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South Carolina Coastal Comm.

A HISTORY OF COASTAL STORMS IN SOUTH CAROLINA

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There really is not much that can be said. The hurricane, an act of God, passed our way, and in a couple of hours undid what it had taken man years to do, and will take him a long time to rebuild. What has happened has happened. Looking backward will do no good. But the experience . . . can be used as a guide as plans are made for the future. -- The State (Columbia), 10/18/54

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L. W. J.

REFLECTIONS AND PROJECTIONS

HURRICANES, cyclones, and heavy gales were once--not very long ago--a common experience of the people who lived on the coast and sea islands of South Carolina. They were "a part of the climate." They "belong/ed/ to expectation."[1] Every generation had its "horrid" or "disastrous" or "great" storm which wrecked large parts of the human environment. The great and marked event gave color and focus to a lifetime. Stories and ballads about it were handed down, and survivors sometimes "remembered" it in formal observance, as black folk of the Combahee River country as recently as 1967 "remembered" the monster hurricane of 1893 with night-long vigils and prayer meetings during the month of August.[2]

Indians whose ancestors walked South Atlantic shores several millennia before the coming of white men told early English settlers of Carolina about 1680 of a tremendous hurricane of legend which "raised the water over the tops of the trees" at the site of Charleston. The first tropical storm of record subsequent to English settlement made its appearance in August, 1686. It was known as the "Spanish Repulse Hurricane" because it may have saved the infant colony--a few hundred men, women, and children spread thinly between the Cooper River and Port Royal Sound--from annihilation by a formidable invasion force from nearby Spanish Florida. (Carolina extended the boundary of English Empire well to the south in North America, encroaching on lands claimed by Spain.) On the evening of August 25, 1686, gale winds drove two units of the invasion fleet ashore and forced the Spaniards to break off their primary attack at Charleston. But the storm scourged the English colonists while saving them. An idea of the havoc the storm left behind appears in a mournful letter from a local official to the Lords Proprietors in London:

> The whole country seems to be one entire map of devastation. The greatest part of our houses are blown down and still lie in their ruin, many of us not having the least cottage to secure us from the rigor of the weather. The long incessant rains have destroyed almost all our goods which lie intombed in the ruins of our houses. Our corn is all beaten down and by means of continued wet weather lies rotting on the ground.
>
> Our fences are laid flat so that the little corn that escaped the storm is devoured or destroyed by our hogs and cattle. Abundance also of them were killed in the tempest by the falls of trees which in infinite number are blown down and lie in confused heaps all over the country so that most of our cattle are in great danger of running wild, there being scarse any probability of finding them out or possibility of driving them home when they are found.
>
> In some places for 3 or 4 miles together there is scarse one great tree standing. All paths being so impassable that there is no traveling on horseback and scarse any on foot, whereby all society and communication with our neighbors, one of the greatest comforts of our lives, is for many years rendered extraordinary difficult. With the falls of trees the foods of our hogs is likewise destroyed which will cause them all to run wild; or which is as bad, they will all be starved from these and the like calamities which now attend us. We have too great reason to fear the near approach of famine to complete all our miseries which we pray God in his mercy to direct from us.[3]

Colonial South Carolina was--and the state of South Carolina is--situated on a northwestern edge of a major hurricane "corridor" which originates in the Atlantic Ocean just above the Equator. Almost fourscore times between the first storm of 1686 and the last significant storm, "David," in 1979, about once every four years, coastal South Carolina was visited (and importantly affected) by tropical storms.[4] The storms levied a heavy toll of human lives and property, for this coast and its sea islands are open, largely unprotected, and low-lying--the highest elevations are rarely as high as twenty feet above sea level--and since the 18th century have been increasingly filled with people, with several towns and clusters of farms which grew into cities, ports, large-scale agricultural enterprises, and vacation centers.[5] Destructive as were the swirling winds, greater damage was usually caused by the "storm surge," the great dome of violently agitating, wind-swept and moon-drawn water, up to ten feet high, which crashed into and over islands, beaches, and shores near the "eye" of the storm,

a bulldozer sweeping away everything in its path, accounting for nine out of ten hurricane fatalities. The most destructive storms moved against the coast directly from the ocean, approaching from the south and southeast. If storm surge and lunar high tide coincided, the cataclysmic effect was compounded, as with the great hurricane of 1752, which propelled a seventeen-foot tidal wave directly over Charleston, already a flourishing seaport of five thousand inhabitants. "The flood," began an account in The South-Carolina Gazette, September 19, 1752,

> came in like a bore, filling the harbor in a few minutes: Before 11 o'clock, all the vessels in the harbor were on shore, except the Hornet man-of-war, which rode it out by cutting away her main-mast; all the wharves and bridges were ruined, and every house, store, &c. upon them beaten down, and carried away (with all the goods, &c. therein) . . . and great quantities of merchandise, &c. in the stores on Bay-street damaged, by their doors being burst open: The town was likewise overflowed, the tide or sea having rose upwards of Ten feet above the high-water mark at spring-tides, and nothing was now to be seen but ruins of houses, canows, wrecks of pettiauguas and boats, masts, yards incredible quantities of all sorts of timber, barrels, staves, shingles, household and other goods, floating and driving, with great violence, thro' the streets, and round about the town. The inhabitants, finding themselves in the midst of a tempestuous sea, the wind still continuing, the tide (according to its common course) being expected to flow 'till after one o'clock, and many of the people already being up to their necks in water in their houses; began now to think of nothing but certain death: But . . . they were soon delivered from their apprehensions; for, about 10 minutes after 11 o'clock, the wind veered to the E.S.E., and S.W., very quick, and then . . . the waters fell about 5 feet in the space of 10 minutes, without which unexpected and sudden fall, every house and inhabitant in this, must, in all probability, have perished."

Many did perish, including nine who drowned on Sullivan's Island and twenty German imigrants who died of injuries sustained when their ship was driven from an anchorage in the harbor and dashed to pieces on the shore. About 500 buildings were blown down and washed away. The people of Charleston had to rebuild their city: on receipts from rice and indigo they built better than before, creating a community whose impressive residences and public buildings earned it

the accolade, "The most perfect Georgian city in the world."[6]

The normal hurricane season was July through October, as suggested by a perennial popular rhyme:

> June, too soon.
> July, stand by.
> August, don't trust.
> September, remember.
> October, all over.[7]

On rare occasions, tropical storms struck the South Carolina coast as early as May (as in 1934). The latest arriving significant storm made its appearance in the last two days of October, 1792. But the great majority of storms--51 out of the total of 76, 18 out of 34 major storms, and 9 of 10 great storms--had their debut during August or September. (There is a scientific explanation: trade winds are generally strongest at this season, and tropical storms wheeling out of the tropics are thus imparted strong forward and westward momentum which more often carry them over continental North America.) From the seventeenth through the nineteenth century, the storms were most often linked with the month of September, sweeping across the South Carolina coast with such regularity that "September gale" became a commonplace expression, and Low Country people had a good reason to plan early-autumn vacations to the mountains. Since the later 19th century August has vied with September on more than even terms for the designation, "month of hurricanes."[8]

Just as there were hurricane months, there were also hurricane years. Such a year was 1893, when denizens of the South Carolina coast had to suffer through a gale in June and two major hurricanes in August and October. ("If there is any connection between 'sun spots' and cyclones, as some scientists affirm," declared the editor of the Charleston News and Courier, "the sun must have some large spots on it just now."[9]) The August storm utterly devastated the lower coast, submerging its sea islands--St. Helena, Lady's, Hilton Head--under a storm surge of twenty feet. Perhaps two thousand South Carolinians,

most of them Negroes who lived in poverty and primitive conditions on the islands, were drowned, and thirty thousand were left homeless, with means of subsistence, growing crops ruined and boats squashed or swept away. The October storm added injury to injury while it violated popular expectations. A contemporary journalist, Joel Chandler Harris, filed a moving account of the disasters of 1893 from St. Helena Island:

> The oldest inhabitant /he wrote/ is able to remember some very severe storms, but not such another year of storms. He is able to measure the intervals that have elapsed between these disturbances, and from this measurement he has constructed the comfortable theory that after every severe storm there must be a peaceful interlude of ten or fifteen years. But to-day, as he stands in the bright sunshine, the solemn mystery of the marshes stretching away before him as far as the eye can reach, he shakes his head sadly, and digs his cane feebly into the sand. His theory has been blown northeastward into the sea, and it is no wonder he sighs as he walks by your side and points to signs of the storm's devastation that might otherwise escape the eye of a stranger. A house was here or a cabin. Nearby a shoal of dead bodies had been seen drifting along, or were washed ashore. Here was where a magnificent dock and warehouse stood, but there is nothing now to mark its site except a few scattered piles . . . Here a house has been staggered upon its end, there a boat has been flung into the arms of a live oak . . . here a magnificent grove of live oaks has been uprooted; there a broad-beamed lighter has been lifted across the marshes; and yonder hundreds of tons of marsh sedge have been spread over arable land . . . . This woman, standing apart, as lonely as the never-ending marshes . . . lost three children. She had five. In the fury and confusion of the storm, she . . . managed to get them all in a tree. The foundations of this place of refuge were sapped, and the tree gave way before the gale, plunging the woman and her children into the whirling flood. Three were swept from under her hands into the marsh, into the estuary, and so into the sea. They were never seen any more.[10]

In Beaufort "every warehouse and wharf" was prostrated. "Stores and offices were inundated . . . Immense Guano factories were blown down and the yawning sea swallowed their phosphate dredges with the heroic crews on board vainly struggling to save them. Men and boys driving their animals from the shore to higher ground were overtaken by the furious waves, swiftly borne back by the receding waves, both man and beast . . . drowned."[11] When Red Cross

workers reached the district, they found a great "dismal swamp" where the dead lay about the shores unburied and the living either starving or dying of pestilence generated by decaying bodies or stagnant ponds of sea-water left on what had been dry land. As late as 1979, Beaufort coroner Roger Pinckney reportedly found human remains in muddy creek bottoms on St. Helena that were carbon-dated to the great storms of 1893.[12]

A human catastrophe of such magnitude has not been visited upon coastal South Carolina since, whether due to protective measures of some sort or for some other reason is not certainly known. The sum total of human lives lost on this coast as a direct consequence of all tropical storms since 1900 is about one-fortieth that of the single August storm of 1893: 1 death in 1906, 17 in 1911, 34 in 1940, 1 in 1945, 1 in 1954, 11 in 1959, and no deaths since, for a total of 65. However, through the first six decades of the twentieth century the values of property destroyed rose to new heights. The hurricane called "Hazel," which ripped into the upper coast very late in the season (October 15) in 1954, was equal in intensity and raw destructive power to the August storm of 1893. Advance warning helped prevent equal loss of life, but there was no staying its devastation of the human environment. "Hazel" dealt the South Carolina coast property damages in excess of $27 million. At Garden City her 106 miles-per-hour winds broke off the upper story of a large business structure and flung it 300 feet into the sound.[13]

Despite this violent history, tropical storms generally had less than determinative influence upon human settlements, institutions, and activities: that is to say, their effect upon coastal South Carolina was temporary and exceptional when viewed in the continuum of time. Individual and corporate losses might be heavy: this crop of cotton or rice ruined, that ship or house reduced to kindling, this life prematurely snuffed out. It was ever the same--

people bent to nature's powerful thrusts but in the corporate sense did not break: the survivors picked up the pieces and continued their former lives and former ways.

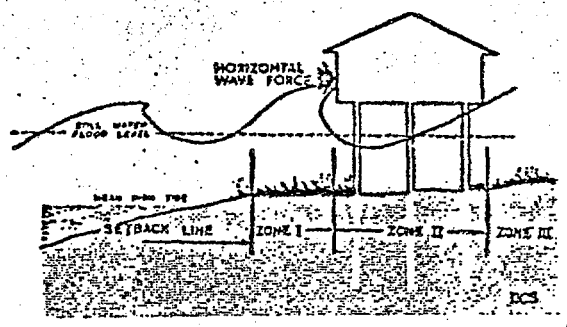
But sometimes the storms served as instruments of important change. The "September gale" of 1822 which plunged ashore between Charleston and Georgetown literally washed away a "summering" village at Cedar Island on the Santee; as a consequence, the old resort site was abandoned as dangerously low-lying, and McClellanville was founded nearby on higher ground as an alternative. The storms of 1893 were partly responsible for the demise of the phosphate industry at Beaufort, and a severe hurricane in 1911 gave the coup de grace to the district's already-troubled rice agriculture, so badly damaging diking systems that they could not be profitably reparied. Most recently a hurricane of August, 1940, struck Edisto with such devastating effect at high tide that the island's promising career as a retirement and vacation resort was dislocated and postponed:

> The beach was hastily evacuated by the Coast Guard, and summer visitors drove away without taking time to gather their belongings. Only one family /the Wallar Baileys/. . . delayed too long. When they started to drive off, their car was caught in the rising tide. Fortunately, they made it back to their large, well-built, well-anchored house on the front beach. In their retreat they watched in terror as the waves broke far inland behind their house, leaving them totally surrounded by the angry sea. The roofs of houses slid by, and sometimes even whole houses . . . . The family came safely through the storm. But they had such a fright that they sold /their property/ and left the beach for good.[14]

Recurring storms influenced architecture in various directions at different times. For more than a century after English settlement, the prevailing view in the Low Country was that structures exposed to hurricane blasts had to be "solid mason-work." At the same time, there was always recognition of the value of tall structures. One indication was houses built on high basements, or, to put it another way, with their first stories starting half-a-story above ground. Another, more ephemeral manifestation was massive storm towers built by planters

of the Winyah Bay-Georgetown district after the killer-hurricane of 1822. In most recent times, building codes have encouraged a combination of high and open foundations as the best proof against the upwash and scour of hurricane storm surge.[15] (See Figure 1)

Since the 1950s, tropical storms have played a diminished role in the history of coastal South Carolina. The number of tropical storms seems to have been on the increase for all areas in the Atlantic during the past several decades. The same trend was apparent for the South Carolina coast as late as 1959. But now we are in the midst of the longest-ever interval between major storms since the founding of Charleston three centuries ago: 22 years. We are disposed to be complacent, to think that the hurricane hazard was tamed by human know-how, like polio, another case of mind over matter. The progress of science and technology in recent decades has been impressive. Well into the 19th century it was impossible to know when a hurricane was threatening or what to do about it if one came. The only warning system was the human eye and ear, which might pick up an ominous heaving of the sea sometimes evident several hundred miles ahead of a storm (and sometimes not), or other "warnings": the alligators' uneasy bellowing out of mating season, the roosters' spontaneous crowing <u>of an evening</u>, or the entreaties of the mysterious Gray Stranger who walked the beaches and knocked on doors.[16] From the early 19th century it was known that tropical storms are moving systems of low atmospheric pressure which may be identified with a barometer. The advent of rapid communications with the completion of the first telegraph lines in 1845 permitted weather-watchers for the first time to apply this knowledge in a practical way: to collect weather observations from increasingly distant points and plot them on a map: a series of such weather maps became a means to "track" the movement of storms from their birth as "tropical disturbances" and forecast their probable paths



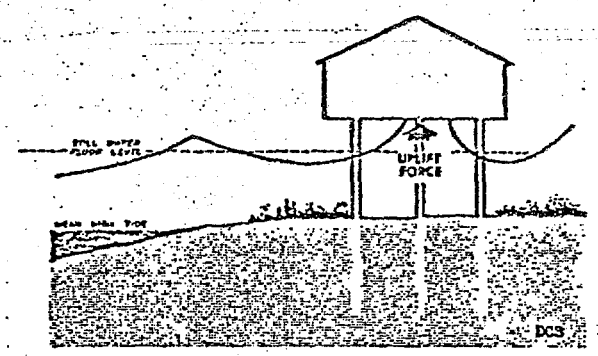


FIGURE - 1

BASIC ELEMENTS OF COASTAL CONSTRUCTION CODES FOR BARRIER ISLANDS
LEE COUNTY, FLORIDA

Source: Dinesh C. Sharma, "Barrier Islands and Beaches: Coastal High Hazard Areas," in Hurricanes and Coastal Storms, Earl J. Baker, editor (Gainesville, Florida, 1980), p. 118.

and speed of advance. Subsequent developments--new instruments like radar and aircraft and satellites and computers, new knowledge about cloud patterns, and the professionalization and bureaucratization of weather-watching and disaster relief--all did their part to insure, in our time, that hurricanes can no longer strike completely without warning or succor for the afflicted.[17]

But difficulties remain. Hurricanes, like the weather, are predictable only within limits. (An expert meteorologist who classified hurricanes by their movements included "right-hookers" and "south-droppers" as well as "text-bookers" and "straight-shooters" among the descriptive names.) In order to predict the points along an ocean front where wind and storm surge will present a hazard great enough to justify the expense and inconvenience of mass evacuation of the inhabitants it is necessary to know 12 to 24 hours in advance precisely where the storm center will strike land. Our current technology does not permit such a projection.[18] Indeed, in three out of four of the greatest hurricanes of the twentieth century (in terms of impact on the South Carolina coast)--those of 1911, 1940, and 1959--fickle storms more or less confounded the experts of the Weather Service, which finally issued belated warnings for all or portions of the South Carolina coast <u>one to three hours</u> before the storms' arrival. The admittedly more sophisticated technology of warning and organized response based on experienced weather and disaster preparedness agencies developed since the 1950s has not yet been tested by a major storm. Yet there has occurred a remarkable latter-day concentration of human activities and habitations on the South Carolina coast, especially on the beaches north of Georgetown and on the islands south of Charleston and at Beaufort. The somewhat paradoxical consequence, it seems to many intelligent people who should know, is not food for complacency but gnawing concern and fear that this coast and this people have never been more vulnerable.

Robert Scott of the Charleston County Disaster Preparedness Agency suggests

that the best advice he can give for hurricane preparation is "cultivate a friendship in Columbia."[19] Although this sounds defeatist in the extreme, it makes a basic point. When a hurricane warning comes, there still is not much that can be done, if one lives in a vulnerable area, except evacuate to higher ground as quickly as possible. Even this is not always (or necessarily) as easy as it sounds: the population on some beaches and most coastal islands is now so large that there may not be enough warning time for safe evacuation of people, for evacuation must be achieved by way of narrow roadways which run over low-lying embankments and bridges and are thus subject to closing by storm surge or bridge malfunction or accident. And even if all people escape, which experts like Neil Frank of the National Hurricane Center doubt,[20] their property, valued in the billions of dollars, is captive to the storm. This has always been the price exacted of those who were drawn to the "good life" on the South Atlantic. The demand for, and soaring values of, ocean-side property in this state suggests that, as ever, people are willing to gamble that benefits outweigh a seemingly remote danger.[21]

Now let us try, as a sort of conclusion, to understand the general meaning of the preceding analysis.

If South Carolina faces a crisis on its islands, inlets, and beach-fronts, it is one sweetened by success: coastal South Carolina has not been so prosperous since early in the nineteenth century, and sun-drenched beaches and sea islands make a tremendous contribution. Moreover, it is a crisis aided by "politics" as it has worked at all levels in the recent past. Local units of government support themselves mainly by taxes on land, and as a consequence heartily encourage any development of land which will increase assessed values. Existing federal flood insurance programs may have the same effect: its public subsidy, by shouldering a large part of the property insurance burden, has

apparently encouraged people to build homes and businesses in even the most hazardous areas.

What is to be done? At the risk of being impertinent, I offer the following suggestions.

1) Local and state governments, the Weather Service, and various emergency agencies like the Red Cross who are collectively responsible for developing and carrying out procedures for dealing with hurricanes need to establish the closest possible working relationships with each other before coordination is required in a disaster.

2) Government at all levels must create and enforce more stringent hazard mitigation zoning and building codes. If, as seems the case, the entire population of all coastal areas likely to be affected by a great hurricane cannot be evacuated by existing transportation systems within the warning time that is likely to be available, perhaps a medium-run solution is that suggested by William H. Wilcox of the Federal Emergency Management Agency: vertical evacuation, that is, instead of moving everyone to higher ground some distance from the coast, settling a portion of the endangered population into local high rise structures which have been built and certified to withstand hurricane wind and flood.[22] More stringent building codes would make vertical evacuation feasible. More stringent hazard mitigation zoning would have the additional benefit of keeping a larger portion of beachfront areas "public" and ecologically "natural."

3) We need impartial and detailed analyses of the emergency preparedness capabilities of each of the coastal counties of the kind just completed by the South Carolina Coastal Council for Hilton Head Island.

4) We need well-conceived and perpetual public education campaigns to educate the public both to the real hazards of hurricanes and to the necessity of individual preparedness.

5) Meanwhile, we need continued good fortune.

Notes

[1]Joel Chandler Harris, "The Sea Island Hurricanes," Scribner's (1899), 229.

[2]R. Y. Lane, "The Hurricane of August 28, 1893," manuscript in Beaufort County Library.

[3]Quoted in David M. Ludlum, Early American Hurricanes (Boston: American Meteorological Society, 1963), 41-42.

[4]See Tables 2 and 3.

[5]The South Carolina "coastal plain," or Low Country, is approximately 190 miles long and 25-40 miles wide and divided into unequal parts by the drainage system of the Santee River. Above the Santee, toward North Carolina, the strand is long and unbroken except for an occasional inlet, like Murrell's, and was almost entirely unused by man before the twentieth century. Below the Santee the coast is sharply indented by bays--Winyaw, Charleston, Edisto, St. Helena, and Port Royal--and rivers, and guarded by a chain of islands, many of them fertile, and was developed first by aboriginal Indians. During the first two centuries of English occupation, the lower coast was the vital center of life in the colony and state. Agriculture was ever the primary economic pursuit, with corn, rice, indigo, and cotton the major staple crops. But it was commercial farming, and a large class of people made their living as merchants, sea captains, and artisans and professional men who lived in towns that served the ocean trade. In the three decades immediately past, because of a number of social factors, particularly a national population that is increasingly elderly (and thus retired) and inured to a leisurely lifestyle by the sea, because of a concentration of naval, military, and air force installations, and because of favorable tax, cost of living, and environmental factors, newcomers have moved into all South Carolina coastal areas in record numbers. See James Henry Rice, Jr., Glories of the Carolina Coast (2nd. edition, Columbia: R. L. Bryan, 1936), pp. 5-14, for South Carolina geography.

[6]J. Perceval Petit, ed., South Carolina and the Sea (Charleston: Walker, Evans, and Cogswell, 1976), p. 66.

[7]News and Courier (Charleston), July 6, 1980.

[8]See Table 1.

[9]News and Courier, October 5, 1893.

[10]Harris, "The Sea Island Hurricanes," pp. 239-243.

[11]Clara Barton, Leaves From My Busy Life: An Autobiography (New York, 1907), p. 4.

[12]Beaufort Gazette, July 13, 1981.

[13]The State (Columbia, S.C.), October 16, 1954.

[14]Clara C. Puckette, Edisto (Cleveland, Ohio: Seaforth Publications, 1978), pp. 81-82.

[15]Elias Bull, "Storm Towers of the Santee Delta," The South Carolina Historical Magazine, 81 (April, 1980), pp. 95ff; City of Charleston Yearbook--1893 (Charleston, 1893), 267-272; News and Courier, July 6, 1980.

[16]It is said that the legend of the Gray Stranger stemmed from two dreams that Anna Alston of Waccamaw had, 30 years apart, in which her dead father appeared to warn her of impending disasters which did occur: once in the form of a hurricane, and again in the form of Yankee soldiers. See H. R. Sass, Story of the South Carolina Low Country (Columbia, S. C., Hyer Publishing Company, n. d.), p. 260.

[17]Patrick Hughes, "American Weather Services," Weatherwise, 33 (June 1980), p. 100-111.

[18]Interviews with William Wolfe of the Charleston County Disaster Preparedness Agency, William Winn of the Beaufort County Disaster Preparedness Agency, and Richard Shenot of the United States Weather Service at Charleston, circa July-August, 1981; also News and Courier, June 1, 1981 and August 7, 1981, for remarks of Neil Frank of the National Hurricane Center and Prof. Cecil Gentry of the physics faculty at Clemson University.

[19]See News and Courier, July 6, 1981.

[20]News and Courier, June 1, 1981.

[21]Beaufort Gazette, July 13, 1981; W. S. Kals, The Riddle of the Winds (Garden City, N. Y.: Doubleday, 1977), pp. 114-128 and passim.

[22]Earl J. Baker, ed., Hurricanes and Coastal Storms (Gainesville: University of Florida, 1980), p. 204.

HIGH WINDS, HIGH WATER

CHRONOLOGY
(with Storm Tracks)

1669 Nov. 2	West Indian storm wrecked the ship Albemarle, part of the first fleet which brought Englishmen to a permanent settlement in South Carolina, off Barbardos
1670	English colony settled at Albemarle Point (later "Charles Town" or "Charleston") in the mouth of a spacious bay formed by the Ashley and Cooper rivers (formerly so-called Kiawah and Etiwan); on Sept. 9 the Secretary of the Colony reported to the sponsors in London: "The Collony is . . . safely settled and . . . there only remains the preservation of it." (South Carolina and the Sea, ed. Petit)
1686 Sept. 4 (2)*	A heavy gale, striking with sudden fury, damaged and drove away from Charleston a Spanish attack fleet, while doing much damage to the English settlement ("Spanish Repulse Hurricane")

*NOTE. I have used a scale which combines "objective" data, particularly wind speed, with situational factors. The United States Weather Service distinguishes several grades of hurricanes, which minimally pack winds of a constant 74 miles per hour, tropical storms, whose winds have a constant speed of 39 to 73 miles per hour, and tropical depressions, with wind speeds below 39 miles per hour. Since no means of determining wind velocity and central pressure, and thus distinguishing the various grades of storms, existed before the late 19th century, I have had to calculate the magnitude of earlier storms backwards, as it were, from effect to cause. Early and late, the interaction of the objective reality (the storm) and situational factors determine impact. Among the most important situational factors are the following: 1) tide stage and wind direction; 2) the spatial spread and density of people and property; 3) their vulnerability based on such variables as: land elevation, depth of coastal waters, distance to shoreline, type of shoreline (open, protected--i.e. by dunes or seawall, bay, estuary), types of property and activities and architectural styles; and 4) efficiency of social organization and economic and scientific technology.

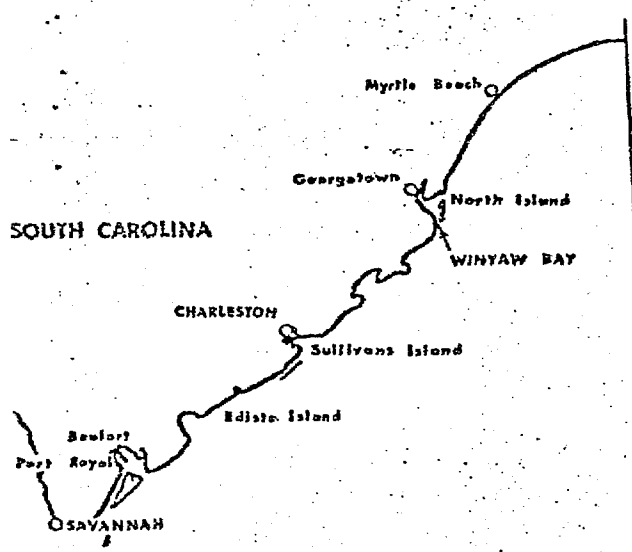
In this study, I have given a storm a rating number (1) when all known factors suggest a tropical storm or hurricane which had significant but rather limited impact on the coast of South Carolina, a rating number (2) when the pattern indicates a tropical storm or hurricane of major proportions in terms of impact on the coast of South Carolina, and a rating number (3) when known factors suggest a storm deserves the title "great", again with reference to its impact on coastal South Carolina, particularly its people and human things.

1700 — Parish register of St. Helena's Church on the lower Carolina coast recorded its first English birth.

1700 Sept. 14 (2) — Hurricane winds and storm surge "very severe, overthrowing many houses and overflowing the town" of Charleston; a large Scottish frigate Rising Sun broke up outside the bar, with at least 97 persons, new Scots immigrants, lost; other vessels in Charleston harbor also wrecked; to the north near the future Georgetown, surging wind and water cut a new channel into Winyah Bay (Bartram; Ramsay; Douglas)

1711 — Lords Proprietors of Carolina ordered the creation of a second major settlement and seaport, Beaufort, on Port Royal Sound

1713 Sept. 16-17 (2) — Storm center made landfall north of Charleston, which suffered 70 lost lives and great injury to shipping, houses, barns, plantations, and fortifications (in amount of 100,000 pounds sterling. The remarks of the Englishman Mark Catesby, who heard about this storm while doing a natural history survey in the Carolinas in 1722-1726, show the state of knowledge of hurricanes in the 1730s:



"Usually once in about seven years, [late summer] rains are attended with violent storms and inundations, which commonly happen about the time of the hurricanes that rage so fatally amongst the Sugar Islands, between the tropicks, and seem to be agitated by them or from some cause, but are much mitigated in their force by the time they reach Carolina; and tho' they affect all the coast of Florida, yet the further they proceed, so much the more they decrease in their fury, Virginia not having often much of it, and north of that still less. Tho' these hurricanes are seldom so violent as in the more southern parts, yet in September 1713, the winds raged so furiously that it drove the sea into Charlestown, damaging much of the fortifications whose resistance it is thought preserved the town. Some low situated houses not far from the sea were undermined and carried away with the inhabitants; ships were drove from their anchors far within land . . ." (Ludlum)

1722 Sept. 19-21 (1)

1724 Aug. 28 (1)

1728 Aug. 13-14 (2)

Charleston again overflowed; large damage to buildings, wharves, and corn and rice fields outside town (Hewatt); 23 ships sunk or driven ashore as follows (Spence):

Identification	*Type*	*Location*
Prince George, Geo. Preist master	vessel	James Island Marsh
Sharlot, Ebanezer Simmons master	schooner	Charleston
Killogray, John Collin master	snow	Charleston
Ruby, Joseph Goll or Gough master	brigantine	Charleston
Betty, John Tannatt master	brigantine	Charleston
Plow, Thomas Bream or Brame	brigantine	Charleston, Quelches Marsh
Catherine, Am. Vicary master	brigantine	Charleston
Good Intent, Walter Kippon master	ship	Charleston Harbor
Carolina Packet, Benjamin Austin	ship	Charleston
True Love, James Omer master	ship	Charleston, Rhett's wharf
Sarah, Francis Baker master	ship	Charleston near sawpit
Mary, Henry Levibond	ship	Charleston on Green May
Buley, William Birt or Burst	ship	Charleston Harbor
Midway, William Paul master	ship	Charleston, White Point
Olive, Hugh Colebouy master	ship	Charleston, White Point
Mary Ann, John King master	ship	Charleston
Thetis	sloop	Charleston, Rhett's Point
Lorril, Ja. Smith master	sloop	Charleston
Merrichios, Wm. Johnson master	sloop	Charleston
Hopewell, Peter Addams master	sloop	Charleston
Tace, Benj. Haskins master	sloop	Charleston, Rhett's wharf
Elizabeth, Ar. Rawlings master	sloop	Charleston
Bumper, William Smith master	sloop	James' Island marsh

1729

Elisha Screven, son of one of the first settlers at Winyah Bay (about 1710), laid out town of Georgetown at head of the Bay, near the confluence of the Peedee, Waccamaw, Black, and Sampit rivers (South Carolina and the Sea)

1752 Sept. 15 (3)

"The most violent and terrible Hurricane that ever was felt in this province" : Charleston inundated by 17 foot storm surge which obliged citizens to retire to upper stories of houses; wind and water damaged housing, fortifications, and wharves "to a considerable amount" (South-Carolina Gazette, Sept. 19, 1752; Hewatt); 30 deaths; shipping seriously damaged (after Spence):

Elizabeth, A. McGillivray	schooner	Charleston
Susannah, Amos Minot	sloop	Charleston
Baulk	schooner	Charleston
ten unidentified small	schooners	Charleston
unidentified	sloop	Isle of Palms
unidentified wreck	vessel	off Charleston Bar
Telemachus	ship	Child's Bluff, Ashley R.
Eagle-Galley, Capt. T. McDaniel	ship	Izard's Creek, Ashley R.
H. M. S. *Mermaid*	Frigate	Charleston
Lucy, John Bulman Master	vessel	7 miles up the Cooper R.
unidentified new	vessel	Mr. Wright's at Charleston
Nancy, John Budley master	schooner	Charleston
3 unidentified	schooners	Charleston
Nancy, John Babb master	sloop	Charleston
unidentified new	vessel	Mr. Scott's at Charleston
unidentified lately begun	vessel	Mr. Scott's at Charleston
New Industry	vessel	Charleston

1752 Sept. 15 (cont'd)

Charming Nancy	snow	Charleston
Peggy & Salley	brigantine	Charleston
Henry	sloop	Charleston
Endeavor	vessel	Charleston
six unidentified	pilot boats	Charleston
Katherine	sloop	Charleston
Dove, John Tuppen master	snow	Charleston
unidentified small	schooner	Charleston
Two Friends	brigantine	Charleston
Upton	ship	Charleston
Polly	sloop	Charleston

1752 Sept. 30-Oct. 1 (2)

Second major storm in this month, centered on lower coast; greatest damage to agriculture and shipping; among the vessels beat to pieces or driven ashore were (according to Spence):

Vine, Robert Makin master	snow	Cuming's Point, Morris Is.
Eleven unidentified	ships	Charleston
Africa, John Derrington master	ship	Mellichamp's Island
unidentified	schooner	Mellichamp's Island
unidentified large	ship	Huntington Island
unidentified	sloop	Racoon Keys
unidentified	ship	Racoon Keys
unidentified	snow	near St. Helena
unidentified	ship	at Kiawah
unidentified	sloop	Perry's wharf at Port Royal
Bristol Merchant, Capt. Parsons	snow	on Edisto Bar
unidentified large	sloop	on Kiawah Island
unidentified	sloop	upon Southern coast

1753 Sept. 15 (1)

1758 Aug. 23 (1)

1761 June 1 (1)

1770 June 6 (1)

"A great storm at night" (Manigault Papers) which confined its destruction to flora and small craft; this list of damaged vessels from Spence:

unidentified, small	schooner	Beresfords Dock, Charleston
two unidentified	boats	Beresfords Dock, Charleston
unidentified, small	schooner	Beresfords Dock, Charleston
Savannah Packet	schooner	at Charleston dock
unidentified, Archibald Stanyarne	schooner	at Charleston
unidentified, George Row's	schooner	at Charleston
Industry, Mr. Nedding's	schooner	at Charleston
great number of small craft	vessels	at Charleston
Experiment	schooner	overset at Charleston
Dove, George Luther master	sloop	ashore at Charleston
unidentified, Villapontoux's	schooner	With Point, Charleston
Dorchester Packet, Benj. Roberts	schooner	at Charleston

1778 Aug. 10 (1)

Several ships driven ashore (Spence):

Bassmorein	ship	on Morris Island
Bienheureuse (French)	schooner	on James Island
9 unidentified coasters	schooners	on James Island
unidentified	sloop	on James Island
Joseph & Benjamin, Dickenson	sloop	at Charleston Exchange dock

1781 Aug. 10 (2) — Winds NE, abated at high tide, minimizing storm surge damage; wind damage substantial. HMS Thetis, part of a British invasion fleet come to suppress the American Revolution, sank at Gadsden's Wharf; also London, Capt. Richardson, at Eveleigh's Wharf, and several other unidentified ships (Royal Gazette, Charleston, August 11, 1781)

1783 Oct. 7-8 (1) — Large part of year's crop of rice destroyed by salt water flow into Charleston warehouses

1784 Sept. 10 (?) (2) — A major storm, attended by torrents of rain; struck west of Charleston; storm surge covered coastal islands; Sullivan's Island most affected; 500 deaths

1787 Sept. 19 (2) — Substantial damage done shipping, property, crops, all along coast from Beaufort to Georgetown; 23 lives lost

1792 Oct. 30-31 (1) — This latest-arriving significant storm drove several vessels ashore at Charleston (Spence)

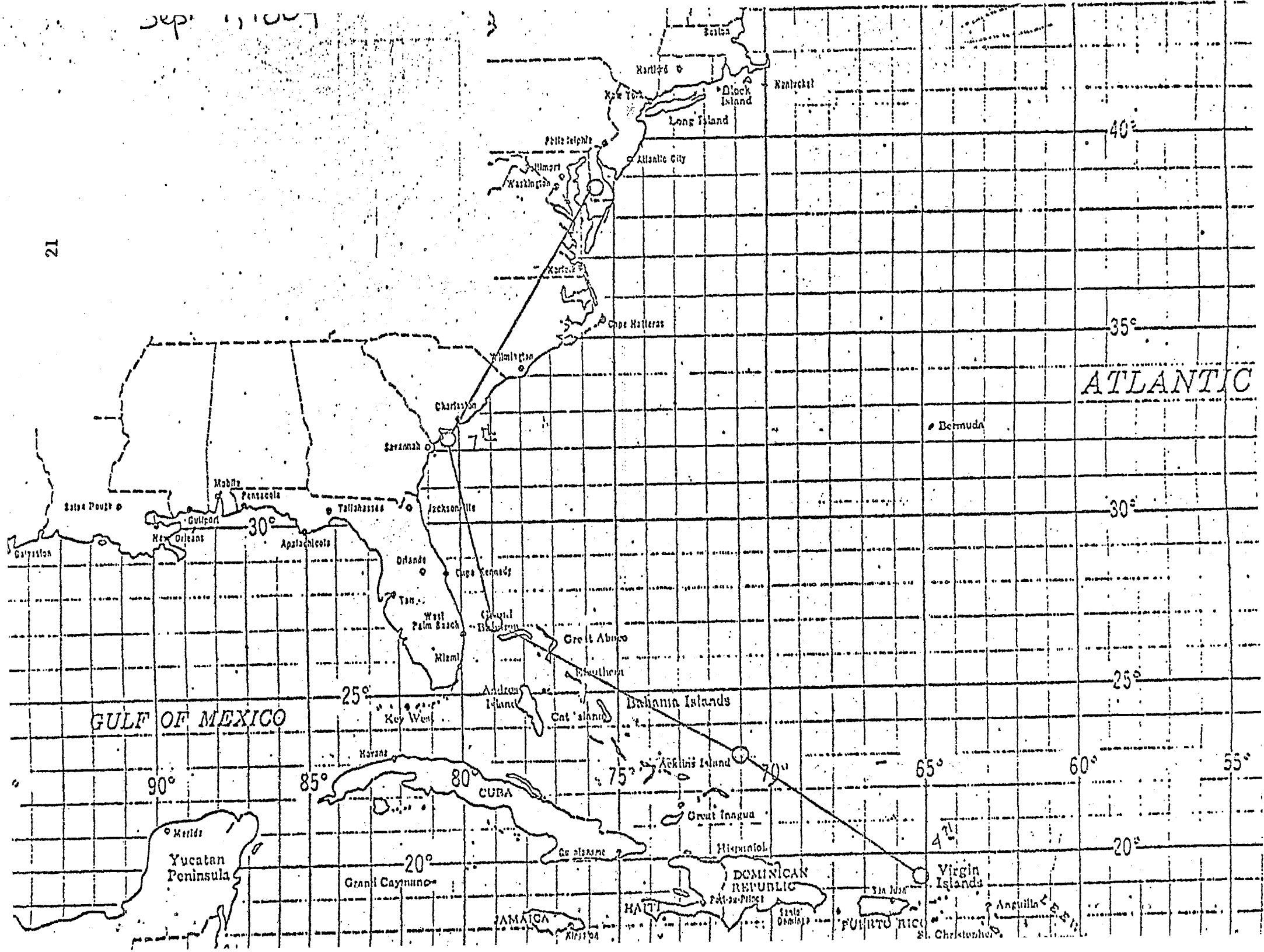
1797 Oct. 19-20 (1) — Center of storm west of Charleston; many houses unroofed by winds; 1 death (Ramsay; Ludlum); a number of vessels destroyed (Spence):

Winyah	ship	opposite Gadsden's Wharf
three unidentified	schooners	march, opposite Charleston
unidentified coaster	schooner	at Roper's Wharf

1800 Oct. 4-5 (2) — "Tremendous and destructive" winds accompanied by tides which were reported "two feet high on the wharves" at Charleston; three houses washed away on Sullivan's Island; 1 person killed (Charleston Times; Ludlum)

1804 Sept. 7-8 (3) — Center of storm kept near coast as moved northeast; 10-11 foot storm surge from Beaufort to Georgetown; immense damage to property: Fort Johnson left in ruins; western end of Sullivan's Island laid under water; 500 lives lost; large number of vessels ruined:

Columbus	ship	wharf at Charleston
Concord, Oldrich master	brig	Prioleau's Wharf, Chasn.
Christopher (English)	ship	wharf at Charleston
Tartar	brig	Charleston
Mary	schooner	Hao's Wharf, Charleston
Ann Eliza	schooner	in Ashley River
Venus	brig	on James Island
several unidentified	schooners	on James Island
many coasting craft	vessels	near Charleston
Lydia, Capt. Heyward	ship	at Charleston
Unanimity, Capt. Wilson	brig	Charleston
Norfolk	brig	Charleston
Rising Sun	schooner	Charleston
Middleton	ship	Charlestn
unidentified, Capt. Stoddard	schooner	near Charleston
many unidentified	wood-boats	in marches



Boston
Hartford
New York
Block Island
Nantucket
Long Island
Philadelphia
Atlantic City
Wilmington
Washington
Norfolk
Cape Hatteras
Wilmington
Charleston
Savannah
Bermuda
ATLANTIC
Mobile
Pensacola
Baton Rouge
Gulfport
Tallahassee
Jacksonville
New Orleans
Apalachicola
Galveston
Orlando
Cape Kennedy
Tampa
West Palm Beach
Grand Bahama
Great Abaco
Miami
Eleuthera
Andros Island
Bahama Islands
Cat Island
Key West
GULF OF MEXICO
Havana
Acklins Island
CUBA
Great Inagua
Merida
Yucatan Peninsula
Hispaniola
Grand Cayman
DOMINICAN REPUBLIC
Port-au-Prince
HAITI
Santo Domingo
JAMAICA
Kingston
San Juan
PUERTO RICO
Virgin Islands
Anguilla
St. Christopher
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35°
30°
25°
20°
90°
85°
80°
75°
70°
65°
60°
55°

1804 Sept. 7-8 (cont'd)

Perseverance, Th. Shubrick owner	schooner	on South Island, Georgetown
Experiment, Capt. Miller	schooner	off head of Bull's Island
unidentified, large	vessel	S. of Charleston Bar

("Great Gale of 1804") (Ramsay; Spence)

1806 Aug. 22 (1) Storm center passed SC at sea; salt water ruined cotton crop in low-lying fields on northern coast

1806 Oct. 8-9 (1)

1810 Sept. 11-12 (1) 2 or 3 sloops sunk at Charleston (Spence)

1811 Sept. 10 (1) Tropical storm and companion tornado sank small craft at anchor in Charleston harbor and spoiled rice in waterfront warehouses

1813 Aug. 27-28 (3) Landfall near Charleston, where tide surged beyond 12 feet; Sullivan's Island virtually submerged; 15 lives lost; damage to property in Charleston estimated at $2 million--buildings, wharves, and ships:

Jupiter, of Saco	ship	at Charleston
Juno of Saco	ship	at Charleston
Margaret	brig	at Charleston
South Boston	brig	at Charleston
Florida	ship	at Charleston
Commerce	ship	at Charleston
Morningstar	ship	at Charleston
Phoenix	ship	Pritchard's Wharf, Chasn.
unidentified (Spanish)	schooner	Pritchard's Wharf, Chasn.
Retrieve	ship	at Charleston
a number of unidentified	vessels	at Charleston
Charleston Prison Ship	vessel	on James Island
Canton	ship	at Charleston
unidentified armed, Capt. Lord	barge	on S. Island, Winyah
two or three unidentified, small	boats	near Ft. Johnson
two unidentified, small	boats	on Sullivan's Island
unidentified, small	boat	near Castle Pinckney
three or four unidentified, small	boats	Charleston
unidentified (inland coaster)	vessel	at Charleston
Necessity	sloop	at Charleston
two unidentified river schooners	schooners	at Charleston
Del Comes (Spanish)	schooner	at Charleston
Byron	schooner	at Charleston
United States	tender	at Charleston
Barge No. 9	barge	at Charleston
Union, Capt. Walter	schooner	at Charleston
unidentified small (Spanish)	schooner	at Charleston
Cornelia	schooner	at Charleston
Sally, of Boston	ship	at Charleston

("Dreadful Storm of 1813") (Spence)

1814 Jul 1 (1)

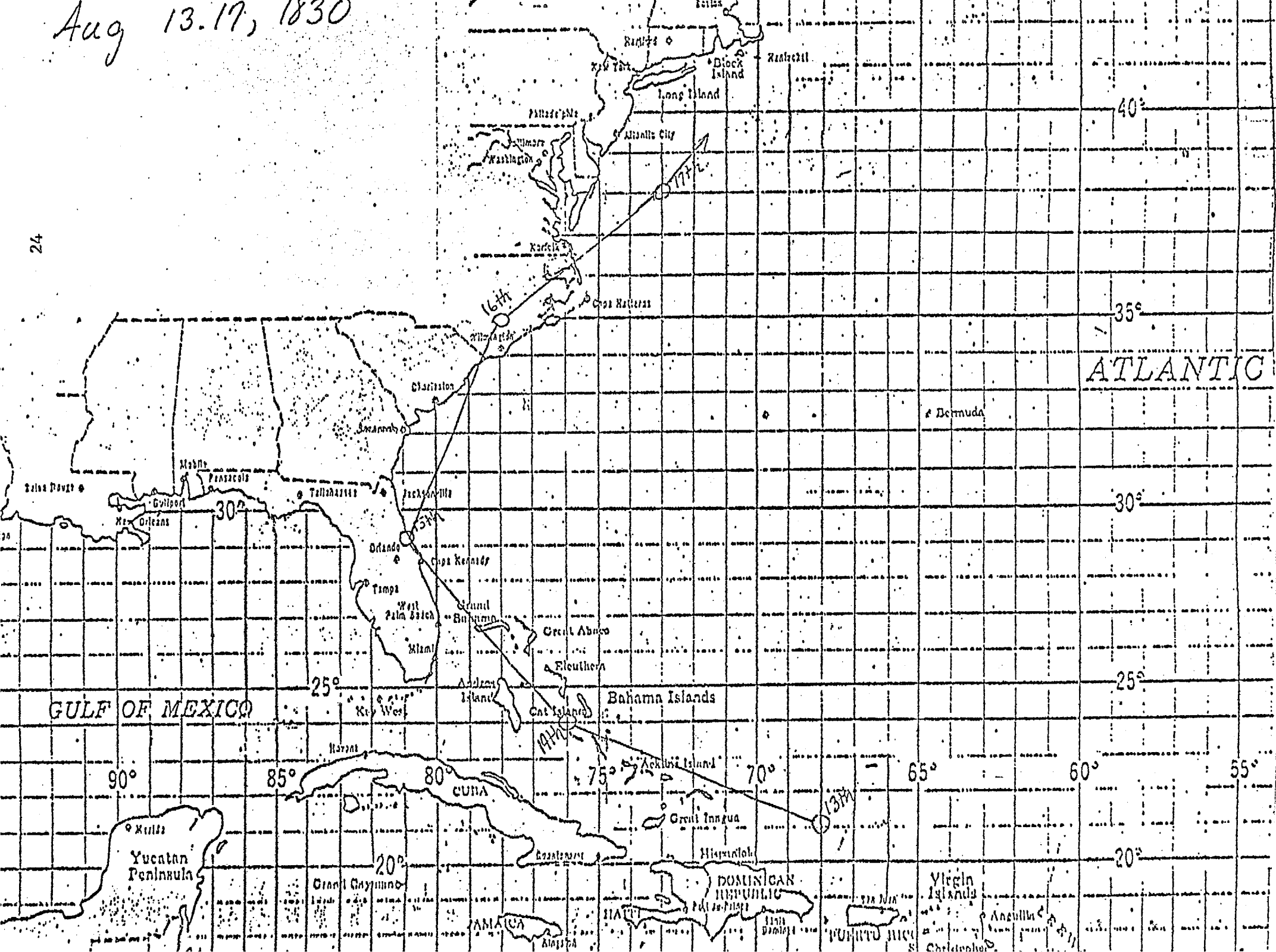
1815 Sept. 2-4 (1)

1816 German Heinrich W. Brandes made the major discovery that tropical storms are moving systems of low atmospheric pressure which could be identified with the barometer. (Hughes)

1817 Aug. 7-8 (1)

1820 Sept. 10 (2)	Storm surge about 11 feet at Georgetown: "About sunset the scene became truly awful . . . The church was blown from its foundations, and many of the inhabitants were seen removing from such houses as appeared most exposed to the . . . tide and wind. After dark the gale continued to increase, and about 10 or 11 o'clock there raged one of the most violent hurricanes . . . ever experienced here. . . . There was not a house in the village could entirely resist its fury." ("Winyaw Hurricane") (Winyaw Intelligencer [Georgetown])
1822 Sept. 27-28 (3)	Storm of very large geographical extent passed barely inland between Charleston and Georgetown; damage to Charleston waterfront great; fifteen ships washed ashore at Sullivan's Island--12 dead; at Georgetown the storm surge may have reached 15 feet; North Island in Winyah Bay overflowed--300 deaths (Charleston Courier, Sept. 30, 1822; Ludlum)
1825 June 3-4 (1)	Severe storm which swept the entire coast of North America; struck SC a glancing blow
1830 Aug. 13-17 (1)	Center and major winds passed offshore, but 9-foot storm surge spilled salt water into rice fields, ruining the crop at Winyah Bay and Georgetown ("Atlantic Coast Hurricane")
1834 Sept. 4 (1)	
1835 Sept. 18-19 (1)	Winds and waves demolished bath house on East Bay, Charleston; crops hurt moderately along entire SC coast
1837 Aug. 16-Sept 1 (1)	Charleston-to-St. Augustine packet SS Miller sank with 15 aboard off Jekyl Island, Georgia; Georgetown lashed by gale-force winds, 9-foot storm surge
1837 Oct. 8-10	Steam packet Home, bound to Charleston from New York City, sank in heavy seas off Cape Hatteras, North Carolina, with 90 lives lost ("Racer's Hurricane") (Ludlum)
1841 Aug. 23-24 (1)	"The stores in Market Street [Charleston] had this morning water . . . nearly two feet deep. Cellars in parts of the city which were never known . . . to contain water were overflowed." (Charleston Southern Patriot)

Aug 13.17, 1830



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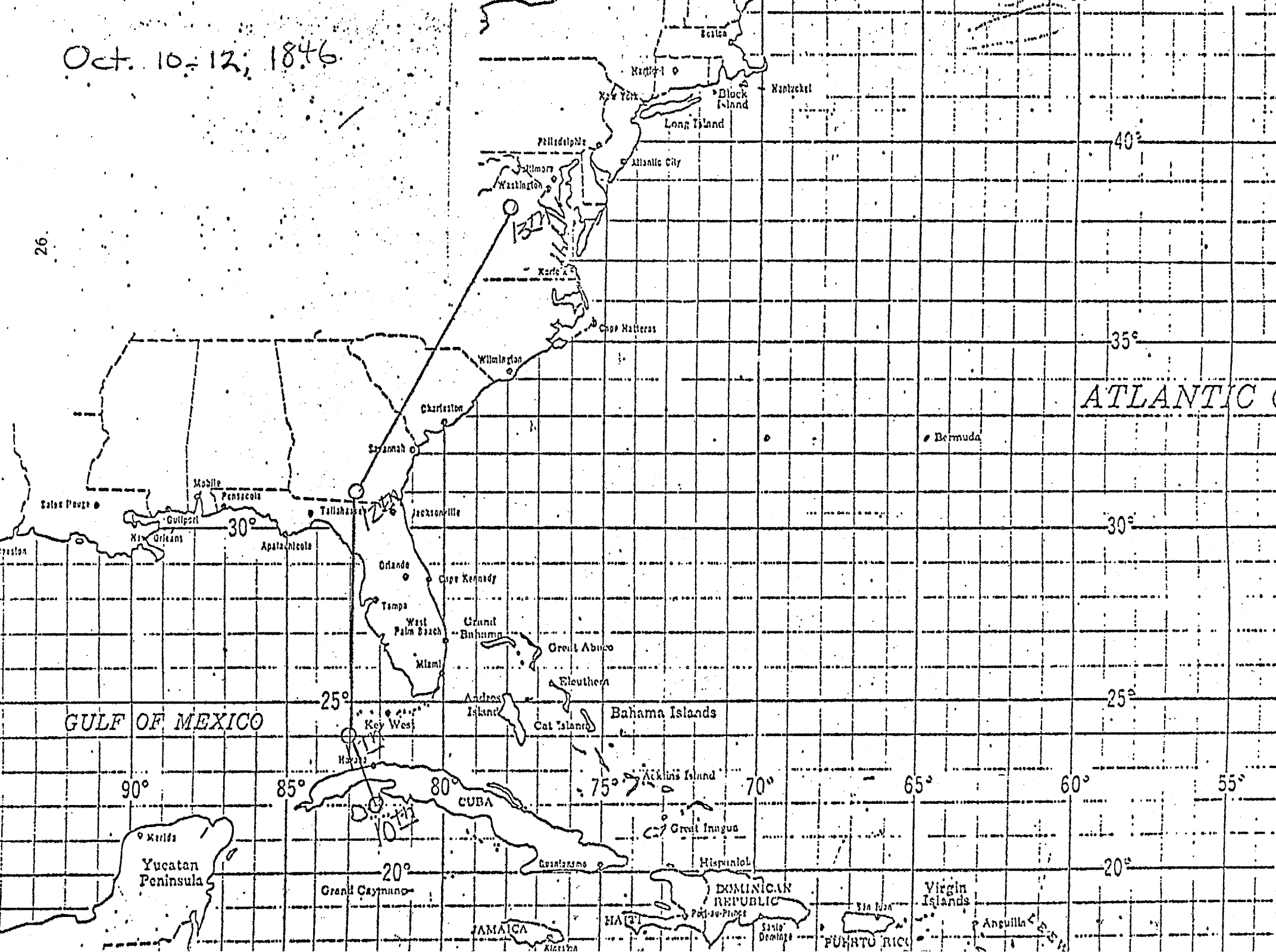
1842 Oct. 4-6	(2)	Storm brought highest tides "in many years" to Charleston area; heavy damage to mail packet Hayne and numerous small craft all along coast; substantial damage to rice and cotton crops; 6 deaths by drowning
1846 Oct. 10-12	(1)	A heavy gale, but from the southwest; thus there was little tidal flooding; West Tradd Street in Charleston was washed away
1849		With the completion of the first commercial telegraph line (between Washington, D. C. and Baltimore, Md.) in 1845, many men of science and affairs saw the possibility of "forecasting" tropical storms by telegraphing ahead what was coming. In 1849, Joseph Henry, first head of the Smithsonian Institution, persuaded a number of telegraph companies to provide free time for the transmission of weather reports to a center in Washington and organized 150 widely scattered volunteers to make regular observations, measurements, and reports. (Hughes)
1850 Aug. 24	(1)	
1854 Sept. 7-9	(2)	Winds ESE 90 mph reported at Savannah; although SC was spared the brunt of the storm, property damage at Charleston added up to $300,000 and there were substantial losses all along the SC coast. An observer described the scene on plantations about Georgetown: "From Waverly to Pee Dee . . . not one head of rice was to be seen above the water, not a bank or any appearance of the land was to be seen. It was one rolling dashing Sea, and the water was Salt as the Sea. . . . Many persons had rice cut and stacked in the field, which was all swept away by the flood." (Rogers)
1870		National weather service established by an act of Congress which required the Secretary of War "to provide for taking meteorological observations at the military stations in the interior of the continent and at other points in the States and Territories . . . and for giving notice on the northern lakes and on the seacoast by magnetic telegraph and marine signals, of the approach and force of storms." The Secretary of War assigned these duties to the Chief Signal Officer of the Army. (Hughes)

Oct. 10-12, 1846

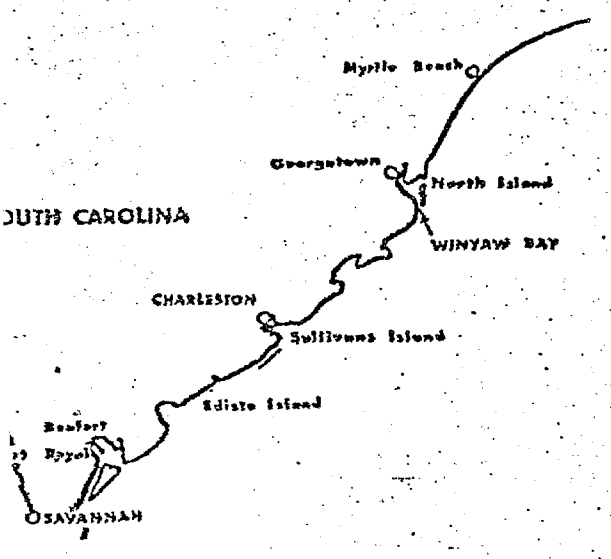


1871 Aug. 19

Gale winds NE 40 mph (Charleston) traversed the entire coast; damage relatively light, but details have intrinsic interest:

In the vicinity of Beaufort--

"The wind was sufficiently strong to blow down trees and obstruct ordinary travel. The rain washed away bridges and ferries, and filled to a depth of 10 or 12 feet, streams that were a few hours before nearly dry. The swollen condition of the streams between Beaufort and Yemassee on Saturday prevented the passage of the mails from Beaufort. The Savannah River, in thirty minutes, rose four and a half feet. On the low cotton lands it may be a week or more before the water can leave them dry, owing to the lack of proper drainage. But little damage is anticipated to the corn crop, it being far enough advanced to be out of danger. Rice is considered generally safe, the fields being flooded with rain offered a strong support to the stalks against the violence of the winds. As so many of the large cotton fields of Beaufort and Colleton counties are in low lands, it is very probable the cotton there has sustained a severe loss.



"Three of the vessels, loading with phosphates at Bull River, dragged their anchors on Friday night, during the heavy blow, and went ashore on the South bank. . . . No damage to the vessels is apprehended, as they lie on a muddy bank, and it is thought they will float off at the approaching . . . tides."

At Charleston--

"The wind blew fresh from about Southeast, during the day changed to Northeast, increasing in force during the afternoon, accompanied by light rain. Soon after dark the wind and rain increased, the former blowing with great violence in heavy squalls, while the latter came down in torrents . . . with a volume not previously known for years.

"It was not unexpected, however, as those unerring monitors, the weather reports, foretold its coming by several days, which enabled the river craft at least to secure safe moorings.

"In the city in many places trees were blown down and snapped asunder, small out houses were injured in the roofs, while shutters banged, and window sashes rattled violently.

1871 Aug. 19 (cont'd)

"The rain was so furious that it got into every crevice where it could be forced, and damaged houses inside more or less. In several of the streets large holes were made--in two or three instances capacious enough to hold a carriage and horse. In the Northeastern and Northwestern parts of the city lots were flooded, and cellars and basements filled to the depth of several inches, and in some cases as many feet. On Saturday it poured unceasingly all day, and actually interfered with the prosecution of business; the draymen and carters of East Bay were compelled to abandon their accustomed haunts, and give their animals the best shelter they could from the merciless elements."

At Georgetown--

"From last Thursday night up to Tuesday there has been a storm of wind and rain of more or less violence. Floods of rain fell, but so low were our rivers, and so parched was the earth, that we believe no damage has resulted from the fall of water. The continued gale of wind has, we fear, done serious injury to the May and June rice, which is in blossom . . . Previous to this storm, all the lower plantations were suffering from the salt waters, which was making serious inroads upon them. Then comes the gale . . . While the rain has saved many of the crops from almost total loss, the winds has done so much damage as to render it doubtful whether the storm has cut short the crop of the district. One thing it certainly has done--it has equalized the loss among all the planters, instead of confining it to those threatened by salt water."

(Excerpts from accounts in Charleston Daily-Courier, August 21-22, 1871; and Georgetown Times, August 24, 1871)

1873 Oct. 16

The meteorological division of the Signal Service, popularly known as the "Weather Bureau," issued its first cautionary "hurricane warning" (Hughes)

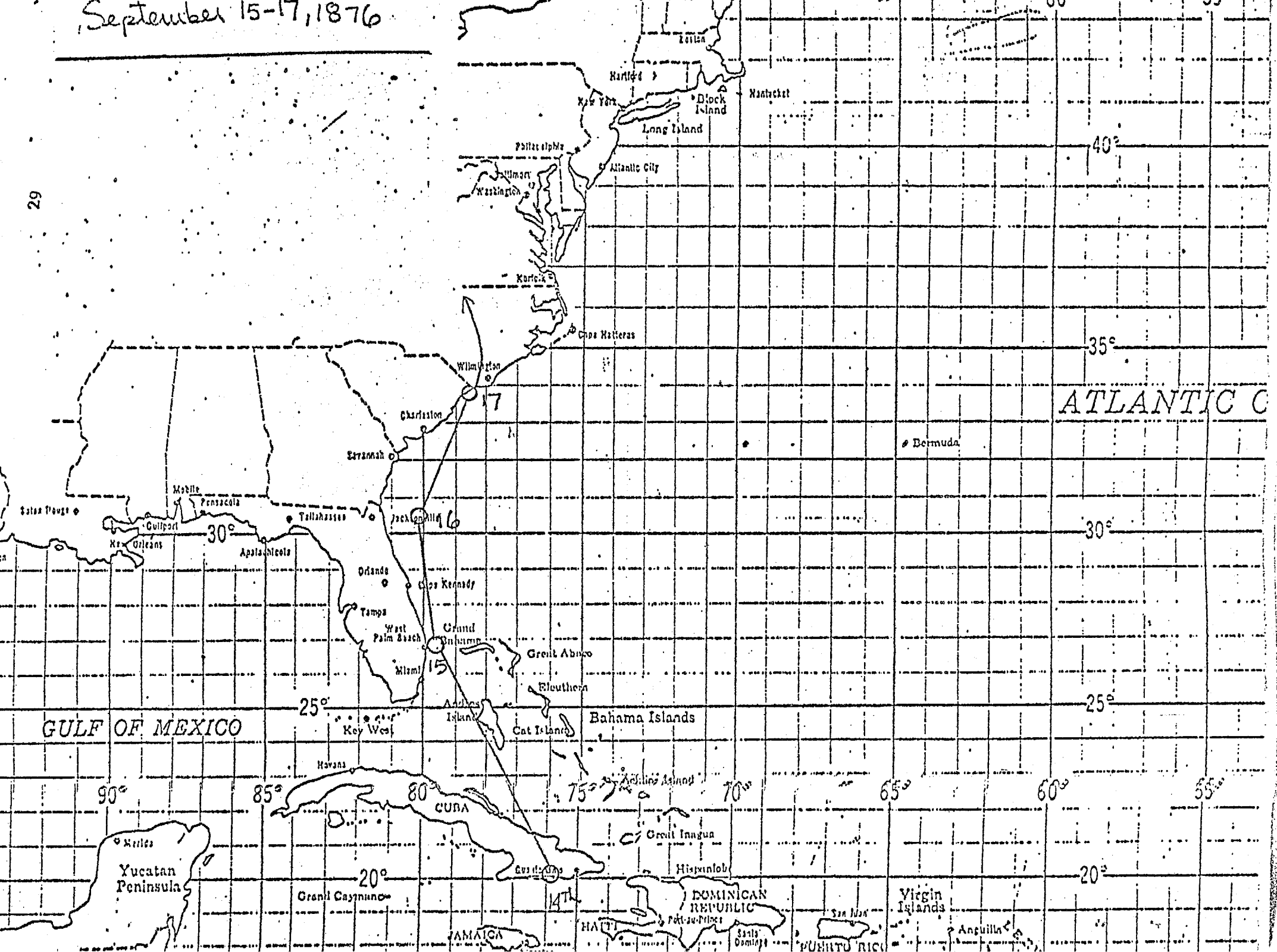
1874 Sept. 28 (2)

Winds SE 55-60 mph (Charleston); telegraph lines down; extensive damage to rice crop; total property losses $750,000; 2 deaths by drowning at and near Charleston; Charleston press gave weather office credit "for the display of cautionary signals from midnight of the 28th, clearly showing a knowledge of the storm eight or ten hours before hand." (Charleston Weather Office Records, College of Charleston)

1876 Sept. 15-16 (1)

Storm slipped ashore at SC-North Carolina border; some damge to property on upper coast

September 15-17, 1876



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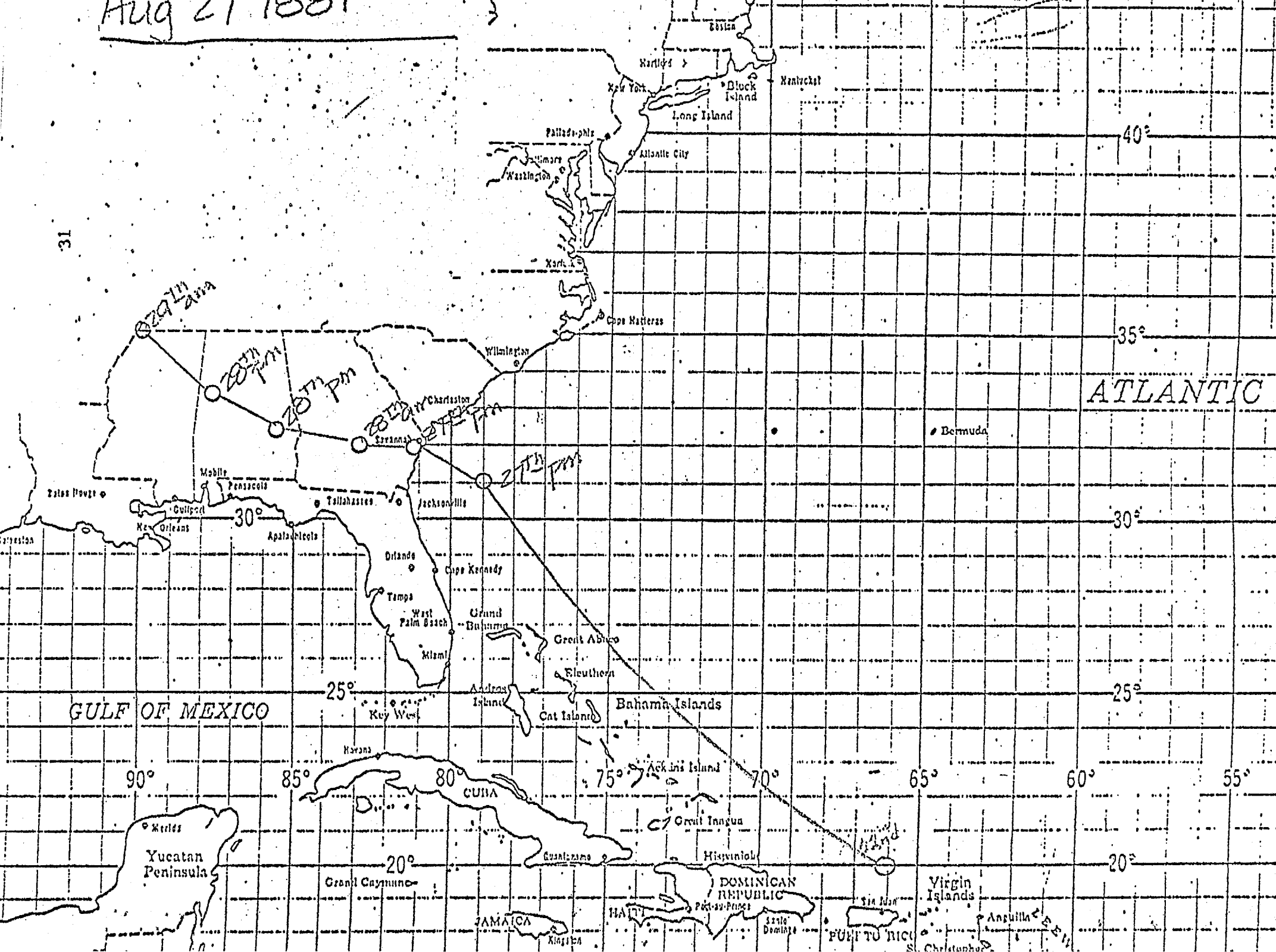
1878 Sept. 11-12	Tail-end of storm; winds SE 44 mph (Charleston); damage minimal
1881 Aug. 27 (2)	Later stage of an extremely destructive storm; centered over Georgia; winds E 54 mph (Charleston); at Charleston and points north property damage confined to small craft and smaller buildings; southern areas worse off; at Beaufort a 15-foot storm surge left few wharves standing; Edingsville, a village on Edisto Island, was destroyed, abandoned by survivors; 4 lives lost
1882 Oct. 11	Weak tropical storm passed a little off coast at Charleston
1883 Sept. 11 (1)	Storm passed inland north of Georgetown
1885 Aug. 25 (3)	Extreme storm; winds SE 90-100 mph (Charleston) swept entire coast; property damage from wind and water in excess of $2 million; at Charleston all wharves but one were destroyed and 90% of all buildings were injured; the iron steamship Glenlivet was torn from her moorings and driven up the Ashley River, where it swept away several hundred feet of a new bridge; all the lowlands were flooded, roads rendered impassable, whole forests leveled, the damage to sea-island cotton estimated at three-fourths of the crop; at Beaufort most vessels in the harbor were driven ashore and damaged; several pilot boats were sunk with all hands lost; a village on St. Helena Island was wiped out and all residents drowned except one woman; altogether a death toll of 21 (News and Courier; "The August Cyclone," 1886)
1887 July 28	"A Dangerous Wind Reported from the Gulf, but Fortunately it Leaves Charleston out of its Course," said the headline in the News and Courier. "The sensational red flag, or cautionary signal, of the signal service was displayed . . . yesterday . . . The red flag has often been run up since the August cyclone [of 1885] and is not ordinarily suggestive of any immediate unpleasantness. It is always, however, a sign of the times that is much more appreciated when it is conspicuously absent."

Aug 27 1881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Philadelphia
Atlantic City
Baltimore
Washington
Norfolk
Cape Hatteras
Wilmington
Charleston
Savannah
Jacksonville
Tallahassee
Mobile
Pensacola
Gulfport
New Orleans
Baton Rouge
Galveston
Apalachicola
Orlando
Cape Kennedy
Tampa
West Palm Beach
Miami
Grand Bahama
Great Abaco
Eleuthera
Andros Island
Cat Island
Bahama Islands
Key West
Havana
CUBA
Acklins Island
Great Inagua
Guantanamo
Hispaniola
Yucatan Peninsula
Merida
Grand Cayman
JAMAICA
Kingston
HAITI
Port-au-Prince
DOMINICAN REPUBLIC
Santo Domingo
PUERTO RICO
San Juan
Virgin Islands
Anguilla
St. Christopher
Bermuda
ATLANTIC
GULF OF MEXICO
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28th pm
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31

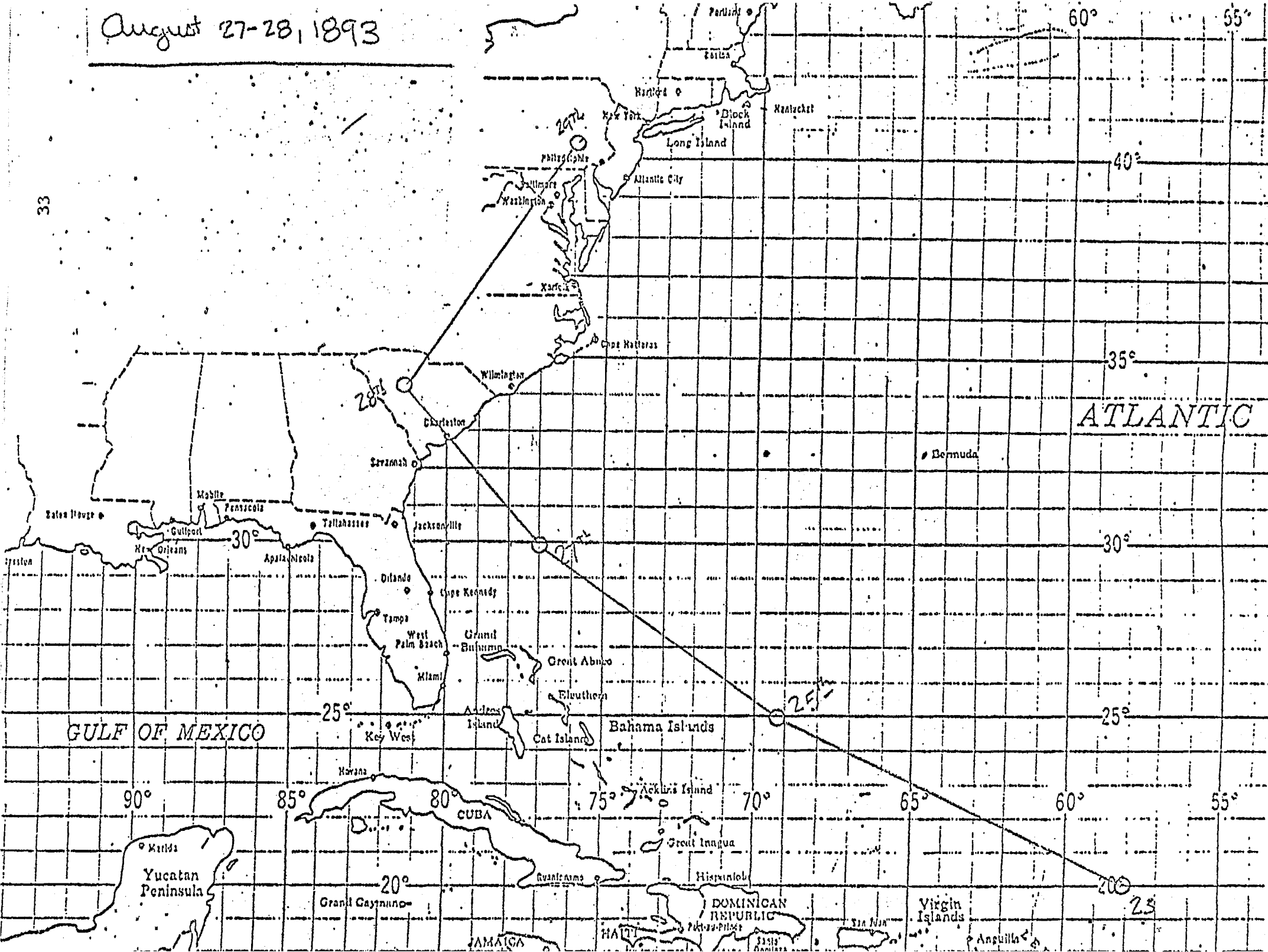
1888 Oct. 11	Gale NE 50 mph (Charleston); property damage slight (perhaps $1500)
1889 Sept. 23	Overland storm brought 45 mph winds (Charleston)
1890 Oct. 1	National Weather Service transferred from Department of War to Department of Agriculture (Hughes)
1893 June 16 (1)	Winds E 54 mph (Charleston); small property loss on lower coast
1893 Aug. 27-28 (3)	Extreme storm; winds SE 96 mph (Charleston); storm surge approached 20 feet on lower coast; St. Helena and other sea islands (Hilton Head) overflowed in considerable part; at Beaufort "the water was so high that following the storm a catfish was found gilled on a fence that surrounded the Methodist Church"; property damages assessed in the millions of dollars (perhaps $10 million); at least 2000 and perhaps as many as 3000 lives lost in coastal Carolina, primarily at Beaufort, St. Helena, and Lady's Island, from drowning (Tannehill)
1893 Oct. 13 (2)	Second major storm of the season; gale winds SE 60 mph (Charleston); major impact in Georgetown district and northward, where storm surge topped 13 feet and 15 people died, largely by drowning
1894 Sept. 25-26 (1)	Brisk gale produced 10 foot storm surge at Charleston; lower parts of city inundated; electricity shorted out; cotton and rice in the field and drinking water significantly hurt

Item in News and Courier, September 26, 1894:

"The bulletin board of The News and Courier was the centre of attention in Broad Street yesterday. All day long an eager group of people stood before it reading the latest cyclonic news and indulging in gloomy reminiscences of previous gales, tornadoes, and cyclones to keep up their spirits.

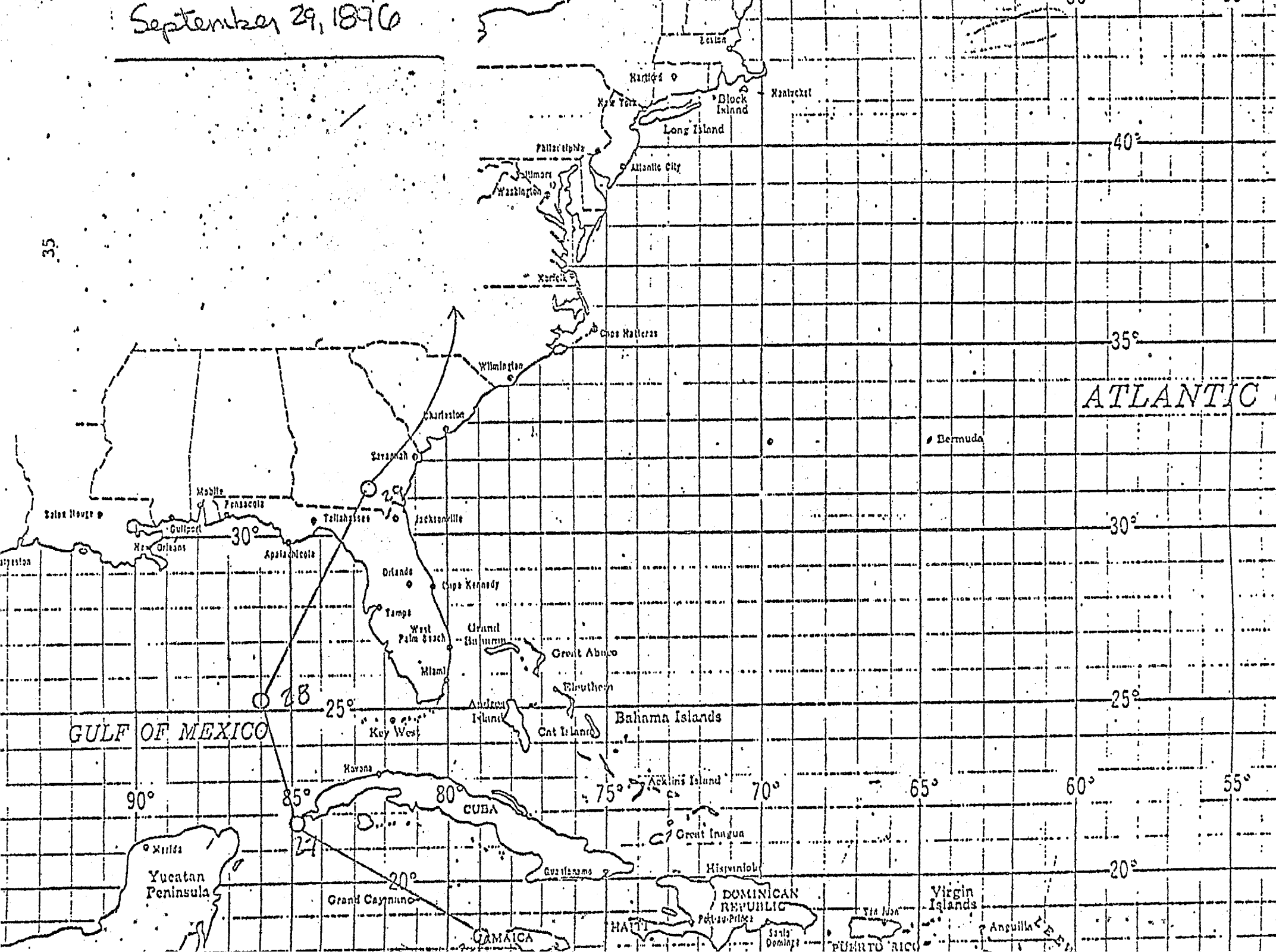
"On the wharves a great deal of activity was displayed in making things 'snug.' The vessels were made fast and put out extra anchors and ropes [sic]; small merchandise was hustled into warehouses, and the cotton was moved out of harm's way. The dealers in firewood were especially active, getting their stock out of danger of being swept off by the expected raging flood. . . . The island boats were crowded with

August 27-28, 1893



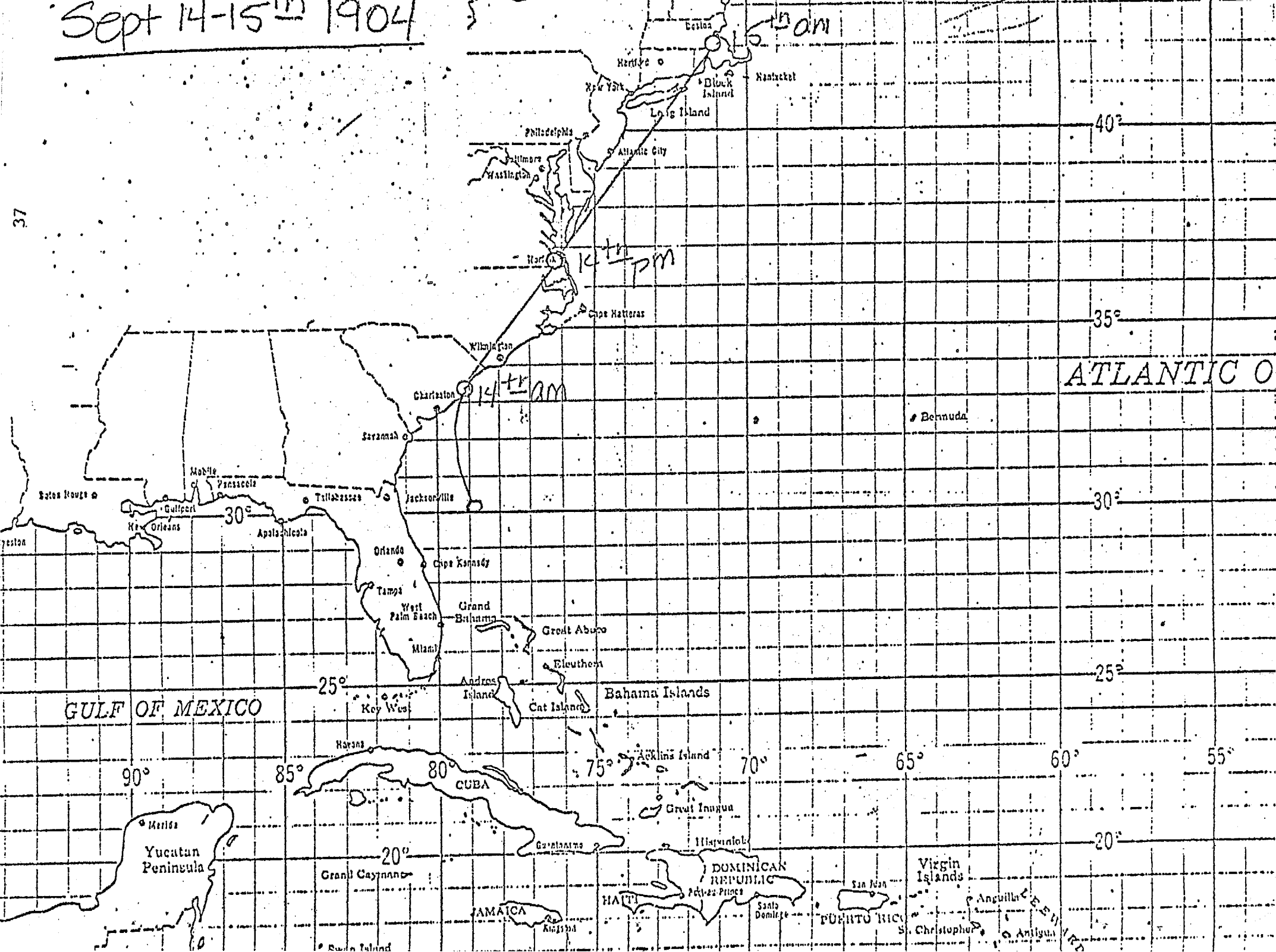
1894 Sept. 25-26 (cont'd)	passengers flying from the expected danger as from the wrath to come. "Early in the day Mr. Local Forecaster Jesunofsky had this posted on the bulletin board: 'Cyclone has curved over Southeast Florida, moving northeast. It will produce wind velocities of from forty to sixty miles per hour from the northeast Quadrant Tuesday night and Wednesday. "All day long the weather office was a very busy place. Mr. Jesunofsky was busy forwarding reports to Washington, and very many people, anxious about the rice crops or phosphate dredges or other possessions, came to ask for news of the cyclone. "Mr. Jesunofsky said to a Reporter who called last night at 7 o'clock: "'I am rejoiced to say that we have escaped the full fury of the storm. The cyclone has gone far out to sea . . .'" In the aftermath, Mr. Jesunofsky or one of his associates noted in the weather journal: "Much praise has been given the Bureau for its storm work. It is estimated that $1,000,000 was saved to the community by the timely warning of the cyclone." (Weather Service Records, College of Charleston)
1896 Sept. 29 (2)	Storm of short duration, but with 62 mph winds (S) and gusts of 100-miles-per-hour; substantial property losses and 30 deaths attributed to the winds and water in Beaufort and the southern sea islands
1897 Sept. 22	Gale-force winds S 52 mph (Charleston); slight damage
1898 Aug. 30-31	Gale E 52 mph at Charleston; minimal damage
1898 Oct. 2 (2)	Winds variable 50-70 mph (reported at Savannah): southern lowlands and islands partially submerged by 14-foot storm surge; conditions similar to that after the great tidal storm of 1893 in terms of lost property; farm crops, especially rice grown along the Combahee and Edisto rivers, suffered "incalculable loss"; but there were many fewer storm related deaths than in August, 1893--nine (9)

September 29, 1896

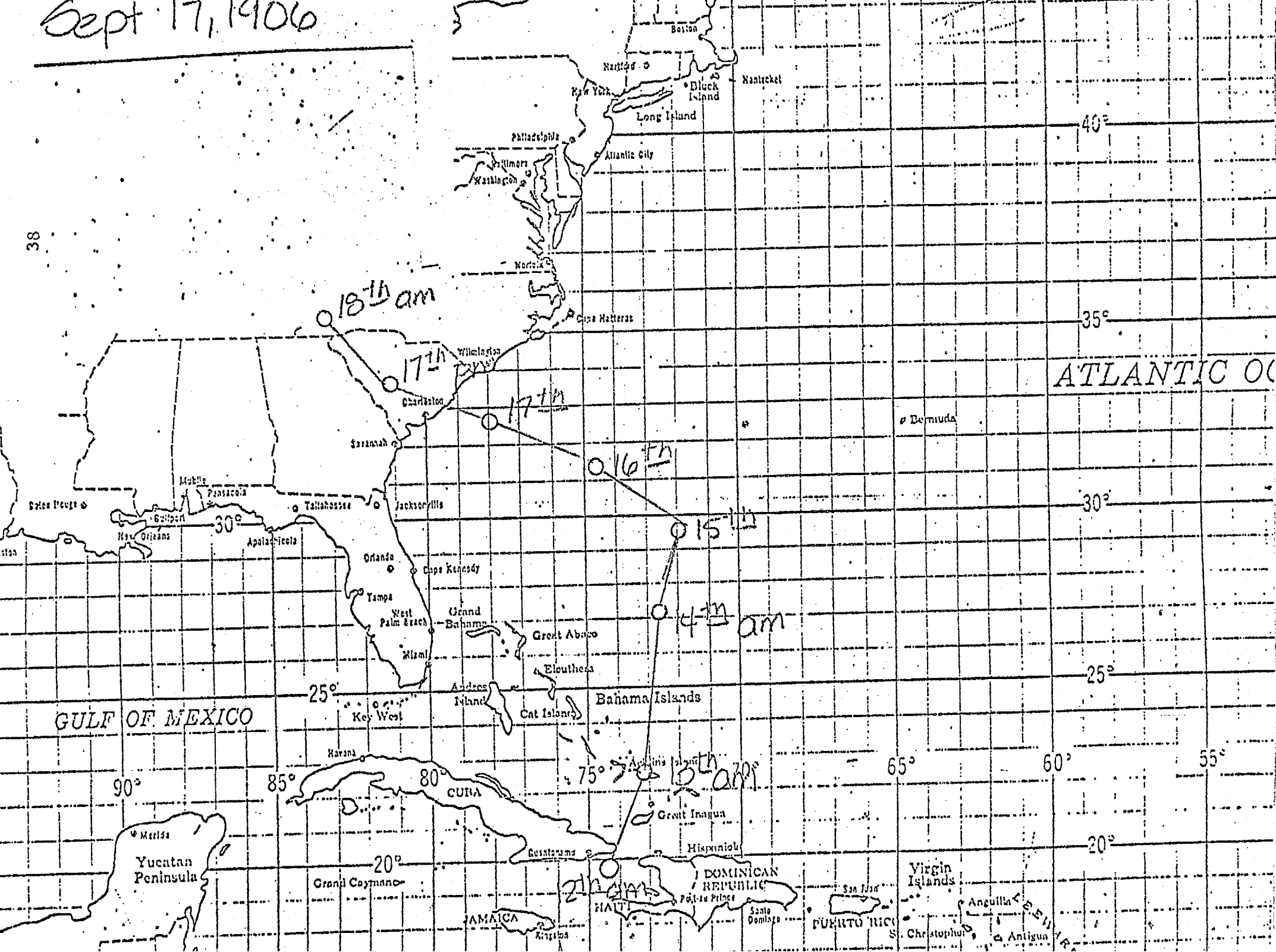


1902	The National Weather Service routinely collected weather data from an area comprising one quarter of the globe (Hughes)
1904 Sept. 14-15 (2)	Gale winds NE 65-70 mph (Georgetown); inexplicably, storm came without warning from the Weather Service; damage to buildings, electric light and telephone and telegraph wires, and especially crops in the Georgetown district heavy, perhaps to the extent of $1.5 million; storm claimed 14 fishermen and two fishing boats in vicinity of Charleston (News and Courier, September, 1904)
1906 Sept. 17 (2)	Winds NW 60 mph at Georgetown and accompanied by driving rain; "tremendous amount of damage" in Georgetown district; "turpentine industry has been practically wiped out" as up to fifty percent of pines were blown down; loss to rice planters 75%; cotton, corn, and peas also badly injured; several brick structures blown down in Kingstree; at Georgetown a score of business structures and private residences were partially wrecked: "Trees and fences are down in every direction. Telephone and electric light wires cover the streets and last night the city was in darkness. Telegraphic communications with the outside world is cut off. . . . The body of a drowned negro was picked up in the river . . . (News and Courier, Sept. 22, 26, 1906) A lad of 14 years was transformed into a hero at Pawley's Island. Safe on the mainland, he and another volunteer recrossed the causeway to the island to rescue a family presumed to be marooned there. It was found that the family had moved to higher ground on the mainland earlier, and with the storm surge rolling in, the boy and his adult companion had to make their return in water that was shoulder deep and were in danger of drowning. Indeed, the older man was quickly exhausted. The boy caught him by the arm and pressed on toward the mainland, which was finally reached in safety. (News and Courier, September 25, 1906)
1906 Oct. 20 (1)	Erratic storm; stood offshore at Charleston awhile and then turned southward toward Florida; winds E 64 mph at Charleston, where there was some sea flooding; rice planters again suffered; indeed, it was a hard year altogether but "There is plenty of pluck here and it is being put to good use in overcoming tremendous difficulties." (News and Courier, Oct. 23, 1906)

Sept 14-15th 1904



Sept 17, 1906



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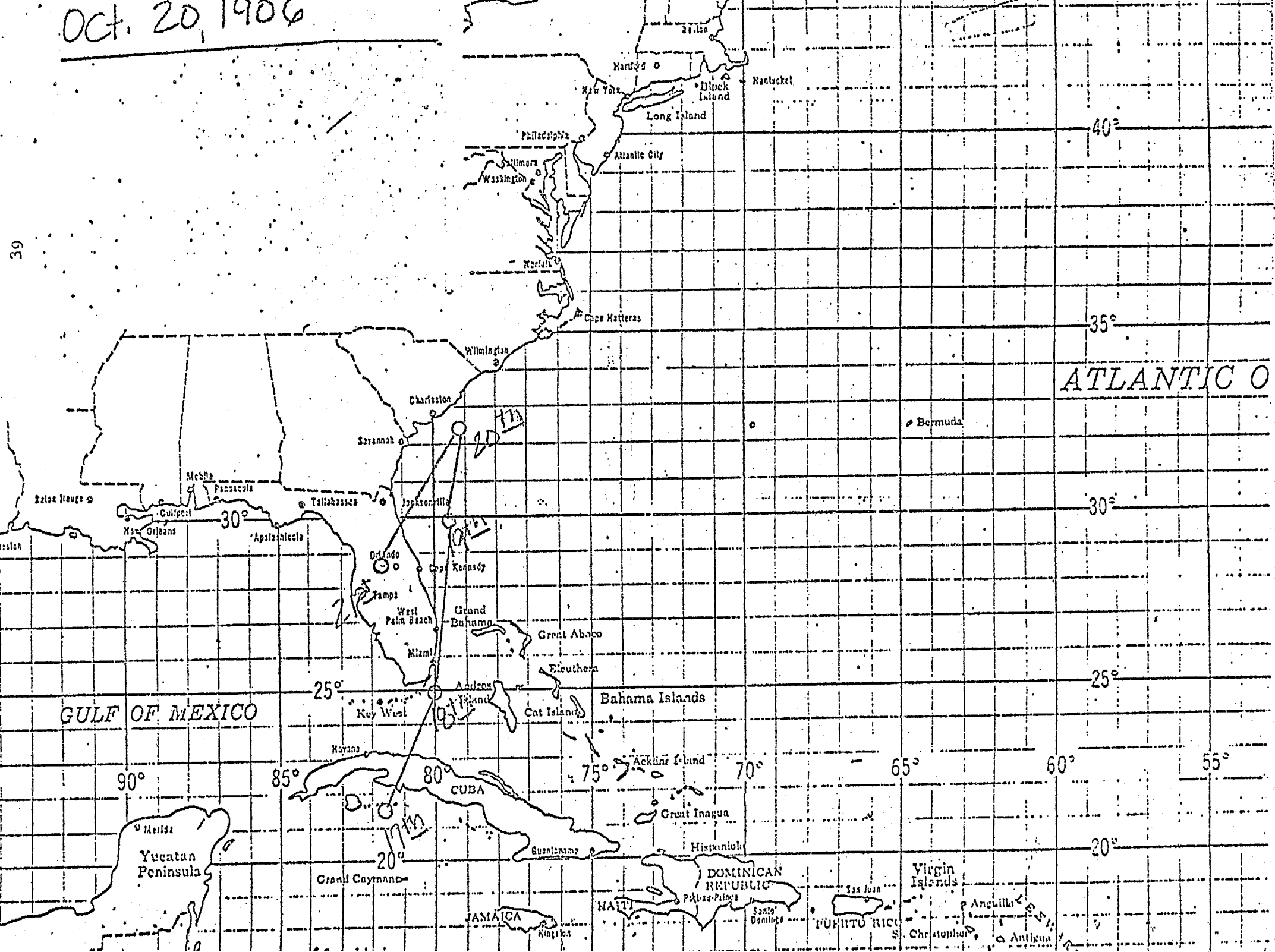
Oct. 20, 1906



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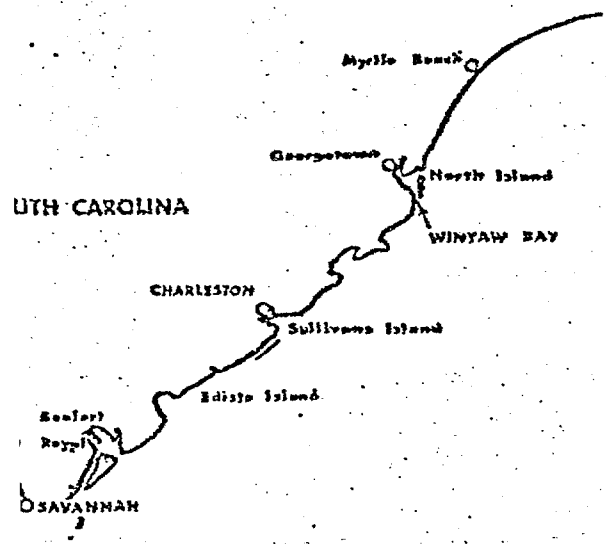
1908 Oct. 9-10

1908 Oct. 22-23 — Weak storm brought heavy rains to northern coast

1910 Oct. 19-20 — Storm centered off coast; slight damage to shipping

1911 Aug. 27-28 (3) — Extreme storm; originated "far to the north of the region common to such storms . . . and moved in from the uncharted ocean, no indication of its approach being given [by the weather service] until Charleston . . . came within its sphere of influence on the morning of August 27. As it moved more within the range of observation and its character became apparent, advisory, storm, and hurricane warnings were issued by the Central Office of the Weather Bureau in rapid succession, the last at 3:30 p. m., though its transmission was somewhat delayed by deranged telegraphic service. The wind attained destructive violence at about 6 p. m., and the highest recorded velocity was 94 miles per hour at 11:20 p. m., after which the recording apparatus was damaged. . . . [I]t is estimated that the highest velocity reached was 106 miles per hour . . ." (City of Charleston Yearbook: 1911) The storm center passed between Charleston and Beaufort as it came ashore, producing a storm surge of 12 feet; dealt death blow to rice agriculture, other property loss in excess of $1 million, took 17 lives; but the Isle of Palms reportedly "improved" by leveling of sand dunes (News and Courier)



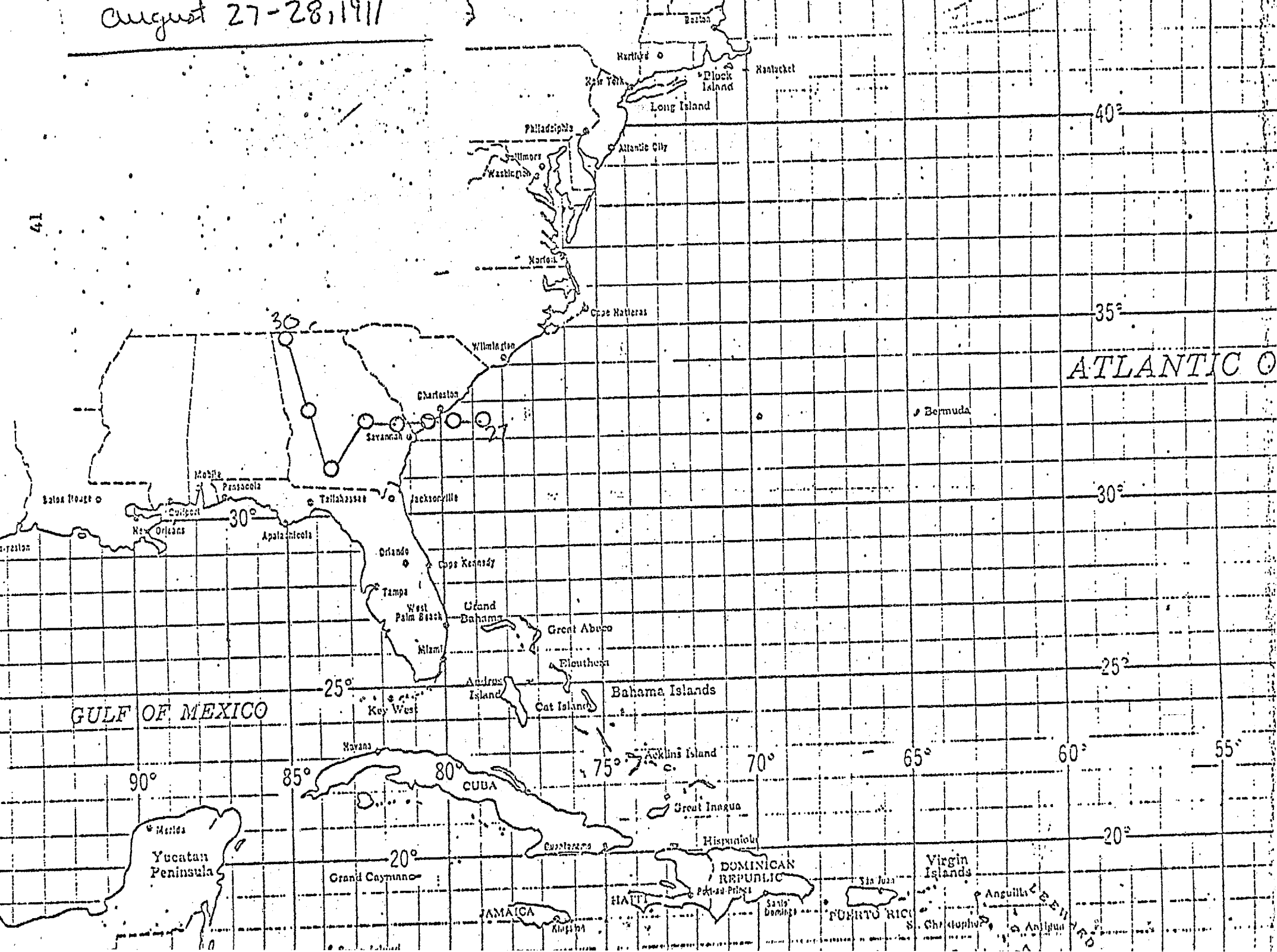
1914 Sept. 17 — Gale winds E 45 mph (Charleston); storm center over Georgia; effect on SC minor

1916 July 14-15 (2) — Winds hurricane force (SE 76 mph at Charleston); rainfall 16 inches at Charleston and Kingstree; severe river flooding; crops lost and roads and communications disrupted from Beaufort to NC line; no lives lost (News and Courier)

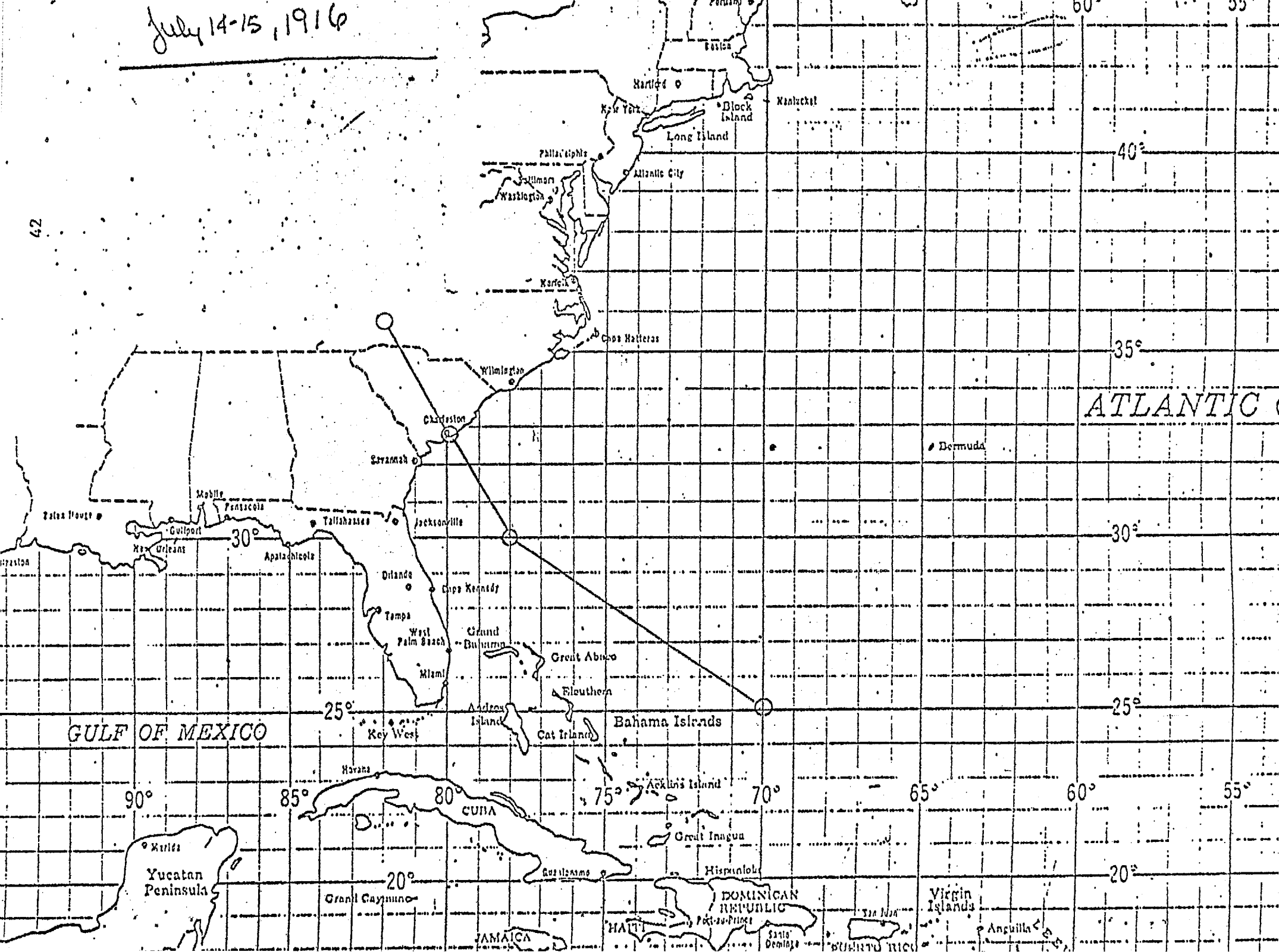
1921 Oct. 26 — Winds E/SE 43 mph (Charleston); "slightest damage" to SC coast (News and Courier)

1924 — A Greenville businessman, John T. Woodside, bought a portion of beach north of Georgetown and began to develop the "grand strand" (Rogers)

August 27-28, 1911

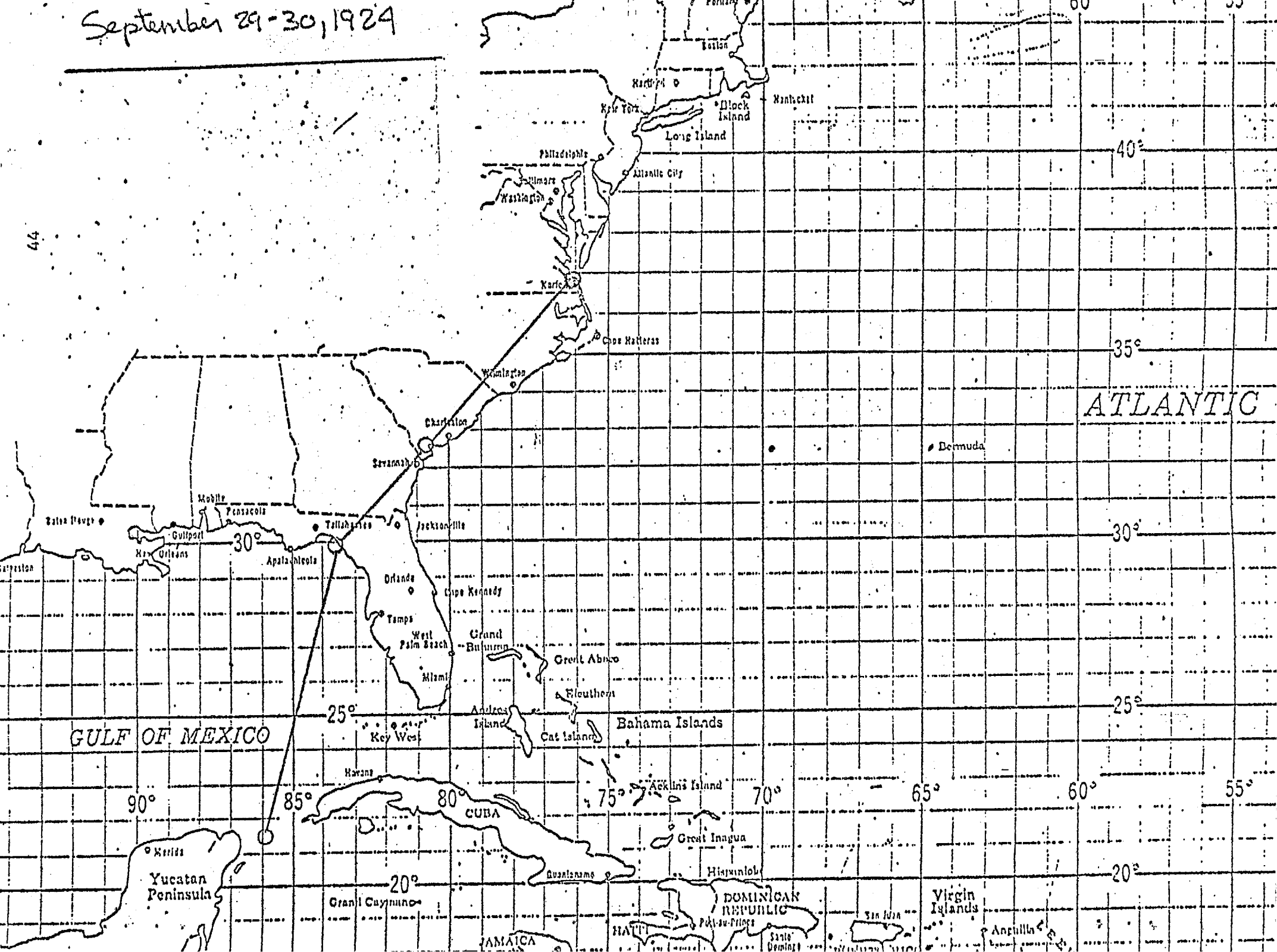


July 14-15, 1916



1924 Sept. 16-17	Gale winds SW 44 mph at Charleston; heavy rains relieved drought conditions
1924 Sept. 29-30	
1926 July 28-29	Winds SE 54 (Charleston); minor effect
1927 Oct. 2-3	Winds SE 50 (Charleston); damage minimal
1928 Aug. 10-11	Tail-end of storm which arrived overland by way of Florida and Georgia; brought 50 miles per hour winds and heavy rains; minor effect in coastal SC (News and Courier)
1928 Sept. 18 (2)	Hurricane force winds (SW 75 mph at Beaufort) accompanied by 12-16 inches of rain; construction Cooper River bridge (Grace Memorial) set back; Folly Beach devastated by high tides, with homes, pavilion, and fifteen feet of beach washed away; power company and roadway damages severe; many communities--Beaufort, Holly Hill, McClellanville, Georgetown--isolated; property damage exceeded $3 million (News and Courier)
1929 Oct. 1 (1)	Winds SW 50 mph (Beaufort); 12 inches rain; lower coast stricken by fresh water flooding; Savannah River broke through swamps at Beaufort and emptied into Port Royal Sound
1933 Sept. 6-7 (1)	Gale SE 53 mph (Charleston); record rains; damage to property in Charleston area at least $100,000, largely the doing of a tornado which developed out of the storm over Sullivan's Island
1934 May 28-30 (1)	Gale SE 53 mph (Charleston); heavy rains; flooded streets, power outage in Charleston and Beaufort; moderate damage to houses on Folly Beach, Pawleys Island; Edisto Island cotton substantially a loss
1935 Sept. 5	Gale SW 47 mph at Charleston; glass broken at Beaufort; tornado at Walterboro; damage minor (News and Courier)
1940 Aug. 11-15 (3)	First severe hurricane to strike SC coast directly in thirty years: winds SE 85 mph (Charleston); encompassed the entire coastal region with 13-foot storm surge; 100 houses destroyed on Edisto, 200 houses on Pawleys Island; "Mosquito Fleet" of shrimp-boats demolished at Charleston; total property losses: $10 million; 34 lives lost

September 29-30, 1924



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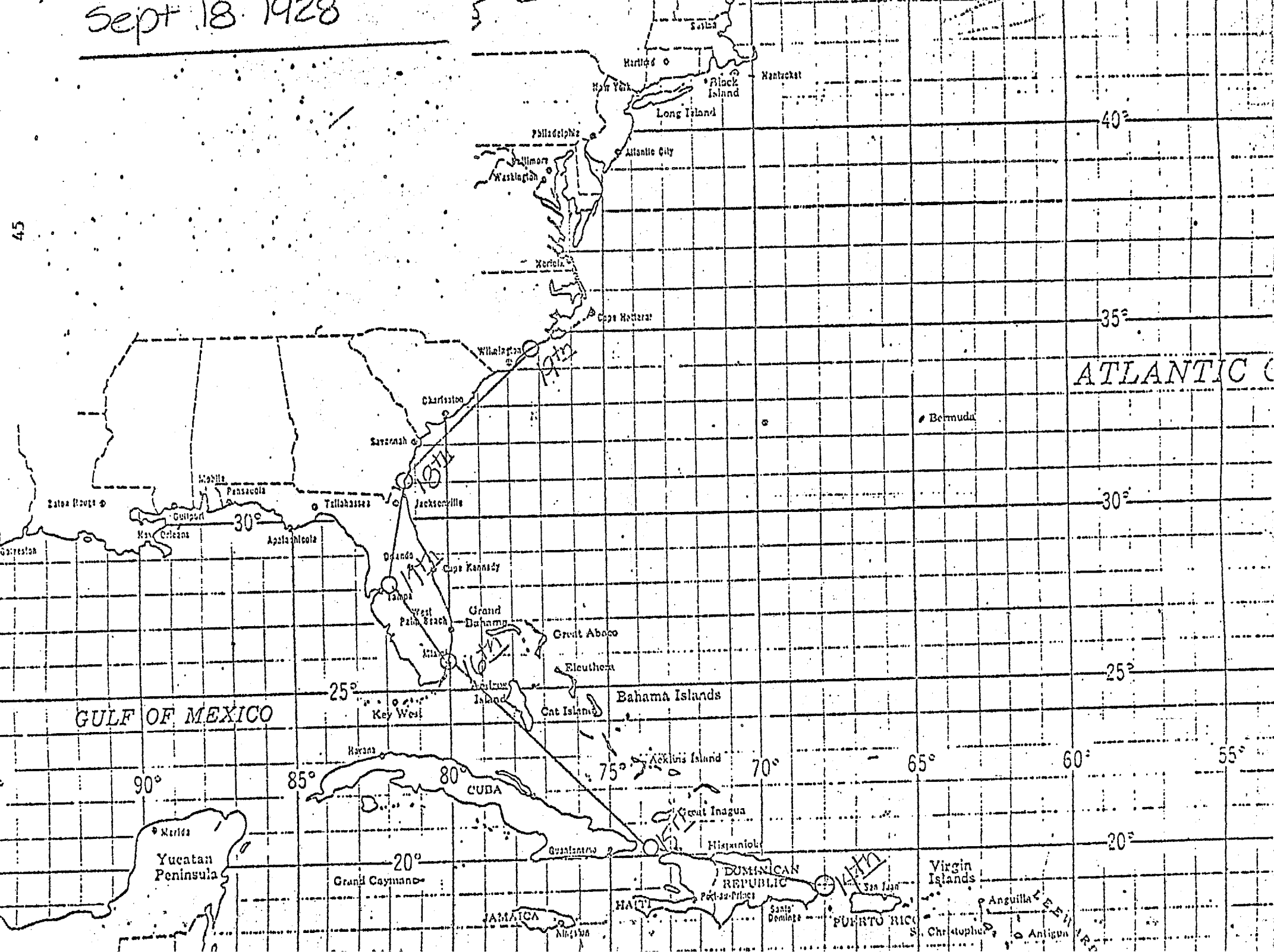
Sept 18 1928


Salem
Hartford
New York
Black Island
Nantucket
Long Island
Philadelphia
Atlantic City
Baltimore
Washington
Norfolk
Cape Hatteras
Wilmington
Charleston
Savannah
Jacksonville
Tallahassee
Mobile
Pensacola
Baton Rouge
Gulfport
New Orleans
Apalachicola
Galveston
Orlando
Cape Kennedy
Tampa
West Palm Beach
Grand Bahama
Great Abaco
Miami
Eleuthera
Andros Island
Cat Island
Bahama Islands
Key West
GULF OF MEXICO
Havana
CUBA
Acklins Island
Great Inagua
Merida
Yucatan Peninsula
Guantanamo
Hispaniola
Grand Cayman
DOMINICAN REPUBLIC
Virgin Islands
San Juan
HAITI
Port-au-Prince
Santo Domingo
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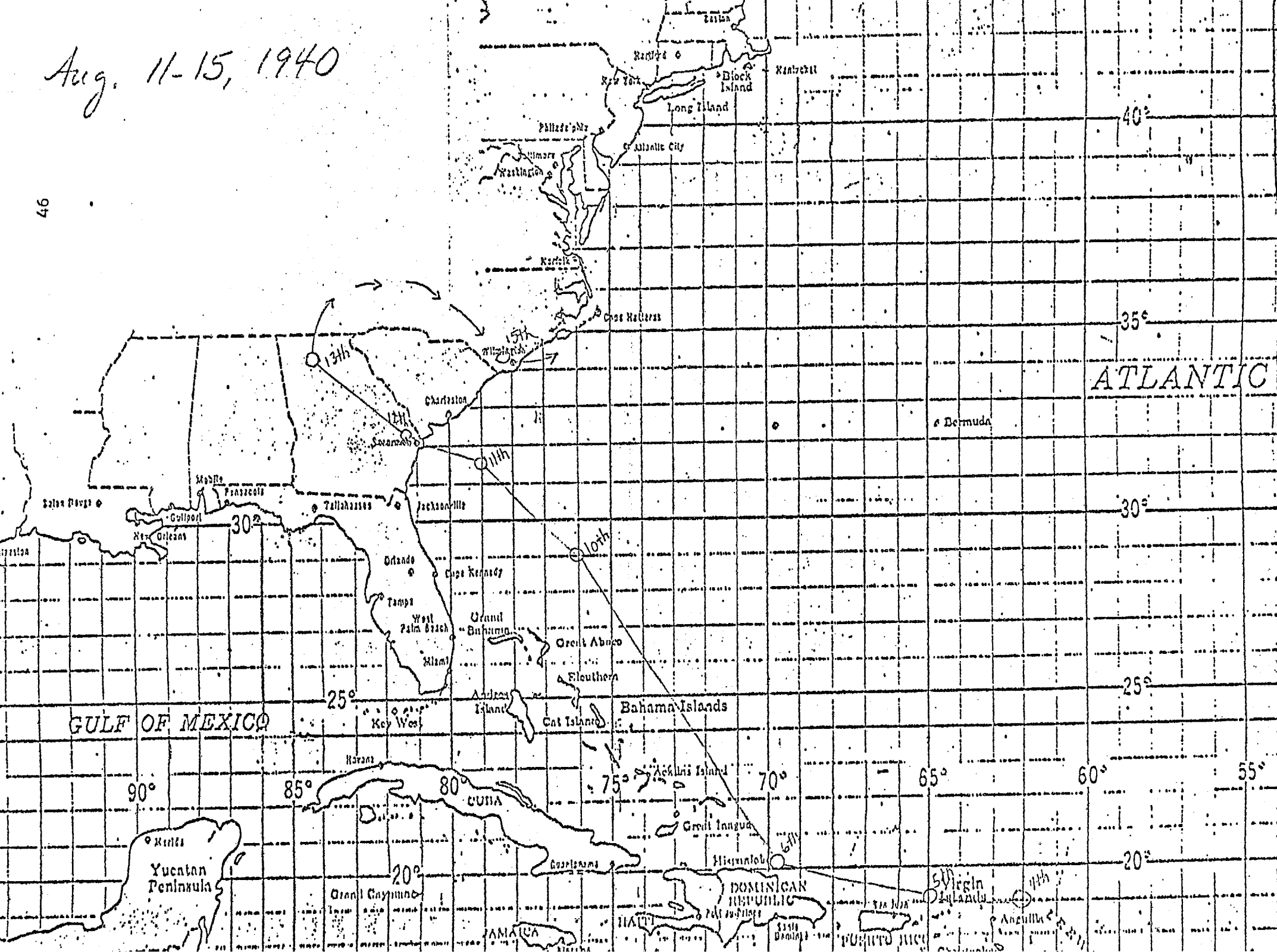
Aug. 11-15, 1940



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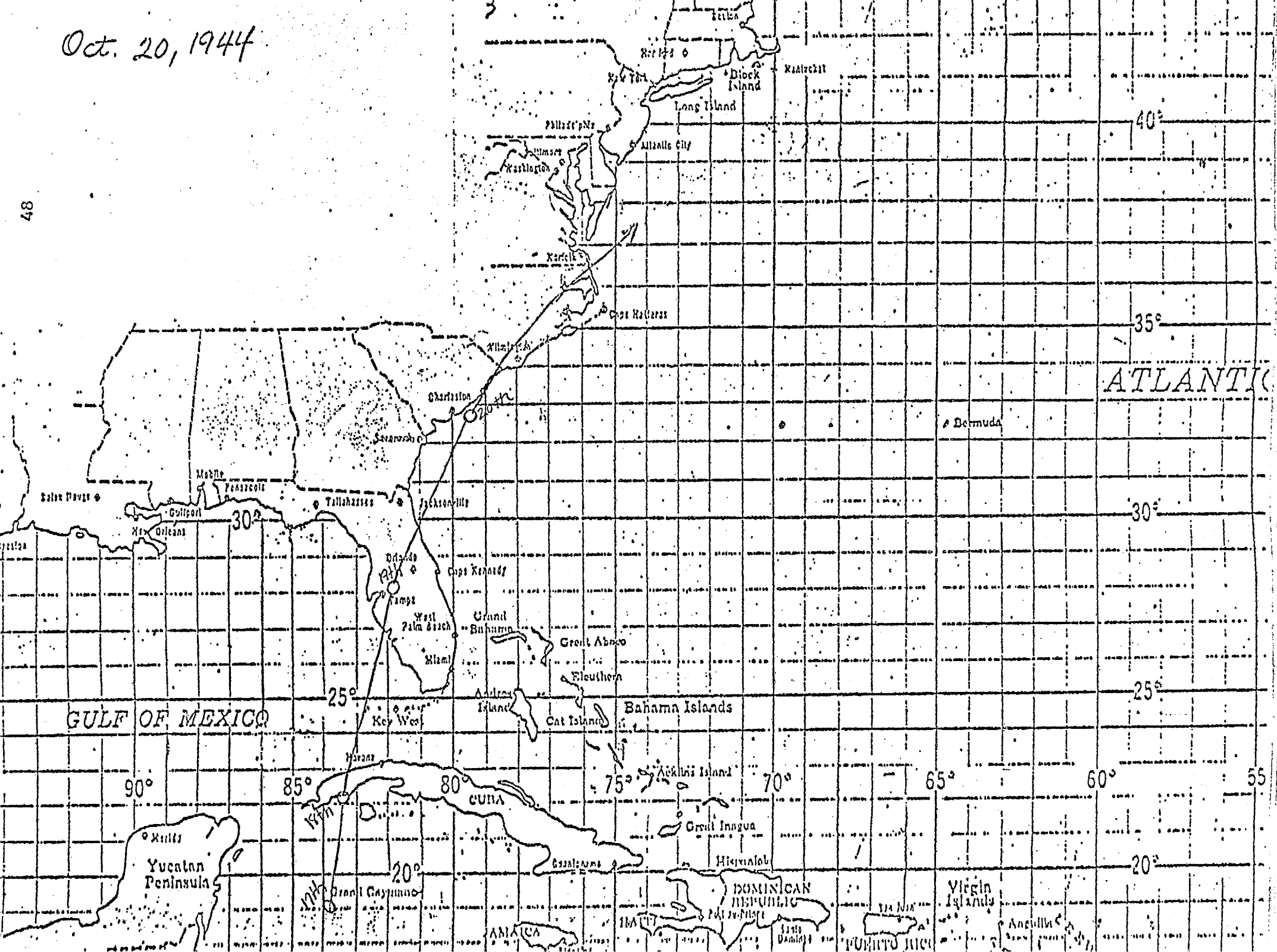
1944 Oct. 20 (1)	Gale NE 65 mph at Beaufort where storm lunged ashore; heavy rains, both salt and fresh water flooding; $350,000 damages to habitations, businesses, farms
1944	Beginning of routine aircraft reconnaisance which made an outstanding contribution to the forecasting of storms
1945 June 24-25 (1)	Gale SW 65 mph (Charleston); 6-10 inches rainfall; some damage to crops; center of storm passed off-shore
1945 Sept. 17 (2)	Major storm; winds hurricane force (SE 85 mph at Parris Island): 9 inches rain in 24 hours at Charleston; storm surge modest--9 feet; damage to property and crops substantial--$6 million; one (1) death
1945	Civil Defense, a network of local units organized and directed nationally, created to deal with the emergency of the Second World War, continued with additional responsibility of coordinating preventive and relief measures in cases of natural hazards like hurricanes (Douglas)
1947 Oct. 13	Scientists made initial experiments to calm a destructive storm by "seeding", that is, dropping dry ice on cloud formation; the results were uncertain (News and Courier)
1947 Oct. 15 (2)	Hurricane-force winds (SE 65-70 mph at Parris Island) with a storm surge of 9-12 feet; property and crops suffered to tune of $3 million; Folly Beach experienced significant erosion, collapsed buildings
1949 Aug. 28-29 (1)	Gale SW 54 mph and power outage at Charleston
1950 Oct. 17-25	Winds E 42 mph (Charleston)
1952 Aug. 31 (2) "Able"	Storm small and "lop-sided" and "wobbling on its course" but packed 70-80 mph winds at Beaufort, which reported "two traffic deaths, fallen trees, disrupted power and telephone service, ruined cotton, smashed windows, ripped roofs"; most severe property damage occurred on Edisto Island, where many houses were washed or blown away; damages for the entire coast was set at $3 million and it would have been greater had storm not arrived at low tide (News and Courier)

Oct. 20, 1944



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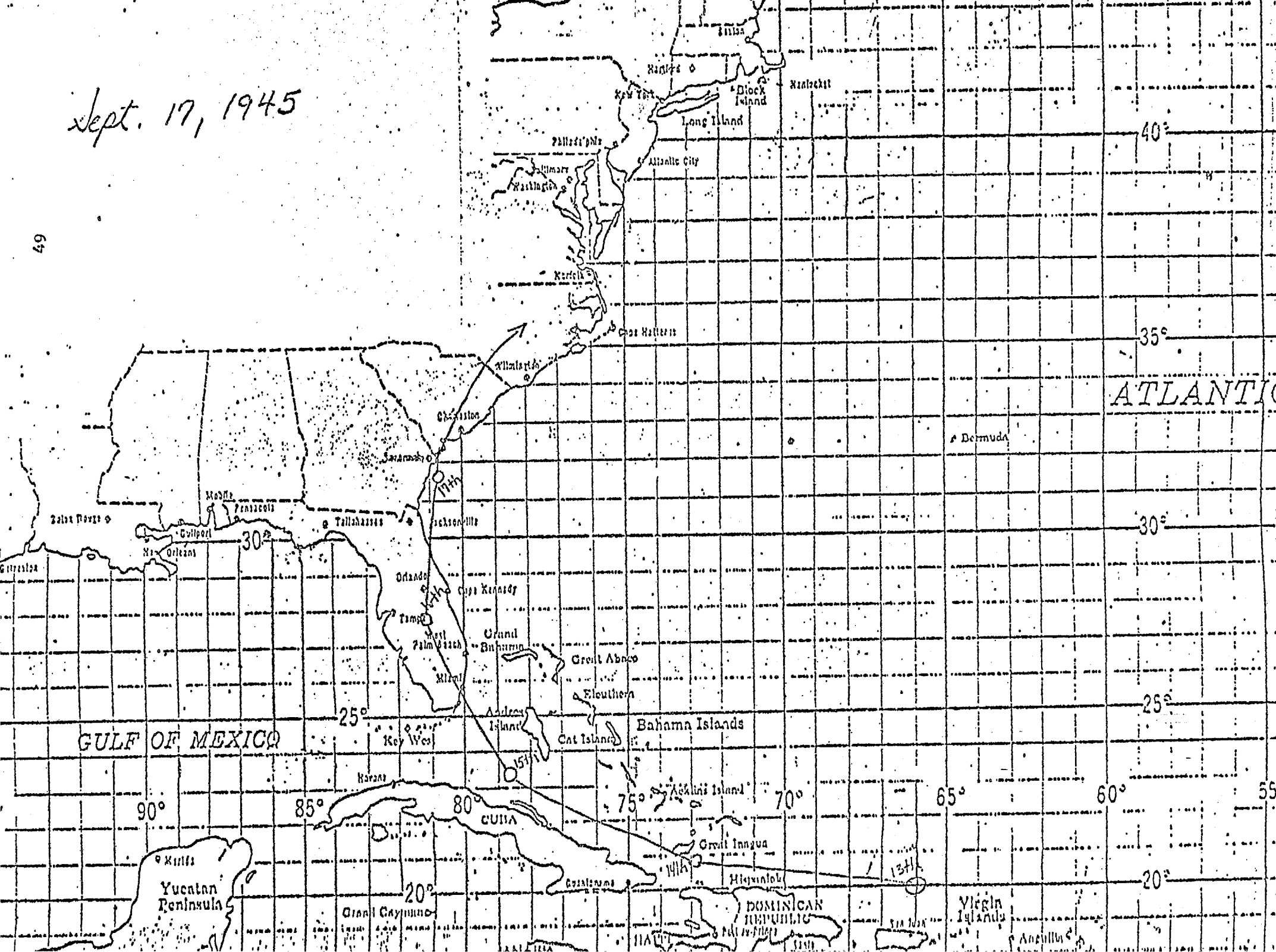
Sept. 17, 1945



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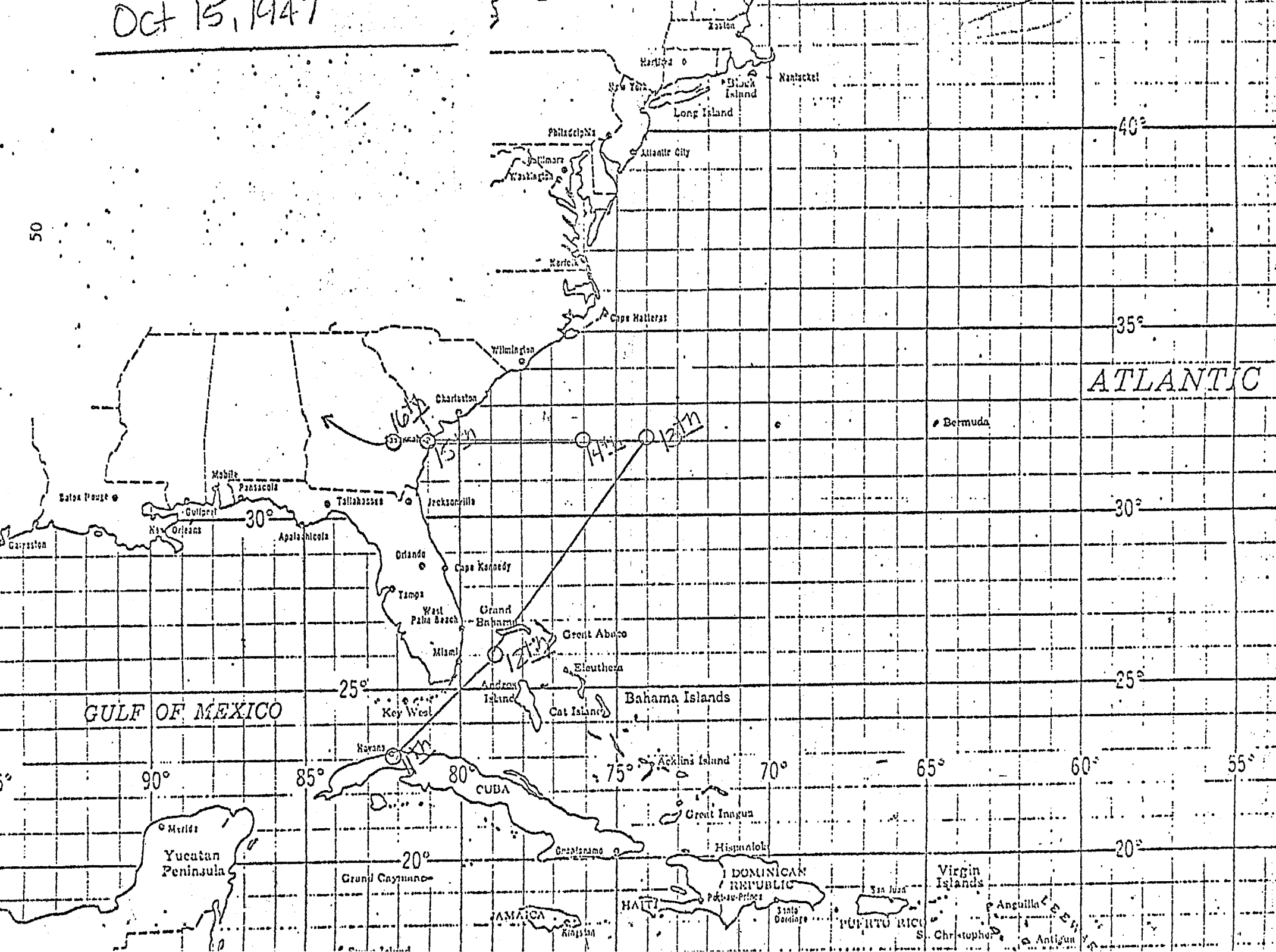
Oct 15, 1947


Easton
Hartford
New York
Block Island
Nantucket
Long Island
Philadelphia
Atlantic City
Baltimore
Washington
Norfolk
Cape Hatteras
Wilmington
Charleston
ATLANTIC
Bermuda
Mobile
Pensacola
Baton Rouge
Gulfport
New Orleans
Galveston
Tallahassee
Jacksonville
Apalachicola
Orlando
Cape Kennedy
Tampa
West Palm Beach
Grand Bahama
Great Abaco
Miami
Eleuthera
Andros Island
Cat Island
Bahama Islands
GULF OF MEXICO
Key West
Havana
Acklins Island
CUBA
Great Inagua
Merida
Yucatan Peninsula
Guantanamo
Hispaniola
Grand Cayman
DOMINICAN REPUBLIC
Virgin Islands
San Juan
Anguilla
HAITI
Port-au-Prince
Santo Domingo
JAMAICA
Kingston
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St. Christopher
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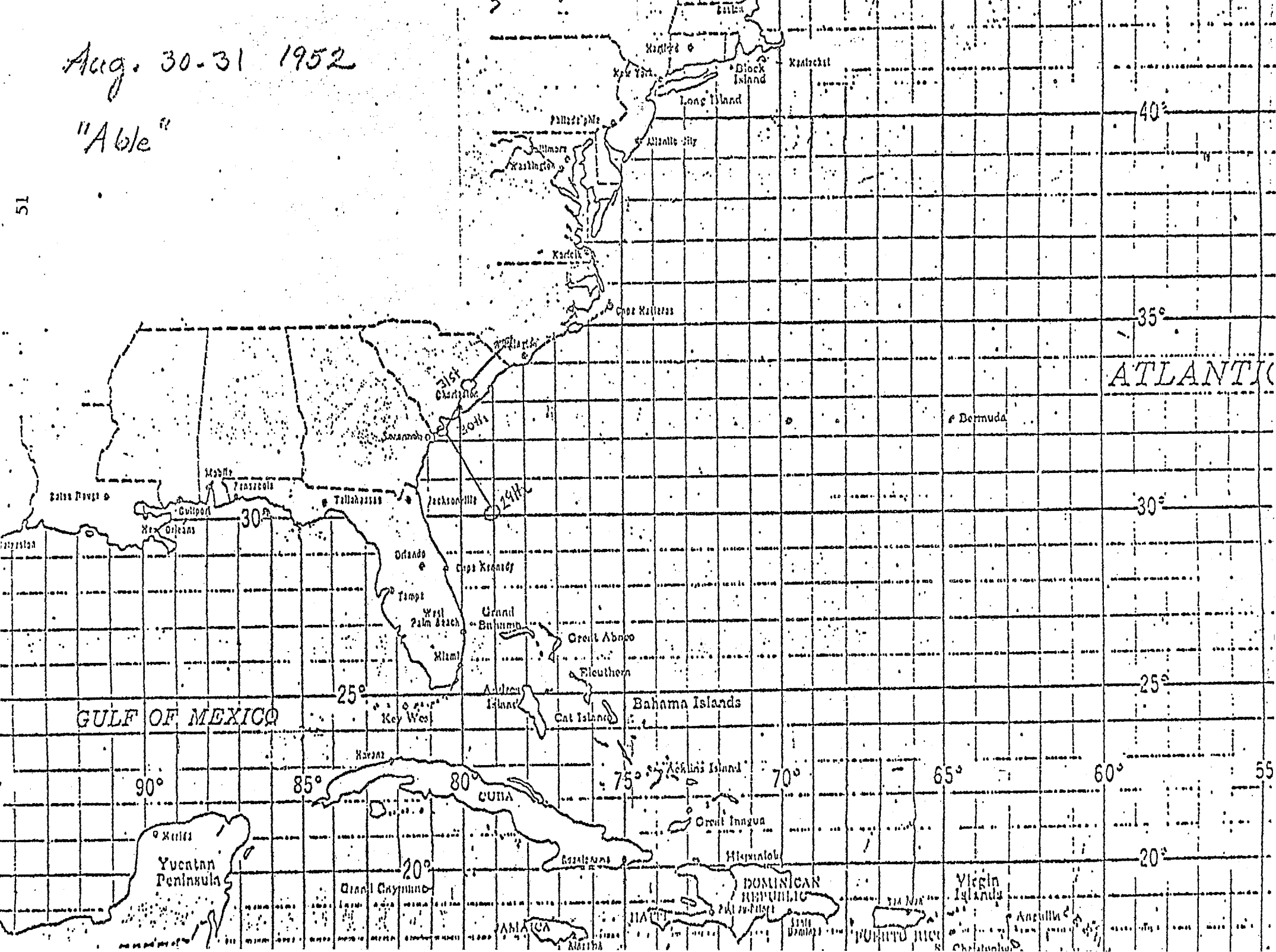
Aug. 30-31 1952

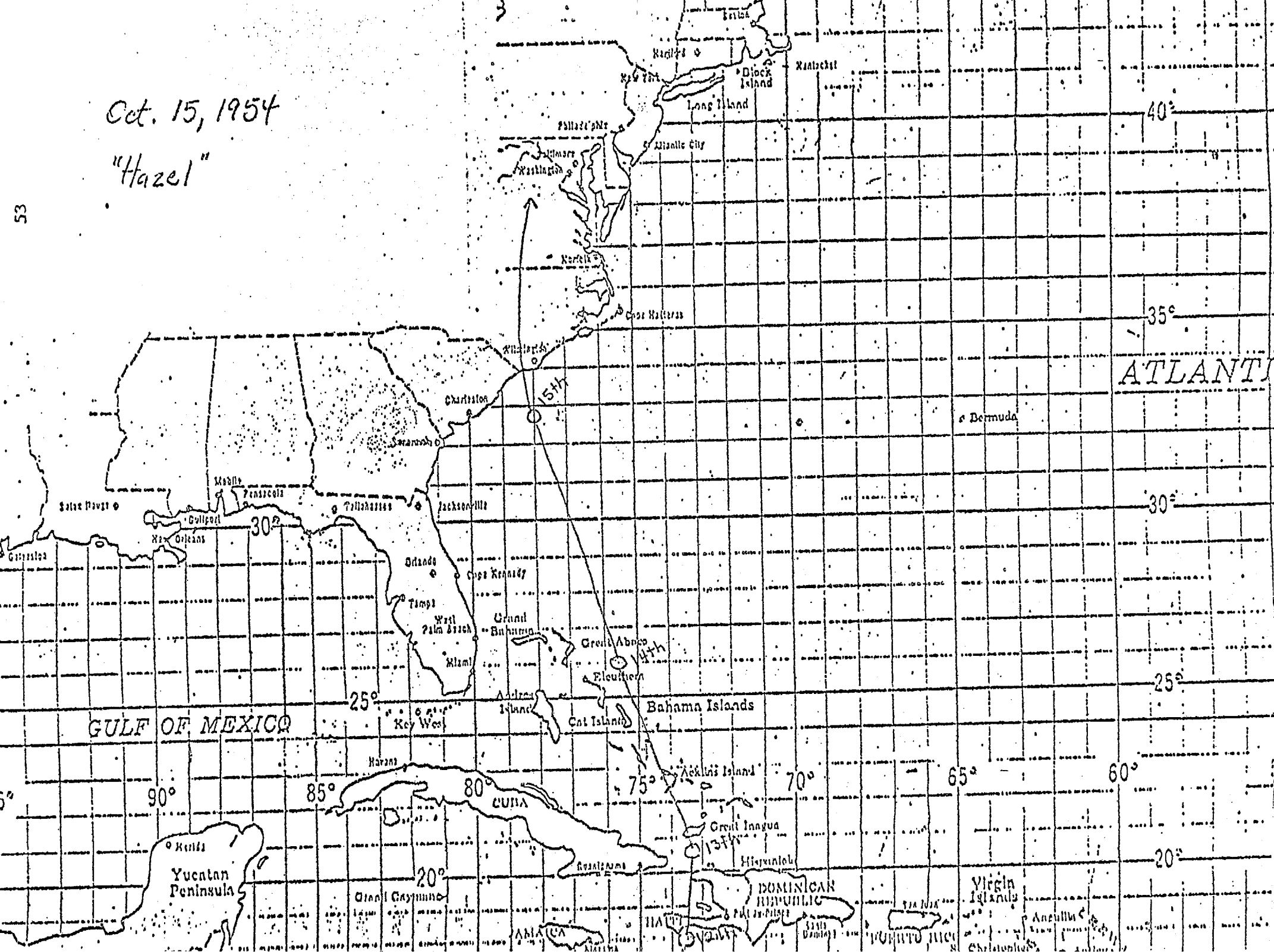
"Able"



1954 Aug. 28-29 (1)	Gale winds pushed salt water 14 miles up Black River near Georgetown
1954 Oct. 15 (3) "Hazel"	Extreme storm, most destructive in terms of lost property ever to trouble coastal SC; winds SW 106 mph at Georgetown/Myrtle Beach; tidal surge 17-18 feet on upper coast; devastation extreme on the beaches north of Georgetown, recently filled with resorts and summer cottages; whole communities were swept away: miles of "grass covered dunes from ten to twenty feet high, along and behind which beach homes had been built in a continuous line . . . simply disappeared, dunes, houses, and all; property losses totaled $27 million, but there is only one death
1955 Aug. 16-17 (1) "Diane"	Center in NC; damage to property in coastal SC--$100,000
1956 Sept. 25-26 "Flossy"	
1959 July 9 (1) "Cindy"	Gale winds 50-60 mph; small storm moved inland across Bull's Island; produced storm surge of 10 feet at high tide at Charleston and points north; damage minor; 1 death due to a traffic mishap at McClellanville
1959 Sept. 29 (3) "Gracie"	Extreme storm; packed hurricane force winds SE 80 mph; storm surge only 8.6 feet (storm arrived on lower SC coast at dead low water); property losses amounted to $12 millions; 11 lives were lost (both figures would have been much higher had tidal situation been different)
1960 July 29 "Brenda"	Eye of storm remained at sea; Isle of Palms recorded 45 mph winds; damage slight
1960 Sept. 11 (1) "Donna"	Diminished hurricane which took heavy toll in Florida passed 65 miles to sea; gale winds 50-60 mph on some beaches; associated with tornadoes at Garden City and Charleston; property losses totaled $1 million due to the tornadoes
1963 Oct. 25 "Ginny"	Gale winds S 50 mph at Charleston, where tornado appeared; center of storm remained at sea; minor effect
1964 Aug. 29 (1) "Cleo"	Dying hurricane spawned two small tornadoes which damaged dwellings in Charleston and Monck's Corner

Oct. 15, 1954

"Hazel"



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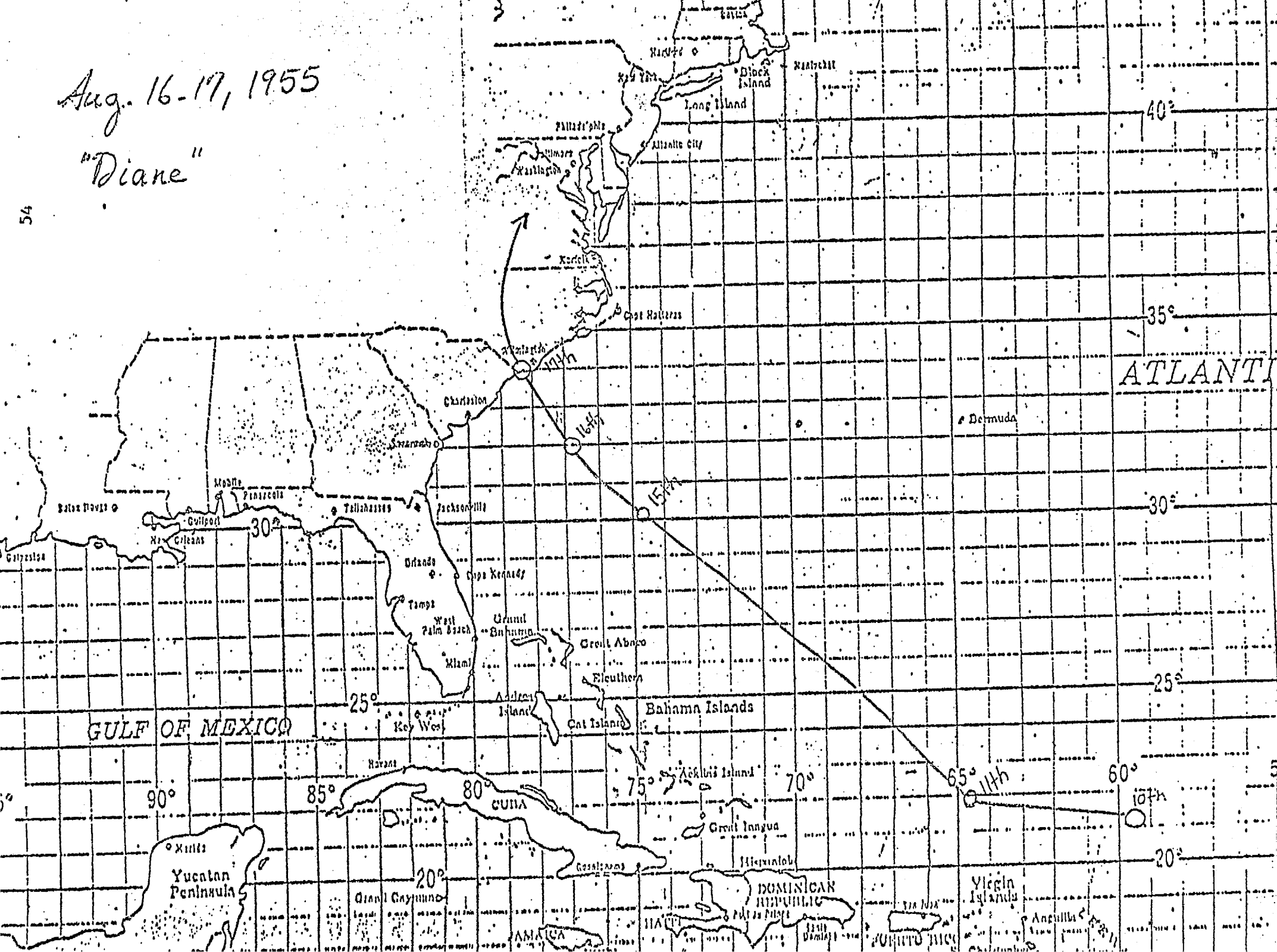
Aug. 16-17, 1955

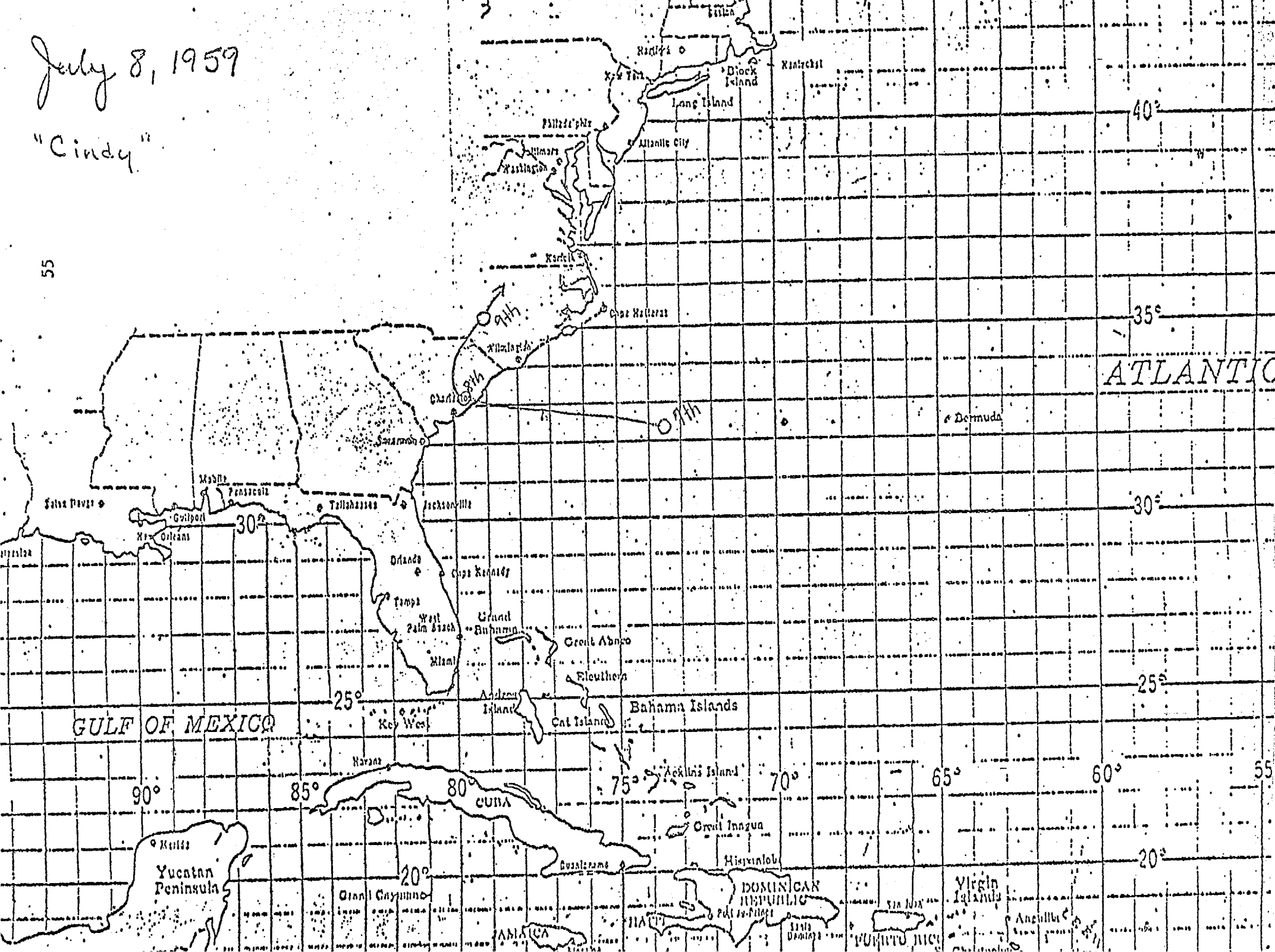
"Diane"



54

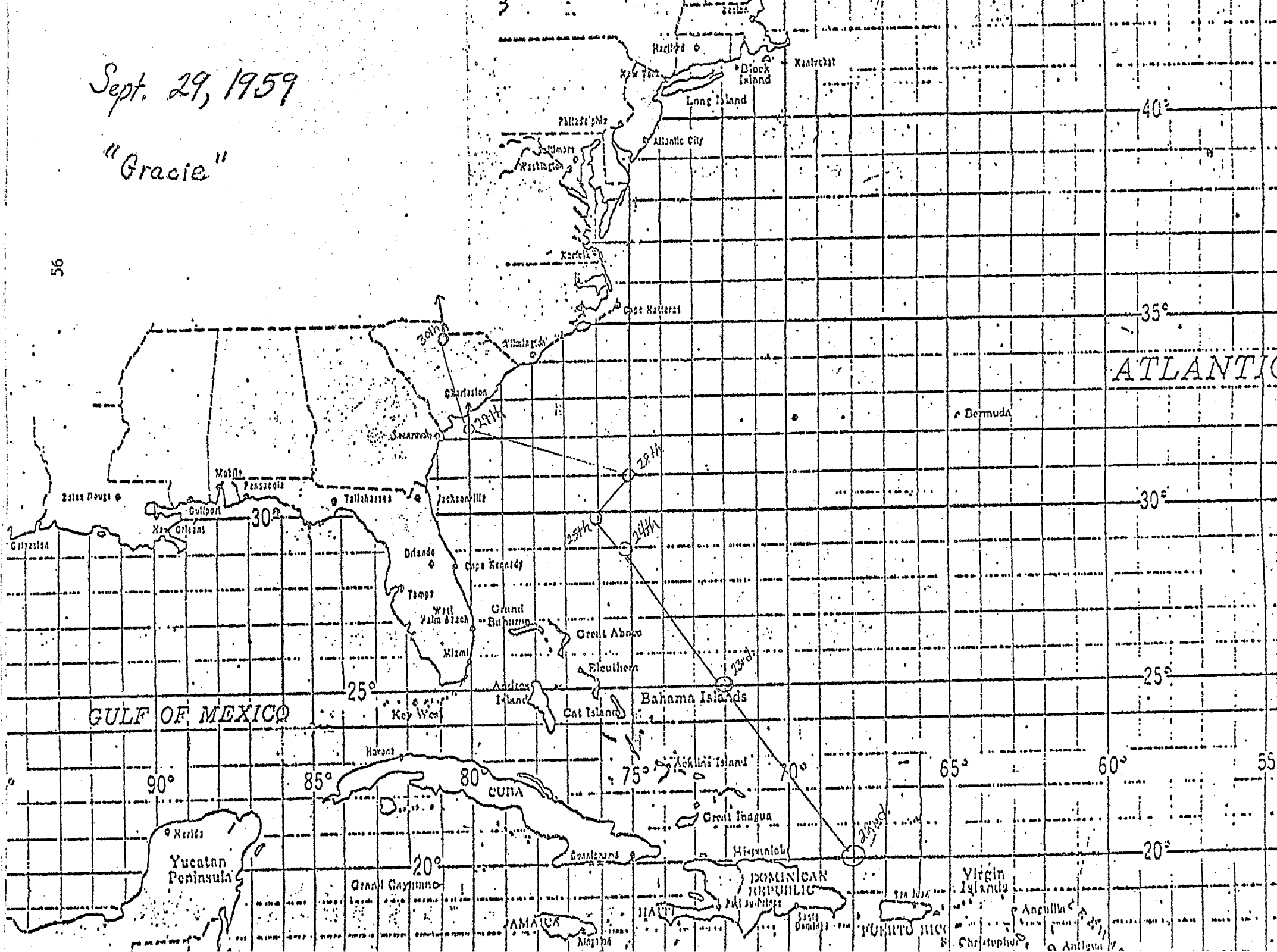
July 8, 1959

"Cindy"



Sept. 29, 1959

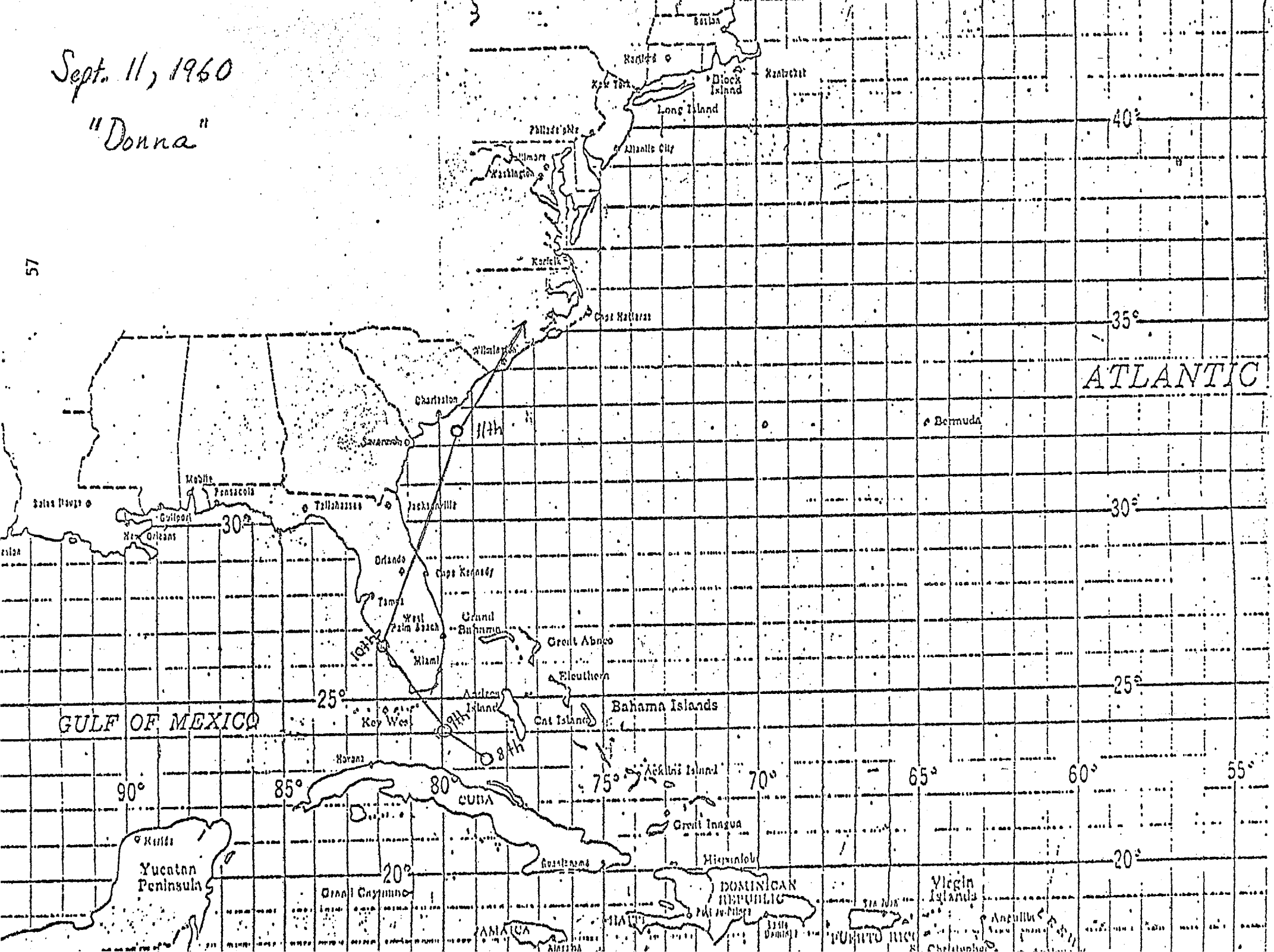
"Gracie"



56

Sept. 11, 1960

"Donna"



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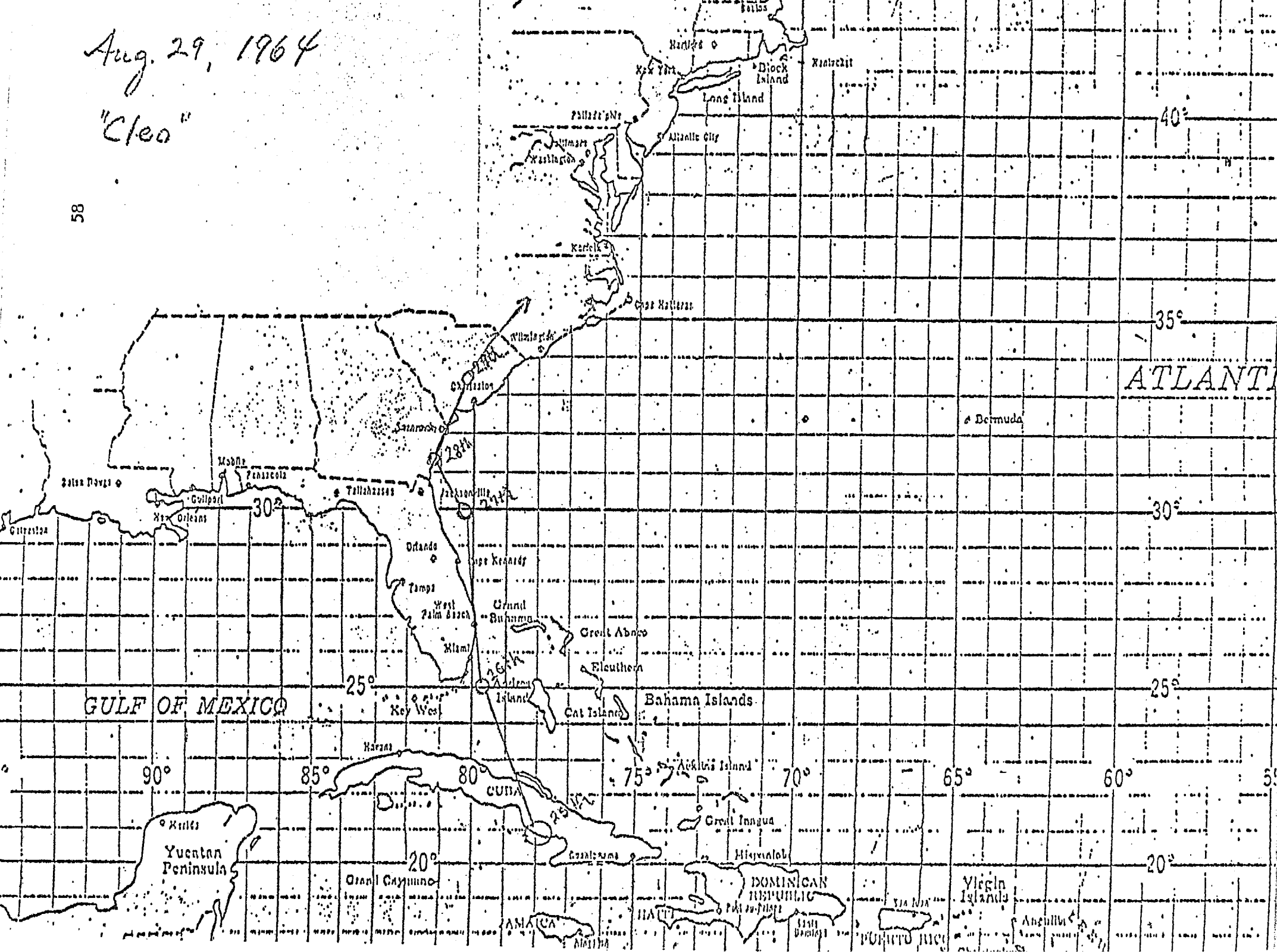
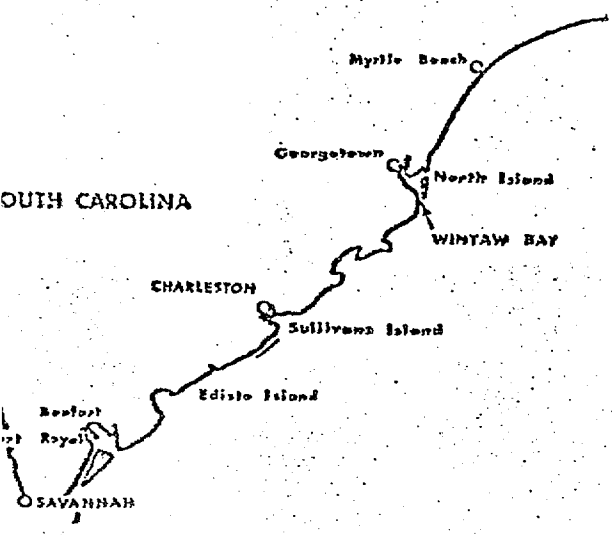
Aug. 29, 1964

"Cleo"



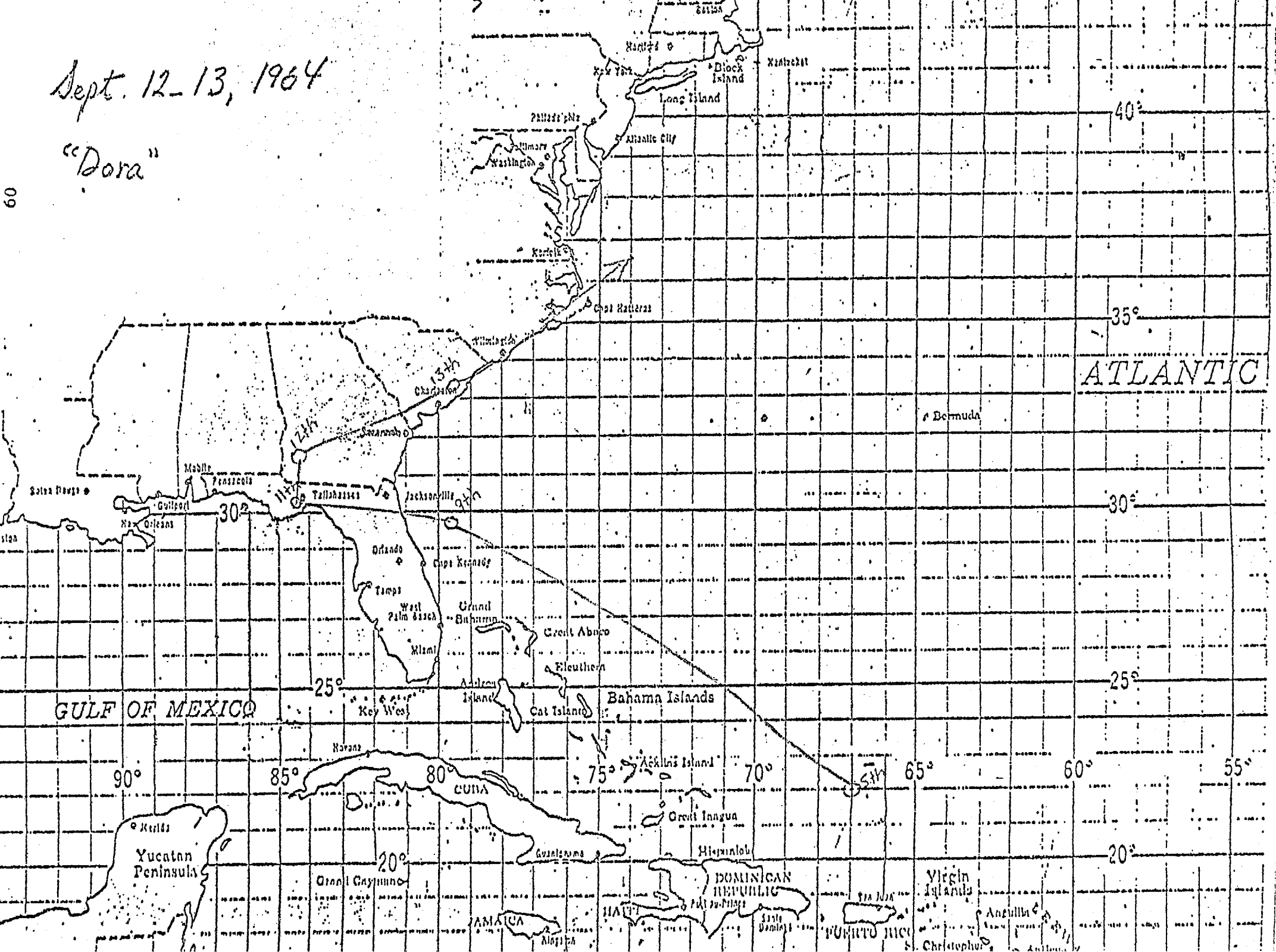
58

1964 Sept. 12-13 "Dora"	Hurricane spent by passage overland; spawned tornado at Myrtle Beach and produced heavy rains--8 inches in 24 hours at Conway; minor damage
1966	With the advent of operational weather satellites, US Weather Service made routine use of satellite cloud photography to identify tropical storms in an early stage of development. (Hughes)
1966 June 10 "Alma"	Diminished hurricane logged winds of 50 mph at Charleston; slight damage to shipping, especially at Beaufort
1968 June 7, 10-11 "Abby"	First storm of the season dumped ten inches of rain on Charleston
1968 Oct. 19 "Gladys"	Center of storm with 100 mph winds passed uneventfully offshore
1971 Aug. 17-18	Tropical depression brought heavy rains (14 inches in 48 hours at Charleston), flooding--waist-deep in Georgetown--and significant beach erosion
1979 Sept. 4-5 (1) "David"	Spent hurricane, having devastated the West Indies, failed to live up to expectations; struck Charleston and the northern coast at normal high tide, but the 56 mph winds generated a storm surge of only 8 or 9 feet, or 2 to 3 feet above normal high tide; property losses (there was no loss of life) totaled $7 million--a modest amount when set over against the potential losses--and centered on the northern coast: 13 houses demolished at Litchfield, several severely damaged and destroyed at Folly Beach; otherwise the storm left tons of fallen trees and debris



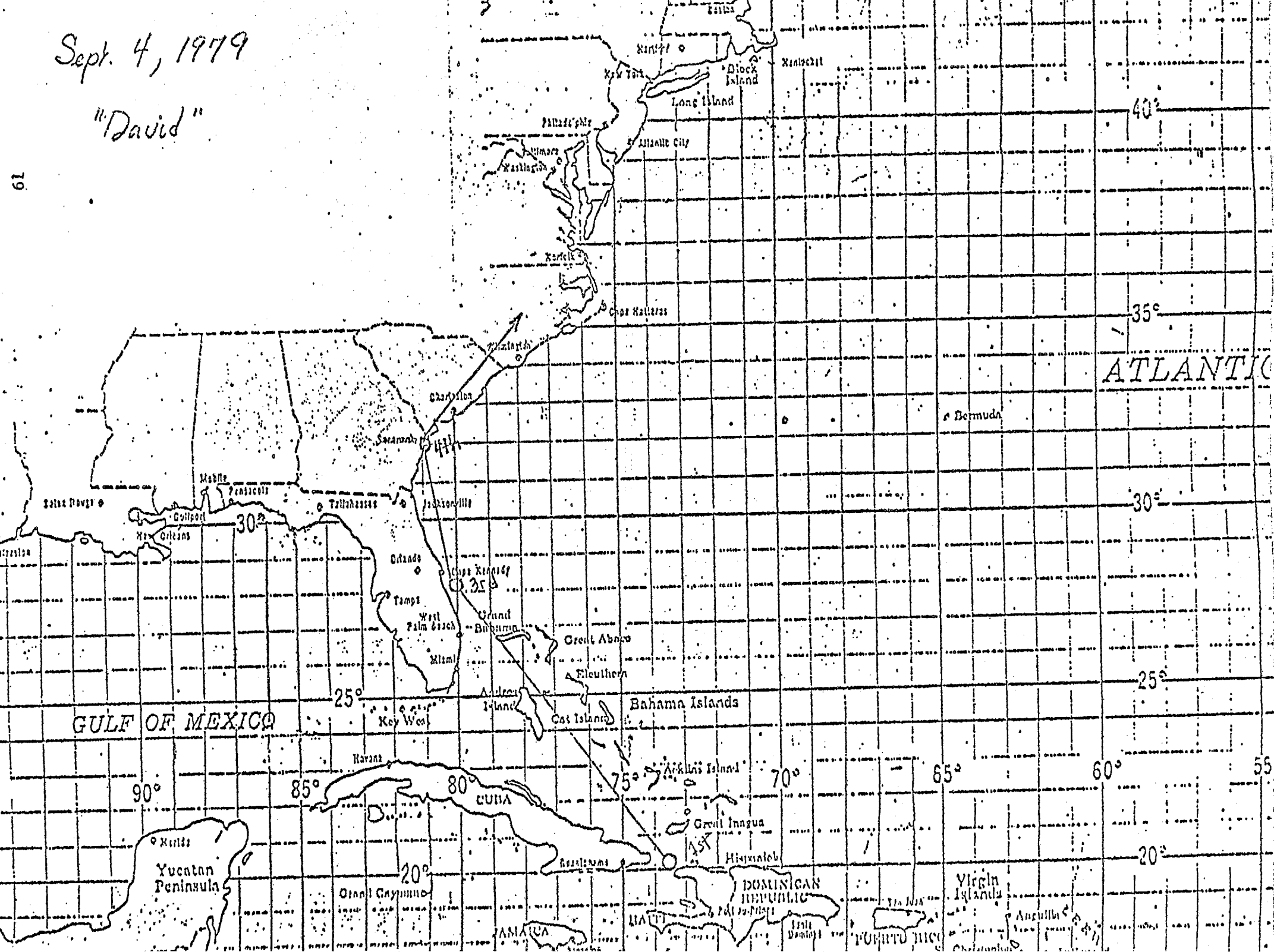
Sept. 12-13, 1964

"Dora"



Sept. 4, 1979

"David"



TABLES

Table 1

SUMMARY OF TROPICAL STORMS - FREQUENCY BY MONTH

A. All Storms

Period of 1686 - 1980

	May	June	July	August	September	October	Total
umber of Storms	1	5	3	22	31	14	76
ercentage of Total	1.3	6.6	3.9	28.9	40.8	18.4	100% (99.9

Period of 1881 - 1980

	May	June	July	August	September	October	Total
umber of Storms	1	2	2	10	11	7	33
ercentage of Total	3.0	6.1	6.1	30.3	33.3	21.2	100%

B. All Major and Great Storms

Period of 1686-1980

	May	June	July	August	September	October	Total
umber of Storms	0	0	1	9	18	6	34
ercentage of Total	0	0	2.9	26.5	52.9	17.6	100% (99.9

Period of 1881 - 1980

	May	June	July	August	September	October	Total
umber of Storms	0	0	1	6	6	4	17
ercentage of Total	0	0	5.9	35.3	35.3	23.5	100%

C. Great Storms

Period of 1686 - 1980

	May	June	July	August	September	October	Total
Number of Storms	0	0	0	5	4	1	10
Percentage of Total	0	0	0	50	40	10	100%

Period of 1881 - 1980

	May	June	July	August	September	October	Total
Number of Storms	0	0	0	4	1	1	6
Percentage of Total	0	0	0	66.7	16.7	16.7	100% (100.

Table 2

SUMMARY OF TROPICAL STORMS - AVERAGE INTERVALS

A. Period of 1686-1980

	Average Interval
All Storms (76)	3.9 years
Major/Great Storms (34)	8.6 years
Great Storms (10)	29.5 years

B. Period of 1881-1980

	Average Interval
All Storms (33)	3.3 years
Major/Great Storms (17)	5.9 years
Great Storms (6)	16.6 years

Table 3

REAL INTERVALS BETWEEN TROPICAL STORMS

(LONGEST/SHORTEST) BY CLASS AND SEVERAL PERIODS

	LONGEST	SHORTEST
1686-1780		
All Storms (13)	14 years (twice: 1686-1700 and 1728-1752)	15 days (1752)
Major/Great Storms (6)	28 years (1752-1780)	15 days (1752)
Great Storms (1)		
* * * * *		
1781-1880		
All Storms (30)	20 years (1854-1874)	47 days (1806)
Major/Great Storms (8)	20 years (twice: 1822-1842 and 1854-1874)	2 years (1820-1822)
Great Storms (3)		9 years (1813-1822)
* * * * *		
1881-1980		
All Storms (33)	15 years (1964-1979)	46 days (1893)
Major/Great Storms (17)	21 years (1959-1980)	46 days (1893)
Great Storms (6)		5 years (1954-1959)
* * * * *		
Whole Period - 1686-1980		
Great Storms (10)	63 years (1822-1885)	5 years (1954-1959)

Table 4

SAFFIR/SIMPSON HURRICANE SCALE RANGES

Scale Number (category)	Central Pressure (millibars)	Central Pressure (inches)	Winds (miles/hour)	Surge (feet)	Damage
1	≥980	28.94	74 – 95	4 – 5	Minimal
2	965 – 979	28.50 – 28.91	96 – 110	6 – 8	Moderate
3	945 – 964	27.91 – 28.47	111 – 130	9 – 12	Extensive
4	920 – 944	27.17 – 27.88	131 – 155	13 – 18	Extreme
5	<920	<27.17	>155	>18	Catastrophic

Table 5

NUMBER OF HURRICANES (DIRECT HITS) AFFECTING UNITED STATES AND INDIVIDUAL STATES 1900-1978 ACCORDING TO SAFFIR/SIMPSON HURRICANE SCALE.
[Updated from Hebert and Taylor (1975).]

Area	Category Number 1	2	3	4	5	All	Major Hurricanes (≥3)
United States (Texas to Maine)	47	29	38	13	2	129	53
Texas	9	9	7	6	0	31	13
(North)	4	3	2	4	0	13	6
(Central)	2	2	1	1	0	6	2
(South)	3	4	4	1	0	12	5
Louisiana	4	6	6	3	1	20	10
Mississippi	1	1	2	0	1	5	3
Alabama	3	1	3	0	0	7	3
Florida	18	11	15	5	1	50	21
(Northwest)	9	6	5	0	0	20	5
(Northeast)	1	5	0	0	0	6	0
(Southwest)	5	3	5	2	1	16	8
(Southeast)	4	8	7	3	0	22	10
Georgia	1	3	0	0	0	4	0
South Carolina	4	3	2	1*	0	10	3
North Carolina	9	3	6	1*	0	19	7
Virginia	1	1	1*	0	0	3	1*
Maryland	0	1*	0	0	0	1*	0
Delaware	0	0	0	0	0	0	0
New Jersey	1	0	0	0	0	0	0
New York	3	0	4*	0	0	7	4*
Connecticut	2	1*	3*	0	0	6	3*
Rhode Island	0	1*	3*	0	0	4*	3*
Massachusetts	2	1*	2*	0	0	5	2*
New Hampshire	1*	0	0	0	0	1*	0
Maine	4	0	0	0	0	4	0

*Indicates all hurricanes in this category were moving faster than 30 mph.

Note: State totals will not equal United States totals and Texas and Florida sectional totals will not equal state totals.

Table 6

COSTLIEST HURRICANES, UNITED STATES 1900-1978
(More than $50,000,000 damage)

Hurricane	Year	Category	Damage (U.S.)
1. AGNES (Fla./Northeast U.S.)	1972	1	$2,100,000,000
2. CAMILLE (Mississippi/La.)	1969	5	1,420,700,000
3. BETSY (Florida/Louisiana)	1965	3	1,420,500,000
4. DIANE (Northeast U.S.)	1955	1	831,700,000
5. ELOISE (Northwest Florida)	1975	3	550,000,000
6. CAROL (Northeast U.S.)	1954	3[2]	461,000,000
7. CELIA (South Texas)	1970	3	453,000,000
8. CARLA (Texas)	1961	4	408,000,000
9. DONNA (Fla./Eastern U.S.)	1960	4	387,000,000
10. New England	1938	3[2]	300,000,000
11. HAZEL (North & South Carolina)	1954	4[2]	281,000,000
12. DORA (Northeast Florida)	1964	2	250,000,000
13. BEULAH (South Texas)	1967	3	200,000,000
14. AUDREY (Louisiana/Texas)	1957	4	150,000,000
15. CARMEN (Louisiana)	1974	3	150,000,000
16. CLEO (Southeast Florida)	1964	2	128,500,000
17. HILDA (Louisiana)	1964	3	125,000,000
18. Florida (Miami & Pensacola)	1926	4	112,000,000
19. Southeast Florida/La.-Miss.	1947	4	110,000,000
20. Northeast U.S.	1944	3[2]	100,000,000
21. BELLE (Northeast U.S.)	1976	1	100,000,000
22. IONE (North Carolina)	1955	3	88,000,000
23. Southwest & Northeast Florida	1944	3	63,000,000
24. Southeast Florida	1945	3	60,000,000
25. Southeast Florida	1949	3	52,000,000[1]

[1] Includes $60,000,000 in Puerto Rico.
[2] Moving more than 30 miles per hour.

Table 7

INCIDENCE OF MAJOR HURRICANES (DIRECT HITS) BY MONTHS TO AFFECT THE UNITED STATES AND INDIVIDUAL STATES ACCORDING TO THE SAFFIR/SIMPSON HURRICANE SCALE.

Area	Month					
	June	July	Aug.	Sept.	Oct.	All
United States (Texas to Maine)	2	2	11	30	7	53
Texas	1	1	5	6		13
(North)	1	1	2	2		6
(Central)			1	1		2
(South)			2	3		5
Louisiana	2		3	4	1	10
Mississippi		1	1	1		3
Alabama		1		2		3
Florida		1	1	14	5	21
(Northwest)		1		4		5
(Northeast)						0
(Southwest)			5	3		8
(Southeast)			1	7	2	10
Georgia						0
South Carolina				2	1	3
North Carolina			1	5	1	7
Virginia				1		1
Maryland						0
Delaware						0
New Jersey						0
New York			1	3		4
Connecticut			1	2		3
Rhode Island			1	2		3
Massachusetts				2		2
New Hampshire						0
Maine						0

Note: State totals will not equal United States totals and Texas and Florida sectional totals will not equal state totals.

Table 8

FREQUENCY OF FULL-FLEDGED HURRICANES FOR SEVERAL SECTIONS OF THE NORTHWESTERN ATLANTIC COASTLINE, 1900-1957 (The relative ratio is result of correlation of number of hurricanes and length of coastline)*

Area	No. of Tropical Storms Giving Hurricane Force (constant 74 miles per hour) Winds	Relative Ratio
Southern Florida	18	12.0
Texas	24	7.2
North Carolina	17	6.2
South Carolina	5	3.1
New York/New England	8	1.5
Georgia	3	1.1

*Adapted from Gordon E. Dunn and Banner I. Miller, Atlantic Hurricanes (Baton Rouge: Louisiana State University Press, 1960), p. 52.

A P P E N D I C E S

A P P E N D I X A (Document)

In 1893 we had the most terrible hurricane that this coast has experienced in a very long time.

It was Sunday August 27th, 1893. We all went to church, but it began to rain, and we hurried home.

All day the wind blew in gusts and rain fell. As evening came on the wind blew harder. Tide was due to be high about 5 P.M. and should have been low water about midnight, but as night settled down, the wind increased in velocity and the tide was held up and could not fall, so the next tide piled on top of the first, and by midnight the ocean had come in over St. Helena and Lady's Island and flooded Beaufort. The wind grew higher and higher, until it reached 125 miles per hour.

The waves of the sea dashed against houses and on the Point where we were living, all small houses were washed away; not one was left standing when morning came.

Around 1 A.M. there was a furious ringing of our door bell, and a tall negro man we knew asked if he might bring women and children to our front porch as all their houses were gone, and they had them in boats seeking shelter. My Father said "No, the piazza is about to go as it is only held up by one column. Bring them into the house". So in a room used as a private school room, and equipped with benches and chairs they were sheltered the rest of the night. Three trips of the big ferry boat were made, bringing 12 to 15 people each trip, so we had around 30 people sheltered for the night. They had lost everything they possessed except what was on their backs. When morning came, two old colored people, man and wife were drowned. One lay at our front door, the other at the back.

The wind came from the east, so I stood at the west windows and watched what was taking place. Huge waves dashed against the causeway near the house, and the wind cut them off and carried the water far back in town. Entire roofs of houses went whirling through the air to crash way back in town. All night this kept up.

Way in the worst of the storm we heard a crash. Boards from a house on the next corner from ours, probably 200 ft. away had been torn off and driven end ways through the side of our house. The house was so badly ruined we had to leave it when the storm was over.

Toward 5 A.M. the wind began to abate, and when daylight came, it was over. But what a wreck.

The water front was a shambles. The cotton gin of George Waterhouse was entirely demolished. The two great boilers were carried by the waves and landed against the bluff in front of the Sea Island Hotel.

The Steamer "Clifton," a steam boat which operated between Beaufort and Savannah, was carried by the waves to the bend beyond the Court House and placed right against the bluff. A deep channel had to be dug in order to get her afloat after the storm had passed.

Capt. George Crofut saved his tug boat by running with the wind and putting the boat against the bluff in front of the court house. This too, had to be dug out after the storm passed.

All goods stored in the basements of the stores on the water front were lost, unless merchants took warning on the approach of the storm and removed them to higher ground.

Roofs of the stores were torn off and Bay street a shambles. Every street in town was piled as high as the house tops with uprooted trees, demolished houses, household furniture etc. It was impossible to get through the streets without climbing over and under the debris. . . .

For weeks fires were kept burning in the streets and dead bodies of dogs, chickens etc, were flung in and burned for they could not be buried.

Miss Clara Barton and the Red Cross came and lent all the aid they could to relieve the distress, and this was very valuable to the helpless.

Communication with the outside world was cut off, as of course we had no electricity nor telephone, so relatives from other places were much distressed until rail or boat communication could be resumed.

There was only one white person lost that I remember of. It was Dr. Hazal, brother of Mrs. Susan Rice. He was quarantine doctor on Parris Island at the outgoing sea depot, and he was drowned. We understood he lost his life in an effort to save the lives of two negro boys. There was much difficulty in getting the body to the Baptist cemetery, as streets were piled high with debris, but by many windings and sending men ahead with axes to cut the debris of trees etc. the hearse finally made it and he was buried.

But on St. Helena and Lady's Island, hundreds of people were drowned, almost entirely negro, for they had no way to escape, and the people of Beaufort town could not get to them, as there was no bridge to cross the river, boats only could be used, and these were a wreck and sunken so not available.

For weeks men hunted these islands for the bodies, and when found buried them at once, for no funerals could be held.

Well, finally all was over and Beaufort picked up and started over again.

And in Sept 29th. 1959 we were still here to undergo Hurricane "Gracie" who did her best to demolish us, but she failed and we are still on hand and getting back to normal. "Gracie" did not have the help of the ocean that 1893 did, so she did her best but the ocean did not help her.

Certified a correct experience of both storms
Ca Mabel Brown

Nov. 3rd 1959

Beaufort Co. Library

A P P E N D I X B (Document)

PROBABLE EFFECTS OF EXCEPTIONALLY HIGH TIDES
ON SELECTED AREAS OF CHARLESTON COUNTY

The following information is prepared solely as a guideline in making decisions effecting the evacuation of selected areas of Charleston County. Tide levels are given in feet above Mean Sea Level (MSL); MSL at Charleston Harbor is 2.72 feet above Mean Low Water (MLW). A predicted tide of 8'MSL would mean that the expected tide will be 8 feet above MSL or 10.7 feet above MLW.

EDISTO ISLAND - With an expected tide of 8'MSL, all beach front residents should be advised to relocate inland. Relocation should be completed before tides reach the 7'MSL point as 7'MSL tides will most likely flood all exit routes. Tides of 10'MSL or above will cause serious flooding over most of the island from the North and South Edisto rivers and residents should relocate to the Adams Run or Hollywood areas. Evacuation should take place before tides reach the 7'MSL point.

SEABROOK AND KIAWAH ISLANDS - A tide of 8'MSL will probably cause serious flooding, however, as a 5'MSL tide floods exit roads, residents planning to leave the island should be advised to do so prior to the tides reaching the 5'MSL mark. With an expected tide of 10'MSL all residents should relocate to higher ground.

FOLLY BEACH - A tide of 8'MSL will cause serious flooding with some water over exit roads. With an expected tide of 10'MSL residents should be advised to evacuate to higher ground.

JAMES ISLAND - A tide of 8'MSL will flood roads in low lying areas. Tides of 10'MSL will cause some serious flooding in residential areas near the river and bay. A tide of 15'MSL would require complete evacuation of the island. Any evacuation should commence prior to tides reaching 7'MSL.

PENINSULA CHARLESTON _ Some streets of Charleston start flooding with tides of 5'MSL; with an expected tide of 10'MSL more than half the city would be flooded. With a 10'MSL tide all residents with homes along the Battery, East Bay Street and within 6 blocks of both the Cooper and Ashley Rivers should relocate to higher ground. With a forecast tide of 15'MSL all residents should be advised to evacuate the city or to relocate to sound structures along, and to one block on either side of King and Meeting Streets.

NORTH CHARLESTON - With an expected tide of 10'MSL, residents near the Cooper River should relocate at least one-half mile inland from the river as far north as Remount Road. Along the Ashley River, residents should make a similar move as far north as Middleton Gardens.

MOUNT PLEASANT - Waterfront properties in old Mt. Pleasant are mostly on a 15 to 20 foot bluff and would not be effected by 10'MSL tides, however, residents along Shem Creek and other low lying areas should relocate. Sound structures along Rifle Range Road, west of Hamlin Road, along Mathis Ferry Road and along Highway 17 should be safe in any hurricane.

ISLE OF PALMS/SULLIVAN'S ISLANDS - With an expected tide of 8'MSL all beach front residents should relocate. With a forcast tide of 10'MSL or higher all residents should evacuate the islands and relocate on the mainland. The causeway between Mt. Pleasant and Sullivan's Island will flood at about 7'MSL.

AWENDAW/McCLELLENVILLE - Residents in rural areas east of Highway 17 who are near major streams or within one-half mile of marsh areas should relocate to higher ground when tides of 12'MSL or higher are forecast. Areas adjacent to Highway 17 should be safe from any hurricane tides. Residents of McClellenville should also consider relocating if tides of 12'MSL or above are expected.

4/29/81

[Source: Charleston County Disaster Preparedness Agency]

A P P E N D I X C (Document)

News and Courier

6/1/81

HURRICANES

Warnings Go Unheeded, Center Director Says

Neil Frank

Season Opens Today

MIAMI (AP) — The 1981 Atlantic hurricane season opens Monday with the first name on this year's list of storm names already used up.

Forecasters began identifying storms with a phonetic alphabet system in 1950.

The first name on this year's list was Arlene, but that was taken by a rare early May tropical storm that dumped torrential rains over Jamaica, Cuba and the Bahamas.

Next up on the list of names for tropical storms and hurricanes is Bret, followed by Cindy and Dennis.

Completing the list of storm names for this year are: Emily, Floyd, Gert, Harvey, Irene, Jose, Katrina, Lenny, Maria, Nate, Ophelia, Philippe, Rita, Stan, Tammy, Vince and Wilma.

CORAL GABLES, Fla. (AP) — From horizon to horizon, thousands of high-rise hotels, condominiums and sumptuous houses line the sun-drenched Florida coast from Pensacola to Key West to Jacksonville.

The same scene exists along the barrier islands of Texas, Alabama, Mississippi and the Atlantic Coast from Maine to Georgia where more than 60 million people have been drawn to the good life by the sea.

Neil Frank enjoys peaceful beach strolls along the coast, but the homes, hotels and high-rises he passes give him nightmares of hurricane destruction.

Frank, director of the National Hurricane Center, has become something of a latter-day Paul Revere, delivering more than 100 speeches and lectures each year warning people about hurricanes and pleading with local officials to make preparations before a big storm strikes.

Much of the time, people simply refuse to listen, Frank said in an interview on the eve of the June 1-Nov. 30 Atlantic hurricane season.

They don't believe a hurricane might actually barrel ashore with 200 mph winds that would collapse homes like houses of cards and push ashore huge waves that could destroy the foundations of beachfront condos.

"When you have a rare event like a hurricane, it's the natural tendency of human beings to deny the danger," Frank said. "They say: 'It's just not going to hit me.'"

Even before the official beginning of the 1981 hurricane season, Tropical Storm Arlene was born in the Caribbean and spread torrential rains over Jamaica, Cuba and the Bahamas.

On the average, six Atlantic hurricanes develop each year. During 1980, there were 11 named storms, nine of which became hurricanes.

James P. Walsh, acting administrator of the National Oceanic and Atmospheric Administration, said this country is "in the most vulnerable position in history" should a major hurricane strike.

"We just don't have the knowledge to predict what this season will bring," Frank said. "But if you're going to bet, you can bet against a hurricane hitting the southeast Florida coast. The odds are one in seven in any one year."

It's that one chance in seven that worries Frank and civil defense officials along the Atlantic and Gulf coasts. They say people living in the most vulnerable areas never have experienced the fury of a major storm.

When Hurricane David came within a few miles of the heavily populated Florida Gold Coast in 1979, hardware and grocery stores were packed with frantic people, while thousands of elderly residents on Miami Beach fled their apartments in a chaotic evacuation that revealed glaring deficiencies in Dade County's disaster plan.

"The disaster plan was a disaster," said Miami Beach Fire-Rescue Lt. Jack Narren shortly after David brushed the area.

Following the false alarm, many Miami Beach residents vowed to never again leave their homes in the face of a hurricane.

"I'm staying home no matter what," Stella Miller said. "I don't care if the water flows over my head. If I drown, I drown. But I would never go again to a shelter — never."

Because that attitude still prevails in Miami Beach and other oceanfront cities, Frank fears that when a big storm does make landfall here the death toll could exceed the U.S. record of 6,000 deaths when a hurricane roared into Galveston, Texas in 1900.

A P P E N D I X D

Flags, Rockets, and Whistles: The Hurricane Warning System in Charleston in the 1890's

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Physics Department
The College of Charleston

Hurricane - the very word has brought fear to coastal residents for centuries. Today a hurricane is followed by the devices of modern science from the moment of its birth until the instant of its death. Born as a slight disturbance in the eastern Atlantic, fed by the warm waters of the Carribean, and finally destroyed by the land mass of the North American continent or the cold waters of the North Atlantic the typical Atlantic hurricane is measured, probed, analyzed and discussed for the two to three weeks of its life. The public is informed several times daily of its position by newspaper, radio, and television. Hurricane tracking charts are distributed by both news media and the National Weather Service. At any time a hurricane is within a few hundred miles of a N.W.S. Office much of the business of that office concerns the hurricane and a surprisingly large percentage of the activity consists of answering telephones which ring almost constantly expressing the questions and fears of the American public. As a contrast to the superb warning system of today, consider the situation in the early 1800's when warnings of hurricanes were minimal and the populace ill prepared for the disaster which befell them.

How did this system we have today develop? What was the transition from the state of no warning of the early 1800's to the well warned state of today?

The National Warther Service Office in Charleston in the 1890's provides a splendid example of this transition stage. This office was established in 1871 when the Army Signal Corps was assigned the task of providing weather observations for the seacoast and Great Lakes regions. The Signal Corps retained this responsibility until 1891 when the function and personnel were transferred to a newly created Weather Bureau under the

Agriculture Department. Prior to the government assuming the task of monitoring the weather Charleston had had a long history of weather observers dating back to the pioneering observations of Dr. John Lining in 1738. For the first time, however, when the Weather Bureau office was opened Charleston like so many cities across the country had a full time, paid weather observer. This first office was located on the third floor of the Carolina Savings Bank Building at 1 Broad street in downtown Charleston. The thermometers, rain gauges, and other instruments were located in a shelter on the roof of this building.

Initially hurricane warnings consisted of the observer hoisting a flag from the top of the building when he was advised (usually by telegraph) of an approaching storm. Details of the announcement were posted at several places throughout the city. Gradually this primitive system evolved into one which rivaled in human if not technical complexity what we have today. The mature system as it existed in the 1890's is described in the annual reports of the Local Forcast Officer In Charge, L. N. Jesunofsky. The first of these reports dates from 1895.[2] One gathers, from reading these reports, that Mr. Jesunofsky was an excellent publicist as well as weather observer. The tone of the reports indicates that there was some question both in the local community as well as at the national level as to the usefulness of a weather service office. He worked hard at providing justification for this existence oftentimes quoting dollar values of ships which might have been lost if it were not for his hurricane warnings. Evidence of his visibility in the community is provided by a notice apparently enclosed with utility bills from The Charleston Consolidated Railway, Gas, and Electric Company dated 1899 which read:

NOTICE TO CONSUMERS:

> If your Bills are higher this month than last, do not complain to us. Remember the days are shorter. Go to Mr. Jesunofsky, at the Weather Bureau, and kick for longer days.[3]

The fact that the official in charge of the local Weather Bureau office was well known enough for the electric company to refer to him by name indicates that he was not a person to retire into the background while the world passed him by. Evidence like this as well as his reports indicates that Mr. Jesunofsky saw himself as a person responsible to the public both in terms of his technical expertise and his ability to publicize and inform. This attitude toward positive relations with the public is still the watchword of the National Weather Service.

Turning now from the man to the warning system he created, we find further evidence of his ability to organize and presuade. Much of the very complex system depended on volunteers. In the report for 1895 the following methods are given for warning the public of the approach of a hurricane: the use of the fire alarm telegraph, factory bells, factory whistles, cannon, railroad trains, railroad telegraph services, telephone exchanges, light ships, lighthouses, pilot boats, steam tugs, steam and naptha launches, steamboats, steamships, horseback carriers, flags, and rockets. Not mentioned explicitly in this list is the means of the initial warning. This was distributed as part of the standard system which had been developed for disseminating forecasts. This system depended on postal cards mailed to anyone who requested them and delivered with the regular mail. Warnings mailed in the morning were delivered to recipients in towns served by a railroad in the coastal area the same afternoon. To the modern reader this rapidity is one of the most astounding things about the whole system. In one of his reports Mr. Jesunofsky mentions that 410 copies of the warning were dispatched by mail.

As an example of the operation of this system let's look at the actions taken by the Charleston Weather Bureau office in response to a hurricane warning received by them at 2:30 p.m. on October 10, 1896.[4] Immediately the warnings were relayed by telegraph to other individuals throughout the coastal region of South Carolina for further dissemination to the public. The postal cards mentioned above were then sent to all individuals on the Weather Bureau's mailing list. The railroads serving Charleston were requested to pass the warning along through their communications systems as well as by train. Mr. Jesunofsky and his assistants (usually two) telephoned warnings throughout the downtown area. Many of these calls were to businesses which would be affected by a storm. Others were to various locations where warning flags were displayed. One such call was to "His Honor, the Mayor", who raised a warning flag at City Hall. Other places displaying flags included the Quarantine Station, the Life Saving Station, the Police Station, the Main Charleston Light (on Morris Island), and the Charleston Bridge (Ashley River Bridge). When night fell many of these stations fired warning rockets. Swift tugs were dispatched throughout Charleston and Georgetown harbors to warn the Masters of all vessels in those harbors. These tugs traveled throughout the harbors with whistles blowing. The warning was brought to the attention of the public at large by the sounding of a hurricane alert on the Charleston Fire Alarm signal. This alert was the sounding of twelve bells twice. Factory bells and whistles were also sounded. One can imagine that very few people in Charleston proper weren't aware that something was happening. Horseback couriers were dispatched from Mt. Pleasant into Christ Church Parish and across the Charleston Bridge into St. Andrews Parish. These couriers were charged with seeing that the residents of the outlying areas were

informed as to the nature of the threat. To inform them of the existence of the threat a swifter means was used. Chains of rocket stations had been established along the Ashley and the Cooper Rivers as well as on James and Johns Islands and in the Georgetown, Beaufort, and Hilton Head areas. Main rocket stations were located in Charleston, Secessionville, Legareville, and Mullet Hall. Other rocket stations were located at Mt. Pleasant, Waverly Mills, Ft. Sumter, and Brookgreen. There were several chains of rocket stations radiating out from these central stations. Each station in a chain would fire rockets when observing rockets from the preceding station. One such chain ran from Youngs Island through Martin's Point, Edisto Island Wharf, Edisto Island (Center), Johns Island, New Cut, and Little Button. During this particular storm this last chain was particularly successful reaching a total length of 62 miles.

One of the main functions of all of these warnings was to prevent ships from leaving shelter in the face of an oncoming storm and warning ships at sea of the necessity of seeking shelter. We must remember that ships at sea in the 1890's had no way of communicating with land. Only by sighting flags or rockets from coastal stations would the master of a ship traveling north-south be made aware of the presence of a storm.

Another prime beneficiary of the warnings was the agricultural comnity. Rice was still an important crop in the coastal zone of South Carolina. The President of the Rice Planters Association in Georgetown could always be counted on to spread the alarm. On this occasion he dispatched four horseback couriers to warn the surrounding agricultural area.

After each alert the inevitable post-mortem followed. The same questions plagued the Weather Bureau then as plagues our modern forecasters. On one hand the warning should be given if a hurricane is going to strike

while on the other hand a warning which is a false alarm both disrupts the community unnecessarily and decreases the confidence of the public in the system.

In the 1890's one prime measure of the success of an alert was the number of ships prevented from sailing into the face of the storm and the dollar value of the cargo they were carrying. It is apparent from reading his reports that Mr. Jesunofsky was trying to prove his operation cost effective. To the public the warning of October 10th was a false alarm. The report reveals that residents of the Charleston area were dissatisfied with the apparent false alarm. Fortunately the "News and Courier" came to the Weather Bureau's rescue by reporting that the storm just off the coast had been very intense and that residents of the Low country were very fortunate to have been spared.

The system described above apparently evolved over about a decade. In one of the reports such a time span is alluded to. By 1898 Mr. Jesunofsky reported that he could think of no further improvements to make. This situation was not to last since by 1899 the report revealed his attempts to get a 75 foot steel tower erected on top of the Customs House.[5] This would carry intense lights which could be seen for a great distance off shore. The report also reveals that "the Honorable, the Secretary of the Treasury" who had jurisdiction over the Customs House refused permission for this tower to be built. Perhaps this was just as well for within the next two decades the seeds were sewn which would replace such coastal warning lights with radio communication.

Today we depend on electronic warnings of the presence of hurricanes. Weather satellites photograph the storms, information is transmitted to earth analyzed electronically, and then broadcast to the public. The

television newscasts provide current positions of the storm so its path may be tracked by thousands of listeners. This is a much more efficient system than Mr. Jesunofsky's but his had a certain charm that today's lacks.

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