; Oct. 22, near 29.0 degrees N., 74.0 degrees W. The 7 A.M. Oct. 23 position in Neumann et al. (1993) was kept unchanged. Differences between actor's positions and those in Neumann et al. (1993) were found to range from about 160 miles on Oct. 21 to about 60 miles on Oct. 22. The author's track for Storm 9, 1908 is shown in Fig. 4.

In spite of that only one wind report of force 8 was found in relation to this weather system (item 1), the author of this study decided to keep the tropical storm status that Neumann et al. (1993) gave to it as for storm 8, 1908. Storm 9, 1908 had obviously an extratropical origin

and tropicalization took place as the storm moved S.E. to lower latitudes. However, for practical purposes, the weather system was kept as a tropical storm over the entire period Oct. 19-22 and it was changed to extratropical near midnight Oct. 22-23 when approaching the South Carolina coast.

Special statement.

In addition to the nine storms that have been fully discussed above, four other weather disturbances have been identified as possible cases during 1908. These cases are presented next.

A) Case of Jun. 2-5, 1908.

Sarasola (1928) published a catalog by M. Gutierrez-Lanza in which a slight cyclone is mentioned to have occurred over extreme eastern Cuba on Jun. 3-4, causing some damage. The regular note of Jun. 4 issued by the National Observatory and published in Diario de la Marina, Havana, Jun. 5, 1908, morning edition, p.3, col.3, indicated a rain storm in the area of Bayamo, apparently on Jun. 3. Diario de la Marina, Havana, Jun. 7. 1908, morning edition, p.5, col.6, published an extensive note from the correspondent at Santiago de Cuba, dated on Jun. 3. The note indicated that on Jun. 2 the aspect of the clouds and the rain showed a perturbation. By 5:30 P.M. the dark clouds increased and the rain became heavier. Then rumors about a cyclone started to circulate. The correspondent learned later that the bishop had apparently received a telegram from the Belen College Observatory announcing the disturbance but the note was not received on time to be published in the newspapers. By 8 P.M. strong gusts accompanied by torrential rain invaded the city (Santiago de Cuba) and caused general panic. Soon the streets were flooded and some houses collapsed. The Yarayo River overflowed, causing considerable damage. Rain continued all the night of Jun. 2-3 and still continued falling as the correspondent wrote his note. When the correspondent inquired about any sensible drop in pressure, he was told that the weather was just due to a common rain storm for that time of the year. Examination of Historical Weather Maps for the early days of Jun. 1908 revealed that a weak low pressure area existed near E. Cuba and over the Bahamas, apparently moving N., but no strong winds were found, except for one of force 6 on Jun. 5. The information above was not enough to document the existence of tropical storm winds associated with this weather system and, therefore, the author of this study decided to keep it as a possible case.

B) Case of Jul. 29-30, 1908.

The Jul. 29 weather map showed a wind E. f. 5 at Port Eads with a pressure of 29.74 inches and a low placed near 28 N., 90 W. (Historical Weather Maps, Jul. 1908); by the morning of Jul. 30, the low was placed 28 N., 92 W. but observations plotted on the map suggested that the low was centered on the Louisiana coast near the 92.5 W. meridian. No winds of tropical storm force were reported, but that author believes that the pressure of 29.74 inches reported at Port Eads on Jul. 29 was low enough to merit the inclusion of this system as a possible case.

C) Case of Aug. 5, 1908.

The weather map for Aug. 5 showed a ship near 28 N., 51 W. reporting a wind S. f. 8, and a low pressure area of 1000 millibar (29.53 inches) centered near 28.5 N., 52 W. (Historical Weather Maps, Aug. 1908); a very weak circulation was drawn near 30 N., 60 W. on the Aug. 3 map and a N.N.E.- S.S.W. trough was shown near the 57 W. meridian on the map for Aug. 4. Information on the three maps above allowed one to identify an eastward moving weather system; however, such a system could not be easily identified on the map corresponding to Aug. 6, 1908. As tropical storm winds (force 8 on the Beaufort scale) were reported by a ship on Aug. 5, the author of this study believes that there is a good chance that this system had attained tropical storm status. However, the ship report could have been unreliable and this is why the author decided to be conservative and to keep this case as a possible one.

D) Case of Oct. 25-31, 1908.

A track for this case is presented in Tannehill (1938) as for Storm 6, 1908; he obviously took it from Mitchell (1924) who said that a storm was first observed near 20 N., 82 W. on Oct. 25 and lasted for 10 days and that it recurved near 23 N., 86 W. and was last observed near 60 N., 60 W. The Monthly Weather Review (Oct. 1908) also showed a track for this weather system starting in the southeastern Gulf of Mexico in the evening of Oct. 27 and ending near the N.E. extreme of Nova Scotia in the evening of Oct. 30, when it had intensified significantly, with a central pressure about 29.06 inches. The Monthly Weather Review (Oct. 1908) hinted the possibility that this could have been the same system that visited the Central American coasts some days earlier and that publication was probably following ideas expressed in cablegrams sent to Washington by the Belen College Observatory, one of which originated at 9 A.M. Oct. 26 and stated: "The ten days old perturbation is to the S.W. (of Havana), moving towards the Yucatan Channel (Diario de la Marina, Havana, Oct. 28, 1908, evening edition, p.4, col.1); however, according to the discussion of the Central American storm (Storm 8, 1908) by the author of this study, most likely this was not the case. Bulletins issued by the Belen College Observatory at 8 A.M. Oct. 27 and 8 A.M. Oct. 28 indicated that the center of the cyclonic perturbation was to the S. and near the extreme western Cuba and to the N.W. one quarter to the N. of Havana, respectively; these advices were published in Diario de la Marina, Havana, Oct. 27, 1908, evening issue, p.4, col.1 and in Diario de la Marina, Oct. 28, evening edition, p.4, col.1. The National Observatory (of Cuba) also published advisories about this weather system in the same editions, and included some information received (at Havana) from the Weather Bureau of Washington. The Monthly Weather Review (Oct. 1908) stated that the Oct. 29-30 storm was of unusual severity in New England and contained a table showing wind velocities about 55 mph to have occurred at several places in N.E. United States. Examination by the author of this study of weather maps for the mornings of Sept. 27-28 revealed that the low pressure area observed in the eastern Gulf of Mexico was rather a development of frontal wave nature, with little, if any, tropical ingredients. No closed cyclonic circulation could be drawn S. of the western tip of Cuba on the basis of available data for Oct. 27 and a cold from was clearly inferred to have extended from a low just W. of Tampa to Yucatan on Oct. 28. The front advanced eastward and was drawn over central Cuba on the morning map of Oct. 29 (Historical Weather Maps, Oct. 1908). Based on information contained on the above maps, there is only a slim probability that this weather system ever exhibited tropical characteristics. But in order to account for this very small probability, the author of this study decided to include this one as a possible case.