

## YEAR 1899

Eight storms were found to have occurred in 1899. Tracks for these storms are presented in Fig.2.

Storm 1, 1899 (Jun.26-27), T. S.

This is a new case which has been recently unearthed by the author of this study; therefore, this case is not included in Neumann et al. (1993).

Documentation of this case was based on the following information: 1) The recent flood resulted from heavy rains which set in near the mouth of the Brazos River on the afternoon and night of Jun.26 and progressed slowly inward until Jun.28, when phenomenal heavy rains occurred on the central position of the Brazos River drainage basin. The heaviest rain were recorded as follows over the 72 hours ending at 8 A.M. Jun.28: Alvin, 7.27 inches; Brazoria, 7.83 inches; Galveston, 3.20 inches. The heavy rains appears to have resulted from a semitropical storm which had moved northward from the central portion of the Gulf of Mexico. The storm was first noted on the morning map of Jun.26, 1899 and later in the day a high tide and heavy swell at Galveston indicated a storm of considerable energy at sea to the S. of Galveston. Storm signals were displayed at Galveston on the afternoon of Jun.26. During the night of ,Jun.26 the storm moved inland and its energy had greatly diminished from that at first shown by the ocean. The lowest barometer recorded at Galveston during the storm was 29.74 inches at 8 P.M. Jun.26. Judging from the progressive movement, the storm died out as it moved inland at the slow rate of about 5 mph. The heaviest rainfall occurred at the coast 24 to 36 hours earlier than at Hearne and Waco. A study of the rainfall at all stations shows the progressive move of the storm inland, notwithstanding the barometer gradients at the surface were not sufficient after the storm left the coast to indicate the position of its center on the chart. (Monthly Weather Review, Jun. 1899). 2) Observations taken at 8 A.M. (E.S.T.) and extracted from weather maps: Jun. 26, ship near lat. 28 N., long.92 W., wind S.E. force 6, barometer 29.80 inches; Galveston, wind N.E. force 3, barometer 29.86 inches. Jun 27, Galveston, wind S.E. force 6, rain, barometer 29.78 inches; Corpus Christi, wind N.W. force 3 barometer 29.85 inches (Historical Weather Maps, Jun. 1899). 3) A storm of some intensity appears to be developing in the West Gulf. Galveston reports a N.E.

wind of 30 mph (The New York Times, Jun.27, 1899, p.3, col.4). Author's note: This statement was probably issued in the evening of Jun.26. 4) Austin, TX, Jun.29. All S.W. and central Texas has today been visited by terrific rainstorms which have practically tied up all the railroads in this section of the state. Many acres of farming land in South Texas are under water tonight and much cotton will be badly damaged. (The New York Times, Jun.30, 1899, p.1, col.2). 5) Austin, TX, Jul.1. The terrific rains in central Texas continue and the overflowing creeks and rivers are devastating growing crops and other property. The Brazos River is the largest flooded steamer. State Senator Davidson of Cuervo arrived here this evening and stated that the Guadalupe and Colorado Rivers in that section are flooding the low country. The fall was 8 to 10 inches in 18 hours (The New York Times, Jul.1, 1899, p.2, col.3). 6) Austin, TX, Jul.1. There has been another 24 hours of continued heavy rainfall throughout the flooded district of S. and central Texas, with the result that rivers had their overflow greatly augmented, inflicting additional loss and damage to the agricultural interests (The New York Times, Jul.2, 1899, p.1, col.6). 7) Austin, Jul.2. There is no improving in the distressing situation in the flooding districts of S. and central Texas. On the contrary, the inundation is growing worse (The New York Times, Jul.3, 1899, p.1, col.7).

The author of this study produced an approximate track for Storm 1, 1899. The author's 7 A.M. Jun. 26 position was estimated near 27.5 degrees N., 93.0 degrees W. on the basis of the ship observation in item 2). The author's 7 A.M. Jun. 27 position was estimated near 29.5 degrees N., 97.5 degrees W. and was based on general information in item 1) and on specific wind and pressure information at Galveston and Corpus Christi for the morning of that day (item 2). Although it is likely that the storm weak circulation still existed on Jul.28, no attempt was made to estimate any position due to the reasons discussed in item 1). The author's track for Storm 1, 1899 is shown in Fig.2.

Information in item 1) regarding the high tide and heavy swell which were experienced at Galveston late on Jun.26, prompted the author to classify this weather system as a weak to moderate tropical storm. However, the most important feature associated with this storm was the very extensive flooding over positions of Texas which resulted from the heavy rains that set in along the Texas coast in the afternoon and evening of Jun.26 (item 1) and then spread inland, where they continued for several days (items 4 through 7).

Storm 2, 1899 (Jul.28-Aug.2), H.

This is the same storm that Neumann et al. (1993) identify as Storm 1, 1899.

The following information was found in relation to this storm:

- 1) Port de France, Martinique, Jul.31. News is arriving slowly owing to the occurrence in Santo Domingo on Friday (Jul.28) of a violent hurricane which caused damage. Three large schooners which were in the roadstead of Santo Domingo were wrecked, and only one man of the crews of the 3 vessels was saved. The hurricane moved to the N.E.(?) between Santo Domingo and Cotuy, 44 miles from the capital. Telegraph lines suffered heavily and great damage was done along the sea coast (The New York Times, Aug.1, 1899, p.7, col.3). Author's note: The storm movement to the N.E. appears to be in error.
- 2) Observations which were extracted from 8 A.M. (E.S.T.) weather maps: Jul.29, Santiago de Cuba, wind W. force 1, barometer 29.92 inches; Camaguey, wind N.E. force 3, barometer 29.87 inches; Port-au-Prince, wind E. force 7; barometer 29.96 inches; ship near lat. 21.2 N., long. 74.4 W., wind S.E. force 7. Jul 30, ship near lat. 24.5 N., long.83.5, wind S.W. force 5; Key West, wind S.W. force 4, rain, barometer 29.97 inches; ship near lat. 25 N., long. 80.5 W., wind S. force 7, barometer 29.88 inches. Jul.31, ship near lat. 26 N., long. 87 W., wind N.W. force 3, barometer 29.97 inches; ship near lat. 25.5 N., long. 84.7 W., wind S. force 3; Key West, wind S. force 3, barometer 30.00 inches; Tampa, wind S.S.E. force 5, barometer 29.88 inches; ship near lat. 24.5 N., long. 83 W., wind S.W. force 6 (Historical Weather Maps, Jul.1899).
- 3) Observations taken at 8 A.M. (E.S.T.) which were extracted from weather maps; Aug.1, Pensacola, wind N.N.E. force 3, barometer 29.94 inches; Port Eads, wind N.N.W. force 3; Tampa, wind S.S.E. force 3, barometer 29.98 inches; Jacksonville, wind S. force 4, barometer 30.00 inches. Aug.2, Pensacola, wind N.W. force 2, barometer 29.96 inches; Montgomery, wind N.E. force 3, barometer 29.98 inches; Port Eads, wind N.W. force 3; ship near lat. 27.5 N., long. 88 W., wind S.W. force 5 (Historical Weather Maps, Aug.1899).
- 4) Taken from a report by A.J. Mitchell, observer and section director of the Weather Bureau: At Carabelle, Fl., over which the center of the storm doubtless passed, the wind was fresh and brisk from the N.E. on Jul.31, and increased gradually until sunrise Aug.1, when the gale was furious. At noon of the same day almost a calm prevailed. Within a short time the wind increased to a furious gale from the S.W., which continued until nearly sundown, the wind gradually diminishing with a W. backing to S. direction. The diameter of the storm was not more than 40 miles and its force was spent before it progressed 50 miles inland. Great damage befell the town of Carabelle where no more than a score of unimportant houses

withstood the storm. The results to shipping was disastrous. The following vessels, most of them loaded, were wrecked: 14 barks, 40 small boats under 20 tons., and 3 pilot boats. The number of persons drowned and killed was 6. (Monthly Weather Review, Aug. 1899). 5) Tallahassee, FL, Aug.2. The town of Carabelle, S.W. of this city, is reported almost completely destroyed by a terrific wind and rain storm which passed through the section during yesterday and last night. Many boats which were in the harbor have been wrecked and the greater portion of the long wharf, together with large portions of many stores at Lanark, the large pavilions and the boats have been destroyed. Unconfirmed reports say that the steamer "Crescent" have been lost between Apalachicola and Carabelle (The New York Times, Aug.3, 1899, p.2, col.3). 6) Tallahassee, FL, Aug.3. The first train from Carabelle through the storm-stricken Gulf section since Monday (Aug.1) reached here this afternoon. Carabelle is literally wiped from the map. Thirteen of the 14 lumber vessels in the bay were blow ashore and are now lying well up on dry land. The towns of McIntyre and Curtis Mill are completely demolished and large interests have been destroyed. The coast resorts St. Teresa and Lanark are more seriously wrecked than at first reported. 15 men who seem to have been fishing on the Dog Island Inlet before the storm broke cannot be found (The New York Times, Aug.4, 1899, p.6, col.7). 7) Storm of Aug.1, 1899. Carabelle, FL. Minimal, 6 killed (Dunn and Miller, 1960).

Some modifications were introduced to the track for this storm in Neumann et al. (1993), which was started over the eastern Gulf of Mexico on Jun.31. as for Storm 1, 1899. On the basis of information in the above items, the author of this study determined an approximate track for Storm 2, 1899, starting three days earlier and about 1000 miles to the S.E. The author's 7 A.M. Jul.28 position was estimated near 17.0 degrees N., 69.5 degrees W. on the basis of information in item 1) which indicates that the storm was felt in Santo Domingo that day. The author's 7 A.M. Jul.29 position was estimated near 21.3 degrees N., 75.7 degrees W., on the basis of an analysis of the corresponding observations for that morning which are contained in item 2). Based on meteorological data contained in item 2), the author of this study estimated 7 A.M. positions near 25.3 degrees N., 81.0 degrees W. on Jul.30 and near 27.5 degrees N., 83.5 degrees W. on Jul.31, being this latter position about 90 miles to the E.N.E of the corresponding one shown in Neumann et al. (1993). The author's 7 A.M. Aug.1 position was estimated near 29.3 degrees N., 84.5 degrees W., primarily on the basis of the storm description at Carabelle and vicinity given in item 4); this position is slightly to the S.S.E of the one shown in Neumann et al. (1993). Finally, the author estimated a 7 A.M. Aug.2 position near 31.5 degrees N., 86.0 degrees W., based on the wind and pressure information for Pensacola and Montgomery in the morning of Aug.2 (item 3); this position is nearly 100 miles to the

W.N.W of the corresponding one displayed in Neumann et al. (1993) as for Storm 2, 1899. The author's track for Storm 2, 1899 is shown in Fig.2.

Information in items 4) through 6) was found to support the hurricane status given to this storm by Neumann et al. (1993), particularly because of the amount of damage described in those items. The author of this study decided to keep the storm as a hurricane only from late Jul.31 to the evening of Aug.1, just a few hours after the storm made landfall on the coast near Carabelle. Although the storm was referred to as a "violent hurricane" at Santo Domingo" (item 1) the author decided against giving hurricane status at landfall on the southern coast of that island due to the lack of confirmation that this was the case.

#### Storm 3, 1899 (Aug.3-Sept.3), H.

This is the same storm which Neumann et al. (1993) identify as Storm 2, 1899. The storm attained great intensity while crossing over Puerto Rico where it is known as that of San Ciriaco because it was felt there on Aug.8, the festivity of that Catholic saint. It was also a very intense hurricane when it was felt on the North Carolina coast on Aug 17-18.

Abundant information was found in relation to this storm: 1) From an article by C.O. Paullin, Nautical Expert, United States Hydrographic Office: Information concerning tropical storms at or near their place of origin is almost wholly lacking, and much interest attaches to the report of the British steamship "Grangense" which vessel encountered the hurricane 1800 miles E. by S. of the Island of Guadeloupe. The "Grangense" passed through the center of the storm and took very careful and complete observations, warranting the publication of her log in full, as follows: At noon of Aug.3, in lat. 11 51 N., long. 35 42 W., we experienced a sudden change in the weather which, being most unusual in this part of the world, is worthy to note. Early in the afternoon the barometer began slowly to fall from 29.93 inches. At 2 P.M. it stood 29.73 inches, the sky becoming overcast with cumulo-nimbus clouds and the wind refreshing to a moderate gale from N.N.W. At 4 P.M. the barometer read 29.53 inches, the wind remaining from the same direction with force increased to a fresh gale, accompanied with heavy rain. At 5 P.M. the barometer reached its lowest reading, 29.38 inches, while the wind fell calm and the rain ceased; very heavy nimbus clouds traveled overhead at a high speed from the S.W. and a high, short and dangerous sea from the

N.E. caused the ship to pitch heavily and made it necessary to let her head fall off to the E. in order to make headway, the ship being very light. At 6:30 P.M. a light breeze came out of the S.S.W. and the barometer rose to 29.43 inches, clearly indicating that the center had passed. At 7 P.M. the wind increased to a strong S.S.W. gale, with excessive rain beating down the N.E. seas and enabling us to return to our course, N.E. one-quarter E. At 8 P.M. the barometer stood at 29.58 inches, with a moderate gale hauling gradually southward. After two heavy squalls at 10 P.M. the weather cleared, barometer 29.73 inches, steadily rising; sea coming up from S.S.E, sky clearing and starts shining out again; strong breeze hauling to E. And so finished this little storm which showed all the symptoms of a genuine West Indian hurricane underdeveloped, with the exception of the sea in the vortex which, instead of being confused, came almost suddenly from the N.E. and remained from that quarter until the wind and sea from the receding semicircle overwhelmed it. Captain Spedding, who has been in this particular trade, from Europe to the river Amazon, for many years and many others on board who has been long acquainted with these regions say they have never experienced any weather of a cyclonic character so far to the eastward before (Monthly Weather Review, Oct. 1900). 2) Observations taken at 8 A.M. (E.S.T.) which were read off weather maps: Aug.3, ship near lat. 11.7 N., long. 35.5 W., wind N. force 6, barometer 29.91 inches; ship near lat. 7.7 N., long. 32.7 W., wind S.W. force 6. Aug.6, ship near lat. 18.7 N., long. 53.0 W., wind N.E. force 7, barometer 30.00 inches. Aug.7, Dominica, wind N.W. force 3, barometer 29.71 inches; Martinique, wind W., force 2, barometer 29.74 inches; Barbados; wind S. force 5, barometer 29.85 inches (Historical Weather Maps, Aug.1899). Author's note: The ship near lat. 11.5 N., long. 35.5 W. on Aug.3 appears to be the "Grangense" which observations were given in item 1). 3) At 8 A.M. Aug.7, the hurricane center was E.N.E. and distant about 150 miles from the Island of Dominica. At Roseau, Dominica, the barometer read 29.72 inches, with rain and wind from N.W. blowing at 12 mph. Immediately upon receipt of the 8 A.M. telegraphic reports, the central office of the Weather Bureau at Washington ordered hurricane signals at Roseau (Dominica), Basseterre (St. Kitts) and San Juan, and sent advisory messages to all other stations in the Lesser Antilles and also to Santo Domingo, Kingston and Santiago de Cuba, with information regarding the position and probable course of the hurricane. During the next 24 hours the hurricane traveled W.N.W. at a speed of about 16.5 mph, crossing directly over the island of Guadeloupe in the afternoon, and passing 50 to 70 miles south of St. Kitts late in the afternoon of Aug.7 and reaching the S.E. coast of Puerto Rico shortly after 8 A.M. Aug.8 (Monthly Weather Review, Aug.1899). 4) Fort de France (Martinique), Aug 8. At 11 A.M. yesterday morning (Aug.7) a cyclone struck Point-a-Pitre, Guadeloupe. the disturbance lasted until 4:30 P.M. Many houses had their roofs blown off and

were flooded and some of them were demolished. All communications with the interior of the island, where damage done is considerable, has been interrupted. At (Les) Saintes two schooners were sunk and some flat boats were driven into the interior. The plantations suffered greatly (The New York Times, Aug.9, 1899, p.1, col.3). 5) Barbados, Aug.10. Ship "Madiana" has arrived damaged about the decks; passed through a cyclone Aug.7 (The Times, London, Aug.11, 1899, p.4, col.5). Author's note: In addition, the Times, London, Aug.12, 1899, p.8, col.5, published a dispatch from St. Kitts, dated on Aug.11, announcing that the barque "Savora", from Trinidad to Trieste, was towed there with loss of sails. This event was probably related to this storm. 6) New York, Aug.7. A telegram from Kingston, Jamaica, announced that a terrific hurricane swept over Dominica this afternoon traveling W.N.W. The shipping along the threatened area has been warned (The Times, London, Aug.8, 1899, p.4, col.4). 7) Taken from an article by C.O. Paullin, Nautical Expert, United States Hydrographic Office: When the hurricane reached Monserrat (on Aug.7) the area of the storm had increased, the barometer was almost two inches lower (than on Aug.3), having fallen to 27.45 inches, the wind blew with hurricane force, causing immense damage and loss of life, and the rainfall was excessive (Monthly Weather Review, Oct. 1900). 8) Taken from a letter by Major General Robert Fowler-Butler, Commanding Troops, Barbados: The hurricane passed over Monseraat on Aug.7. On Wednesday falling I arrived there on my military inspection tour. The pier was blown away and all the material newly laid in for its extension gone to sea. The Courthouse and a school are standing and crowded with homeless women and children. Not a church or parsonage is standing in the island. There are so far about 100 deaths and 1400 injuries (The Times, London, Aug.31, 1899, p.8, col.6). 9) Observations taken at St.Kitts: At 3 P.M. Aug.6, the wind set in steadily from the N.E. at the rate of 12 mph. At 10 P.M. the barometer began to fall and the wind had attained a velocity of 18 mph. By 3 A.M. Aug.7, the wind was blowing at a rate of 24 mph and there was an apparent tendency to cloudiness so that by 5:30 A.M. the sky was almost entirely overcast with low clouds, from which frequent showers fell. The storm came from the S.E., and the center passed a little to the S. of the island, the barometer reached its lowest reading at 5 P.M. when it stood at 29.27 inches; after this hour it began to rise rather gradually. The wind continued from the N.E. until 6 P.M., when it veered to the E. where it remained until about 8 P.M.; it then veered to the S.E. and so continued until the end of the storm. The maximum velocity (greatest velocity for any 5 minutes) was 72 mph and occurred between 4:22 and 4:27 P.M. The extreme velocity (one mile in the shortest time) occurred at 4:40 P.M. and blew a mile in one-half minute or at a rate of 120 mph. The verifying velocity (45 mph) began at 2:34 P.M. and ended at 12:25 A.M. Aug.8; the storm therefore lasting nine hours and fifty one minutes. The hurricane was accompanied by a light rain, the

total amount of which was 1.28 inches; the heaviest fall occurred between 4:53 and 5:10 P.M. (Alexander, 1902). 10) Some additional pressure observations taken at St. Kitts: Aug.7, noon, 29.74 inches; 2 P.M., 29.62 inches; 3 P.M., 29.52 inches; 4 P.M., 29.38 inches; 4:30 P.M., 29.30 inches; 5:30 P.M., 29.29 inches; 6 P.M., 29.33 inches; 7 P.M., 29.44 inches; 8 P.M., 29.60 inches; 10 P.M., 29.72 inches; midnight Aug.7-8, 29.74 inches (Monthly Weather Review, Aug.1899). Author's note: The above observations were sent to the Weather Bureau by W.H. Alexander, the observer at Basseterre, St.Kitts. 11) Taken from a report by C.W. Doelizsch, Officer of Customs, St. Martin: During the afternoon of Aug.7 the weather was gloomy and squally, with wind increasing to E.N.E. and going to E. At 10:28 P.M. the barometer read 29.81 inches, and the storm was increasing. This was the last observation taken of this hurricane (Monthly Weather Review, Aug. 1899). Author's note: The barometer reading of 29.81 inches appears to be too high. 12) Taken from a report by Mr. John B. Simons, Saba, Dutch West Indies: At 4 P.M. (Aug.7) the wind was from N.E. and increasing. The barometer continued to fall until 11 P.M., when I judged the wind to be from the N., after which it remained steady until midnight (Aug.7-8) when it shifted to S.W. and the barometer began to rise. The minimum reading by an aneroid barometer was 29.40 inches. There was no means of measuring the wind velocity but I estimated it at 55 to 65 mph. This island is high and mountainous and contains no low land. (Monthly Weather Review, Aug.1899). Author's note: The winds given might have not been responding to the hurricane circulation but to local effects associated with the mountainous terrain. The timing of lowest pressure shortly before midnight Aug.7-8, was found to be inconsistent with the storm motion and to be incompatible with the time of lowest barometer at St.Kitts, only about 40 miles to the S.E. of Saba, which occurred at 5 P.M. Aug.7 (item 9). However, there is still a possibility that the observations at Saba were expressed in Greenwich time, in which case the reported time of lowest pressure (about midnight Aug.7-8) would make sense. 13) St. Thomas, Aug.10. The island of Monserrat was completely devastated by the hurricane Monday (Aug.7). All the churches, estates and villages were destroyed and nearly 100 persons were killed (The New York Times, Aug.11, 1899, p.1, col.7). 14) Washington, Aug.9. The American Consulate at Point-a-Pitre, Guadeloupe was wrecked. Consul Ayme reports that a great many vessels were lost and that the damage done to the city was great. (The New York Times, Aug.10, 1899, p.1, col.2). 15) London, Aug.10. The Governor of the Leeward Islands sent a dispatch which says that 74 deaths are already known at Monserrat and that 21 persons were killed in the island of Nevis. (The New York Times, Aug.11, 1899, p.1, col.7). 16) St. Thomas, Aug.9. A severe hurricane swept over the island of St. Croix Monday night (Aug.7). Nearly every estate has been wrecked, the large buildings in the town have been unroofed, stock has been killed and a maximum of 11 deaths have

occurred among the laborers. On St. Kitts about 200 small houses were destroyed and considerable damage was done to the estates. Antigua has suffered severely in damage to estates and buildings in the towns; there were a few fatalities. The force of the storm was also felt at St. Thomas but the damage done was slight. Enormous seas, however, did damage to the wharves (The New York Times, Aug.10, 1899, p.1, col.2). Author's note: Alexander (1902) added that, at St. Kitts, a number of very substantial buildings were blown down and the canes were badly damaged. 17) St. Thomas, Aug.7. There are hurricane indications over the area from Martinique northward and it is feared the storm may strike some island, probably Guadeloupe (the New York Times, Aug.8, 1899, p.1, col.6). 18) Washington, Aug.7, 2:53 P.M. The following warning has been sent out by the Weather Bureau: Hurricane center E. of the Island of Dominica, apparently moving N.W. Hurricane signals are displayed from Dominica to Santo Domingo. H.E. William, Acting Chief of the Weather Bureau (The New York Times, Aug.8, 1899, p.1, col.6). 19) Kingston, Aug.7. It is reported from the island of Dominica that a severe storm was sweeping over there this afternoon, travelling W.N.W. and heading for Jamaica. (The New York Times, Aug.8, 1899, p.1, col.6). 20) Santo Domingo, Aug.7. Advices that the hurricane is approaching have been received from various parts of the "Republic of Dominica" and the barometer here is falling rapidly. The Dominican warships had sailed for Caldera, a part of refuge on the south coast (The New York Times, Aug.8, 1899, p.1, col.6). 21) Santo Domingo, Aug.8. The cruiser "New Orleans" put to sea this morning at 4:00 A.M. The barometer then stood at 29.81 inches and as this dispatch is filed the register shows 29.85 inches (The New York Times, Aug.9, 1899, p.1, col.3). 22) Washington, Aug.8, 10:45 A.M. The following bulletin was sent out: Telegraph communications cut off E. of Santiago de Cuba. Hurricane center apparently moving towards Puerto Rico (The New York Times, Aug.9, 1899, p.1, col.3). 23) Taken from a report by R.M Geddings, section director, Weather Bureau, San Juan: During the afternoon of Aug.7 the sky was unusually hazy (at San Juan), and the lower clouds were rapidly moving from the N.E. At 3 P.M. the sky was covered by thick alto-stratus and stratus clouds, the former coming from the S.E. and the latter from E.N.E.; at this time the barometer registered 29.87 inches. At 10 P.M. the barometer began its downward movement, which did not cease until the lowest reading, 29.23 inches, was reached at 8:30 A.M. Aug.8 at which time the mercury in the tube was oscillating violently. The wind reached no very high velocity until 2 A.M. Aug.8. At 5 A.M. Aug.8 it was raining and blowing furiously, both increasing until between 7 and 9 A.M. the hurricane was at its height, the wind reaching a registered velocity of 66 mph from the N.E. The wind shifted during the progress of the hurricane from N.E. to S.E. The storm passed to the S. of San Juan, and striking the island (of Puerto Rico) on the S.E. part, passed in a direction N. of W. until it passed the N.W. part, the time consumed in its

passage being from 7 A.M. to 1 P.M. The rainfall during San Ciriaco (as the hurricane is known in Puerto Rico) was excessive, as much as 23 inches falling at Adjuntas during the course of 24 hours. This caused severe inundation of rivers with which Puerto Rico is so liberally endowed, and the deaths from drowning numbered 2,569 as compared with 800 killed by injuries received from the effects of the wind (Garriott, 1900). Author's note: Similar information was also published in Alexander (1902). 24) Extracted from a report by R.M. Geddings, Section Director, Weather Bureau, San Juan: At Guayama a reading of 27.80 inches was made on an aneroid barometer which has since been compared and found to read 0.20 of an inch too high; allowing for difference in elevation, the reading of the instrument, corrected, was about 27.75 inches. I was disposed at first to doubt this reading, but a report from the voluntary observer at Juana Diaz records a reading of 28.11 inches at 9:30 A.M. The lowest barometer was reached at Mayaguez at 1:25 P.M. Aug.8. At Arroyo, at 5:30 A.M. Aug.8, barometer 29.30 inches; it fell rapidly until 8 A.M. when it read 27.90 inches; the wind blew from the N. until about 8:30 A.M. when there was a lull of about 15 minutes, then the wind changed and came from the S. with such terrific force that it appeared that nothing could stand against it. At Aguadilla the wind began blowing at 8 A.M. Aug.8 and increased in force to about 1 P.M., when perfect stillness reigned up to about 2 P.M.; after that the wind blew from the S. sometimes with tremendous velocity, until 7 P.M., after which it slackened gradually (Monthly Weather Review, Aug. 1899). Author's note: Guayama and Arroyo are located near the southeastern tip of Puerto Rico, Juana Diaz is inland a few miles to the N.E. of Ponce, Mayaguez is on the west coast and Aguadilla is near the northwestern tip of the island. 25) Taken from Hurricanes of the West Indies by Oliver Fassig, published in Washington in 1913 by the U.S. Weather Bureau: On August 8, 1899 one of the most destructive hurricanes in the history of Puerto Rico passed along the island. More than 3000 lives were lost, the majority of them drowned; the violent winds and torrential rains, completely destroyed a coffee crop which value was estimated over 7 billion dollars, almost all banana crops were blown down by the wind or washed away by river overflowing. And still we can see the effects of the storm in the abandoned coffee plantations, in which the growers lost their entire wealth. The center of the storm moved across the island in 6 hours, at a rate of 12 mph. At San Juan, 40 mph wind started to blow at 5 A.M. and continued to 10 A.M. This would indicate that the diameter of the cyclone was about 60 miles. On the basis of the reports received from Arroyo, the diameter of the storm should have been 80 to 85 miles. Rainfall lasted for 28 hours on the average, and with a forward motion of 12 mph, the rain area would be about 335 miles across. (Salivia, 1972). Author's note: Oliver Fassig was a professor of meteorology with the U.S. Weather Bureau who was the director of the office at San Juan,

Puerto Rico early this century. 26) Taken from "Descripcion del Ciclón de San Ciriaco", by Ramon Araez y Ferrando published by Imprenta El Heraldo in 1905: At Mayaguez, my two barometers read 754.2 millimeters (29.69 inches) at 4 A.M. Aug.8 and by then I did not have any doubt that the N. wind which had started to blow at 4 P.M. Aug.7 was the forerunner of the approaching storm. By 7:30 A.M. some 30 persons have taken refuge in my house, where they were friendly welcome. Using my military binocular, I looked at the bay of Mayaguez, and observed that the steamers "Vasco" and "Gillher", the schooners "Dichosa", "Concepcion" and "Elena", the "San Julian", the "Guadalupe" and other small vessels were anchored there. Later I saw the "Gillher" weathering the storm at the bay and I wished that the steamer could be saved as it actually happened. The "Concepcion" could not weather the storm and came shore on Sabalos Beach about 150 meters from my house. The "Vasco" got also loose and came ashore not far from the place where the "Concepcion" did. The schooner "Dichosa" came ashore just behind my house, and I welcomed the crew in. My house lost the roof in the middle of the cyclone and torrents of rain inundated the bedrooms. The night following the storm we and the neighbors who had taken refuge in my house, had to rest on wet chairs and rocking chairs. I took note of my barometric observations during the cyclone (some of the observations are reproduced here): 8:A.M., 29.65 inches; 9:20 A.M., 29.53 inches, the cyclone began; 10:50 A.M., 29.37 inches; noon, 29.06 inches; 12:30 P.M., 28.94 inches; 12:50 P.M., 28.90 inches; 1:06 P.M., 28.86 inches, cyclone at its height; 1:40 P.M., 28.94 inches; 2:40 P.M., 29.13 inches; 3:40 P.M., 29.41 inches; 4:37 P.M., 29.53 inches; 5:40 P.M., 29.68 inches; 7:15 P.M., 29.80 inches. The wind directions during the storm were: first from the N., then from the N.W., afterwards from the S. and finally from the N.W. (Salivia, 1972). Author's note: According to Salivia (1972), Ramon Araez y Ferrando was a retired officer from the Spanish Army who lived at Mayaguez. The N.W. wind direction which was reported as having blown at Mayaguez at the end of the storm was not representative of the cyclonic circulation; it was the product of some local effects or, else, it was a typographic error. 27) Washington, Aug.9. Hundreds of houses have been destroyed and several persons killed by the hurricane in the West Indies, according to advices received late this afternoon by the War and Navy Departments. Signal officer Glassford wired from San Juan, Puerto Rico that the calvary barracks there have been destroyed, the signal barracks, storehouses and many other public buildings and hundreds of native houses wrecked, telegraph and telephone lines are down and several people have been killed. The center and south of the island probably fared worse. Capt Snow, in command of the naval station at San Juan, announced by cablegram that about \$2,000 worth of property have been destroyed at the station (The New York Times, Aug.10, 1899, p.1, col.2). 28) San Juan, Aug.10. A hurricane broke over the south coast at 1 A.M.

Tuesday morning (Aug.8) and swept N.W. There was no abatement for 9 hours, the greatest damage being done between 8 and 10 A.M. A dispatch by cable from Ponce sent at 10 A.M. this morning says the town was almost destroyed. At Aibonito very little remains standing, except the cathedral and the barracks. El Cayey was leveled to the ground. At Caguas 4 persons were killed. Humacao was totally destroyed. Forty-six bodies have been recovered and there are many more in the debris (The New York Times, Aug.11, 1899, p.1, col.7). 29) Ponce, Aug.10. The hurricane struck the place at 8 A.M. Tuesday morning (Aug.8) and lasted until 3 P.M. (The New York Times, Aug.11, 1899, p.1, col.7). 30) New York, Aug.13. According to a cablegram received from San Juan the port of Arecibo has been destroyed, the place having been inundated by both the sea and the river (The Times, London, Aug.14, 1899, p.4, col.4). 31) Washington, Aug.11. A report has been received here from an officer at San Juan estimating that the number of persons killed by the hurricane in the island amounts to 500 (The New York Times, Aug.12, 1899, p.1, col.7). 32) List of deaths in Puerto Rico: Humacao, 89; Cayey, 34; Yabucoa, 175; Aibonito, 23; Arroyo, 16; Guayama, 30; Juana Diaz, 5; Jayuya, 30. In addition, 300 persons were wounded in Humacao (The New York Times, Aug.31, 1899, p.4, col.3). 33) Puerto Plata, Aug.9, 11:30 A.M. A hurricane has swept the N. coast since last night and increases in violence. Shipping in the port is a peril but up to this hour no vessel has been damage (The New York Times, Aug.10, 1899, p.1, col.2). Author's note: Puerto Plata is located on the northern coast of the Dominican Republic. 34) Taken from a report by Louis Dorman, Weather Bureau Observer at Santo Domingo: The storm was not felt there until 5 A.M. Aug.9, and the greatest velocity recorded here was 35 mph from the S. at 3:45 P.M. The storm was accompanied by excessive rains both in the interior and on the coast. The Ozama River rose very high and it is believed that the northeastern coast of the island suffered more than the southern (Monthly Weather Review, Aug, 1899). 35) Hurricane of San Ciriaco (Aug.8) affected the Dominican Republic (Garcia-Bonnely, 1958). Author's note: That country was affected late on Aug. 8 and also on Aug.9. 36) Kingston, Jamaica, Aug.9. The barometers are alarmingly low here and Turk Island reports a hurricane blowing, with rapidly falling barometer at 3:30 P.M., causing great excitement. 37) The steamer "Alfred Dumois" came yesterday (to New York) from Santo Domingo. While anchored off Santo Domingo harbor, the vessel was struck by the gale in the morning of Aug.9, and was obliged to run out of the harbor at 11 A.M. For 40 hours the "Dumois" could not get back. Several schooners came ashore in the vicinity of Santo Domingo (The New York Times, Aug.20, 1899, p.7, col.4). 38) The steamer "Isis" encountered the storm on Aug.9 (The New York Times, Aug.16, 1899, p.2, col.1). 39) The "Beverly" left Port Antonio, Jamaica at 9:50 A.M Aug.9. It was rounding Cape Maysi (eastermost tip of Cuba) at 1:45 A.M. Aug.10 when the glass showed that it was "in for it". The wind coming from N.W. got steadily

stronger. She attempted to reach the open sea via the Crooked Island Passage but the hurricane overtook the vessel when it was no more than 10 miles beyond Castle Island. It would be difficult to exaggerate the violence of the wind. Windows in the chart house were blown in by the pressure of the wind. The storm lasted 24 hours and during that time the captain was able to keep the steamer's head up to the sea (The New York Times, Aug.16, 1899, p.2, col.1). 40) The steamer "Themis" was struck by the hurricane off Castle Island on Aug. 10 (The New York Times, Aug.16, 1899, p.2, col.1). 41) The steamer "Herald" also arrived from Port Antonio. She was caught in the storm between Cape Maysi and Castle Island. She was in it for 19 hours on Aug.10, the wind blowing from W.S.W. first and then all around the compass (The New York Times, Aug.16, p.2, col.1). 42) The steamship "Arlene" stopped at Fortune Island to land some laborers on Aug.11. The captain learned that the island had been visited the night before by the hurricane, which has destroyed a large number of homes and other properties and driven several small vessels ashore . (The New York Times, Aug.16, 1899, p.2, col.1). 43) Observations taken at 8 A.M. (E.S.T.) which were extracted from weather maps: Aug.9, Santo Domingo, wind S.W. force 6, barometer 29.73 inches; ship near lat. 17.5 N., long. 69 W., wind S.W. force 8; barometer 29.68 inches; ship near lat. 16.7 N. long. 68.7 W, wind S. force 8, barometer 29.65 inches. Aug.10, Santiago de Cuba, wind N.W. force 4, barometer 29.74 inches; ship near lat.19.7 N., long. 74.5 W., wind W.S.W. force 5, barometer 29.62 inches; ship near lat. 22.5 N., long. 75.4 W., wind N.E. force 4, barometer 29.71 inches (not clearly read off the map); ship near lat. 19.7 N., long 74.5 W., wind W.S.W. force 5, barometer 29.62 inches (Historical Weather Maps, Aug. 1899). 44) Aug. 10, 1899. The cyclone which devastated Puerto Rico on Aug.8 was felt with some force in Oriente province (Cuba). There was some damage, but it was not heavy (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). 45) The cyclone which devastated Puerto Rico on Aug.8-10 was felt in Oriente, Cuba. (Martinez-Fortun, 1942). 46) A telegram has been received in the Colonial Office in reference to the hurricane at Fortune Island, from which it appears that the damage done is comparatively slight. Several vessels however, were stranded (The Times, London, Aug.17, 1899, p.4, col.3). 47) Nassau, Aug.13 (delayed in communication). The hurricane which broke here at 7 A.M. Friday night (Aug.11) and continued with great severity is ended, the center passing to the W. yesterday afternoon. The shipping in the harbor has been injured and many small vessels were lost. The Post Office is partially unroofed and the Government house is damaged. A preserving factory, a new sponge warehouse and many light buildings have been destroyed. The fruit trees and crops are badly injured, but there is little loss of life reported. No news has been received from the adjacent islands (The New York

Times, Aug.15, 1899, p.4, col.5). 48) Jacksonville, Aug.16. Advices have been received to the effect that the hurricane visited the island of Andros in the Bahamas, inflicting great damage to property and completely wrecking the sponging fleet. It is said that 150 bodies were washed ashore. At Nassau some damage was done but the extent of it is not stated. (The New York Times, Aug.17, 1899, p.3, col.1). 49) Jacksonville, Aug.18. According to a Miami dispatch to The Times Union and Citizen, the town of Red Bays, on the island of Andros was swept away in the recent hurricane and about 300 lives were lost. An eye-witness estimates the loss of life at the island as fully 600. The captain of the steamer "Cocoa" says that the wind blew at a rate of 90 mph at Nassau, with occasional gusts to 105 mph (The New York Times, Aug.,19, 1899, p.1, col.2). 50) Taken from a report by P.H. Burns, Superintendent of Bahamas Cable, Nassau. Number of small craft lost, 50. A few of these were swept out of Nassau by the E. wind; others were lost on Exuma Cays, some on Berry islands, but the majority on the sponge beds on both sides of Andros Island. The center of the storm passed between Nassau and Green Cay, which is 60 miles to the S., striking the settlement of Red Bays on Andros Island. N.E. wind did some damage there, backed to N.W. and fell dead calm. People came out to gather their scattered effects when the wind came from the S.W. with great force, bringing in heavy seas which caused great damage. The storm was severe at Bimini, where a few houses were destroyed. At Grand Bahama the storm was stronger than at Bimini and a few lives were lost. Conservative estimates place the total loss of life at 125, probably 100 occurring at Red Bays. A few sponge vessels are missing, which may swell the totals given (Monthly Weather Review, Aug, 1899). 51) Taken from a report by Thomas J. Mc Lain, U.S. Consul, Nassau, Bahamas: The storm began at Nassau about 4 P.M. Friday, Aug.11, and ended late in the afternoon of Saturday (Aug.12). The wind commenced from the N.E., and hauled gradually around to the S., the center passing about 30 miles W. of New Providence. The velocity of the wind at one time reached 90 mph and the barometer registered at its lowest 29.10 inches. The only American vessel in port (Nassau) was the steamship "Cocoa" which moved high up the harbor, kept steam up and rode out the gale in safety. The British steamer "Richmond" was also in port and escaped injury. The steam tug "Nassau" broke her moorings, drifted down the harbor and was wrecked on the reefs W. of the city (Monthly Weather Review, Aug, 1899). 52) Observations taken at 8 A.M. (E.S.T.) which were extracted from weather maps: Aug.11, center of the cyclone was drawn to the E. of Nassau, the circulation being clearly defined by observations from Florida, Cuba and ships. Aug.12, Jupiter, wind N.E. force 6, barometer 29.74 inches; ship near lat. 28 N., long. 76.3 W., barometer 29.71 inches (Historical Weather Maps, Aug. 1899). 53) Washington, Aug.11. The West Indian hurricane tonight was rapidly approaching Nassau, where the barometer has fallen considerable since the morning and the wind has reached a velocity

of 36 mph at 5:40 P.M. There is still a possibility that the storm may curve out to sea; Weather Bureau officials now express the opinion that it will reach the Florida coast and hurricane warnings have been sent there by telegraph and telephone (The New York Times, Aug.12, 1899, p.1, col.7). 54) Washington, Aug.12 (from a statement made by the Chief of the Weather Bureau tonight). At 8:20 A.M. the observer at Jupiter reported that the hurricane began at the hour. The wind was puffy and squally and a moderately heavy sea was running. At 11:40 A.M. a bulletin was sent out indicating that the hurricane center was approaching Jupiter and hurricane signals were order displayed as far north as Charleston (The New York Times, Aug.13, 1899, p.2, col.5). 55) Jupiter, FL, Aug.12. The wind refreshed at 8 A.M. and under murky skies increased in velocity until a rate of about 40 mph was reached. At 8 P.M. tonight the speed of the wind is 38 mph. The barometer registers 29.57 inches. (The New York Times, Aug.13, 1899, p.2, col.5). 56) Key West, Aug.12. A heavy wind prevailed here all day (The New York Times, Aug.13, 1899, p.2, col.5). 57) Local weather clerk Emery (at New York) said that the lowest barometer reported last night was 29.60 inches at Jupiter. It was last night 29.80 inches at Jacksonville and 29.76 inches at Tampa and the barometer has fallen as much at both places. At Key West it was 29.72 inches (The New York Times, Aug.13, 1899, p.2, col.6). 58) The hurricane center has continued its N.W. movement and it was central last night near Jupiter, FL, this place reporting a maximum velocity of 36 mph with a pressure of 29.60 inches. Key West reported a maximum velocity of 37 mph from N.W. and Havana 24 mph from N.W. Indications favor the northward motion of the storm today over Florida, and hurricane signals are flying from Charleston southward and (around Florida) to Cedar Keys (The New York Times, Aug.13, 1899, p.2, col.6). 59) Washington, Aug.13. The West Indian hurricane appears to be gradually decreasing in strength and the chances are that it will spend before making much progress. The hurricane movement is very slow and even at Jacksonville the velocity of the wind this morning was 22 mph. The opinion of the (weather) officials is that by the time Charleston is reached the storm will have dwindled into an ordinary blow (The New York Times, Aug.14, 1899, p.1, col.7). Author's note: The actual intensity of the storm was underestimated in the above item. 60) Taken from a report by J.W. Cronk. Weather Bureau observer, Jupiter, FL: On Aug.12 the wind increased to high in the early morning and to gale by midnight, with the maximum velocity on that date being 41 mph from the N.E. at 10:45 P.M. In the early morning of Aug.13 the hurricane struck Jupiter with great force and continued blowing a gale during the day, with wind shifting to N., N.W, W., and S.W.; maximum wind velocity 52 mph from the N. at 6:20 A.M. with an extreme velocity of 63 mph. At 11:30 A.M. a wind of 51 mph was registered. Heavy rain fell in the morning and light rain in the afternoon. The barometer fell rapidly until shortly before 8 A.M., and then remained nearly stationary