

70/dec

PRELIMINARY REPORT

Hurricane Edith

September ⁵~~7~~-17, 1971

Edith became a tropical depression on September 5, just prior to moving westward through the Windward Islands.

On September 2 an area of bright convective cloudiness was noted on satellite pictures near 12N 35W, but on the next day after having moved westward to 40W, the intensity of the convection seemed to have decreased. During this time there was an almost total lack of cloudiness in the intertropical convergence zone west of 50W. However on September 4 the disturbance had moved westward to 50W, but then was only barely distinguishable from the ITC cloudiness by this time had extended to South America, and the zone was clearly defined from South America to Africa.

Since the system was approaching the Windwards, a reconnaissance flight was set up for the next day, September 5, when the existence of a closed circulation was confirmed near 11.5N 57.0W.

During the night of September 5-6, the depression passed through the southern Windwards, producing heavy rain and winds of 30 kt. A reconnaissance flight on September 6, after the depression moved into the southeast Caribbean, did not find a closed circulation. An examination of satellite pictures suggests the southern part of the circulation, i.e., the westerly winds, was over northeastern Venezuela.

Pictures on the morning of September 7 showed a well-defined circulation. A reconnaissance plane found a central pressure of 1006 mb at 1230 GMT, and by 1730 GMT the same flight found that the pressure had dropped to 995 mb. Tropical storm Edith was named at 1400 GMT September 7 when located at 12.5N

69.5N. At 1000 GMT September 8, Edith became a hurricane in the south-central Caribbean, bearing highest sustained winds of 65 kt and a central pressure of 993 mb. Gradual deepening continued throughout the day with the pressure falling to 982 mb during the afternoon. Very rapid intensification began on September 9, the pressure falling to 943 mb and sustained winds reaching 140 kt at 5000 ft just before Edith slammed into Cape Gracias, Nicaragua at midday.

Reconnaissance crews just prior to landfall reported that Edith was extremely turbulent, causing concern for the safety of the crews. The hurricane at that time was likened to a large tornado. The perfectly-formed eye was only five miles in diameter.

The eye of Edith was over land in Honduras about 18 hours before it emerged in the Gulf of Honduras. It probably regained some strength there, but it is likely that any hurricane force winds at this time were confined to a few squalls. Southwest winds of 55 to 60 mph were reported on some small keys off the east coast of British Honduras. In any case, Edith lost hurricane intensity quickly over the Yucatan peninsula.

After moving across the Yucatan peninsula, Edith emerged in the Gulf of Mexico near the city of Campeche during the night of September 11-12. It moved steadily westnorthwestward across the southwestern Gulf of Mexico, hesitating just as it was about to make landfall near Soto la Marina, Mexico during the evening of September 13. During this time Edith failed to regain hurricane intensity, remaining a rather weak tropical storm.

Edith then drifted north-northeastward along the Mexican coast until the morning of September 15, when it began a more rapid movement, turning first northeastward, then east northeastward as it crossed the Louisiana coast in a sparsely

(3)

populated area about 30 miles east of Cameron.

Intensification of the storm began as its more rapid movement set in.

A reconnaissance flight reported a central pressure of 982 mb and a wind of 65 kt at 1812 GMT on September 15 and at 2030 GMT a special advisory proclaimed that Edith was once again a hurricane, located 100 miles northeast of Brownsville, Texas and moving north northeastward 11 kt.

After landfall in Louisiana, the hurricane weakened rapidly and slowed its forward speed. As it moved ^{through} southern Louisiana, southern Mississippi, central Alabama, and northern Georgia it became no more than an area of rain as it filled to a pressure of 1015 mb on September 18.

Edith was an anomalous storm in many ways. In addition to its small size and its great fury, no September hurricane had ever developed so far south in the Caribbean, and very few had ever reached hurricane intensity in any month so far east in the Caribbean. The lowest pressure of 943 mb places it in the category of a great hurricane. During its long odyssey it made landfall three times.

A narrow, but persistent ridge of high pressure extended from the southwestern Atlantic into the southern Gulf of Mexico as Edith traversed the Caribbean, Yucatan peninsula, and the southwestern Gulf of Mexico, keeping the hurricane far to the south and away from meridional currents farther north which could have turned it northward. However, as Edith was about to cross the Mexican coast, it came under the influence of a midtropospheric trough in the westerlies which had dug into Texas and it began to move north northeastward. It is likely also that this meridional movement was aided by a low-level southerly flow east of the remnants of tropical storm Fern, which at that time was moving westward along the Texas-Mexico border.

Two points concerning the fluctuations in strength of Edith during its long history are of interest and should be the subject of further study: (1) the meteorological factors supporting the explosive deepening of Edith in the Caribbean, and (2) the factors working against its deepening in the Gulf of Mexico between the Yucatan peninsula and the Mexican coast.

A cursory examination of 200 mb charts on September 7, the day Edith was named, shows a well defined cold cyclone about 650 nm northwest of Edith. As the storm travelled westward the cyclone disappeared and was replaced the the expanding anticyclone associated with the deepening Edith. Similar sequences of events have been noted with other explosive deepening situations, e.g., Camille.

When Edith was still a depression on September 6, it was moving into an area of light vertical shear, and relatively high thicknesses, a combination which generally must prevail if an incipient disturbance is to develop.

Lack of upper air data in the extreme southern Caribbean, and the impossibility of reconnoitering the hurricane over land to the south of its center in its early stages made it difficult to assess the low level inflow into the hurricane or to depict adequately the upper level outflow.

When Edith entered the southwestern Gulf of Mexico from the Yucatan peninsula, the Gulf was occupied by a large anticyclone, centered at 200 mb in the north central Gulf. This anticyclone had been closely connected with Fern, and the upper level flow across the southwestern Gulf of Mexico was easterly-- a direction not considered especially favorable for intensification, even though the necessary light vertical shear and high thickness values were present.

Another factor inhibiting the deepening of Edith as it moved off the Yucatan peninsula was the presence of Fern, then barely inland along the lower Rio Grande—about 550 nm northwest of Edith. Fairly strong low level southerly currents over the west Gulf of Mexico were still feeding into Fern, robbing Edith of the low-level inflow required for deepening.

Reports of damages and casualties as a result of Edith are incomplete at this time. It was a violent hurricane when it struck northeastern Nicaragua and extreme eastern Honduras, but mild as hurricanes go when it crossed the Louisiana coast.

The meteorological service in British Honduras reports that there were 100 fatalities and 7000 persons rendered homeless in the Cape Gracias area. Press reports have stated that every dwelling in Cape Gracias was destroyed. An unofficial report from Puerto Lempira, Honduras indicated that winds reached 140 mph at the airport there.

To date no reports of casualties in the United States associated with Edith have been received. The highest sustained winds reported by a land station was 69 mph at Cameron, Louisiana. Gusts at Cameron reached 96 mph. Since the eye of Edith crossed the coast about 30 miles east of Cameron, it is certain that winds were higher in that remote area.

Considerable structural damage occurred at Baton Rouge where roofs were blown off by some of the several tornados spawned by Edith. Extensive damage was done to the sugar cane crop along the Louisiana coast.

Height of the maximum storm surge is not known since no measurements are available at the point of landfall. Tides of 4 to 5 feet were reported along the upper Texas coast.

Residents of northeastern Nicaragua and eastern Honduras were warned to to prepare for hurricane conditions on the 0400 GMT advisory--about 14 hours before landfall. Subsequent advisories warned of extreme danger as the hurricane intensified.

Hurricane warnings were posted from Cameron to Morgan City at 3:30 PM EDT September 15. The hurricane crossed the Louisiana coast near the middle of the hurricane warning area about 9:00 AM EDT on September 16.

John R. Hope
National Hurricane Center

Hurricane Edith September 5-17

Hurricane Edith was the only hurricane of the 1971 season to qualify as a major hurricane. Its central pressure fell to 943 mb and sustained winds reached 140 kt just as it slammed ashore at Cape Gracias, Nicaragua.

The seedling disturbance which later became Edith was first noted on September 2 when it appeared as a small circular cloud mass within the ITCZ near 12N 35W. As the seedling moved steadily westward for three days it became detached from the ITCZ and on the 5th a reconnaissance plane reported that a depression centered near 11.5N 57.0W had formed. That night the depression passed through the southern Windward Islands producing heavy rains and sustained winds of 30 kt.

Edith was named at 1230 GMT on September 7 after a reconnaissance plane found a central pressure of 1006 mb. Ninety minutes later it had fallen to 1001 mb. Early the following day, Edith reached hurricane strength with sustained winds of 65 kt, and a central pressure of 993 mb. For 36 hours pressures fell steadily to a low of 960 mb. Then during the next six hour period as the center approached Cape Gracias on September 9, the pressure fell rapidly to 943 mb. A reconnaissance plane at 5,000 ft elevation measured sustained winds of 140 kt just before the center reached the coast at midday. The reconnaissance crew reported extreme turbulence, jeopardizing the integrity of the aircraft and safety of the crew. Edith's perfectly-formed eye shrunk at times to five miles in diameter. Figure 4 is a radar photograph taken by a reconnaissance flight at 1303 GMT September 9

as the hurricane approached Cape Gracias.

Edith quickly lost strength as it crossed northern Honduras. However, southwest winds up to 50 kt were reported at some small Keys off the coast of British Honduras. Further loss of intensity occurred as the center again moved inland over British Honduras. It had difficulty in maintaining its identity as it crossed the Yucatan Peninsula before emerging into the Gulf of Mexico near Campeche.

Little reintensification occurred as Edith moved west northwestward across the southwestern Gulf of Mexico. It stalled off Soto la Marina, Mexico on the evening of September 13, then drifted slowly northward. On the morning of September 15, Edith began accelerating northeastward regaining strength. By noon on the 15th it had regained hurricane status with a central pressure of 982 mb and sustained surface winds of 65 kt.

The third and final landfall occurred in a sparsely settled area of the Louisiana coast about 25 n.mi. east of Cameron early September 16. Inland it weakened rapidly losing its identity entirely in northern Georgia September 18.

Edith was anomalous in several ways. In addition to its small size and great fury it developed farther south and east than most September storms in the Caribbean. During its odyssey it made landfall three times.

In the Caribbean the course of Edith was controlled by a narrow persistent ridge of high pressure extending from the southwest Atlantic to the southern Gulf of Mexico which protected the hurricane from meridional currents which would have turned it northward.

However, as it approached the Mexican coast, it came under the influence of a midlatitude trough which deepened and extended its circulation into south Texas, causing the storm to move to the northeast.

The meteorological factors supporting the explosive deepening of Edith in the Caribbean are of special interest. 200 mb charts on September 7, the day after Edith was named, show a well-defined cold cyclone centered about 650 n.mi. northwest of the vortex. As the storm traveled westward the upper level cyclone weakened and was replaced by an anticyclone. Similar sequences notable during the explosive deepening of Camille (1969) and Celia (1970) have prompted Riehl (1971)* to suggest that the transformation in the upper troposphere may be the source of baroclinic releases of energy which cause explosive deepening in some hurricanes. However, while Edith was still a depression on September 6, it was moving into an area of light vertical shear and high thickness values as depicted on the NHC tropospheric shear charts. This has been found to be a required combination if an incipient disturbance is to develop (Gray, 1969). Lack of upper air data over the extreme southern Caribbean and the impossibility of reconnoitering the hurricane over land to the south of its center in early stages made it difficult to assess the character of the low-level inflow or the upper level outflow.

Edith weakened over Yucatan and failed to regain intensity in the southwestern Gulf of Mexico, but a more favorable environment for strengthening was encountered after the remnants of Fern moved westward across Mexico. This allowed the flow in the western Gulf of Mexico which

*Professor Riehl discussed this concept in a lecture to the Greater Miami Chapter of the American Meteorological Society, September 22, 1971.

had previously fed into the vortex of Fern to enhance the boundary layer transport of mass into Edith.

Two fishermen were reported lost at sea as Edith passed over Aruba on September 7. Sustained winds of 35 kt were reported at Aruba and gusts reached 50 kt. There were 28 confirmed fatalities and 1876 people left homeless when Edith struck the Cape Gracias area of Nicaragua. Unofficial reports have placed the toll much higher, but no confirmation of the higher estimates has been obtained.

A meteorological summary for selected U. S. stations is shown in table 3. As Edith passed offshore the Texas coast, Galveston recorded gusts to 45 kt. Tides of 6 ft above normal occurred at Sabine Pass. Damage to crops and property in Texas was estimated to be less than \$200,000.

In Louisiana highest sustained winds were 60 kt measured at Cameron where gusts reached 83 kt. A strong rain band well in advance of the hurricane center spawned several tornadoes in southern Mississippi and Louisiana on September 16, one of which caused considerable property damage along an intermittent 7-mi. path through Baton Rouge.

Rainfall amounts up to 8 inches were reported in southwestern Louisiana, with not more than 2 to 3 in. elsewhere in the southeastern states.

Total U.S. damage caused by Edith is estimated at 25 million dollars, most of which was crop losses in Louisiana. Storm tides in Louisiana near the point of landfall reached 8 ft above normal, the highest being reported at Vermilion and Cote Blanche bays. No U.S. fatalities have been attributed to Edith.

EDITH SEPT. 5-17, 1971

STORM #5

<u>DATE/TIME</u>	<u>LAT.</u>	<u>LONG.</u>	<u>PRES. (mb.)</u>	<u>CATEGORY</u>
05/1800Z	11.4	58.0	1010	Trop. Depression ✓
06/0000Z	11.6	59.4		
0600Z	11.8	61.1		
1200Z	12.0	62.8		
1800Z	12.2	64.4		
07/0000Z	12.3	66.0		
0600Z	12.5	67.7		
✓ 1200Z	12.7	69.1	1001	
1800Z	12.9	70.9	995	Trop. Storm
08/0000Z	13.0	72.3		
0600Z	13.2	73.8	993	
1200Z	13.6	75.3		Hurricane
1800Z	13.8	77.2	982	
09/0000Z	14.0	78.8 ✓		
0600Z	14.2	80.5		
1200Z	14.4	81.9	960	
1800Z	14.8	83.2	943	
10/0000Z	15.2	84.1		
0600Z	15.5	84.9		
1200Z	15.9	85.8		
1800Z	16.5	86.9		
11/0000Z	17.3	87.8		
0600Z	18.1	88.4 ✓		Trop. Storm
1200Z	18.6	89.2		

<u>DATE/TIME</u>	<u>LAT.</u>	<u>LONG.</u>	<u>PRES. (mb.)</u>	<u>CATEGORY</u>
11/1800Z	19.3	89.9 /		
12/0000Z	19.8	90.5	1000	
0600Z	20.7	91.4	1001	
1200Z	21.5	92.2		
1800Z	21.9	92.9	1000	
13/0000Z	22.1	93.3		
0600Z	22.3	94.2	998	
1200Z	22.9	95.1		
1800Z	23.1	96.1		
14/0000Z	23.3	96.9		
0600Z	23.4	97.6		
1200Z	23.7	97.8		
1800Z	23.9	97.8	992	
15/0000Z	24.2	97.6	989	
0600Z	24.7	97.2		
1200Z	25.3	96.8	984	
1800Z	26.2	96.2	982	Hurricane
16/0000Z	27.3	95.4	979	
0600Z	28.4	94.6	977	
1200Z	29.5	93.1	978	
1800Z	30.5	91.6		Tropical Storm
17/0000Z	31.8	89.9		
0600Z	32.3	89.0		Tropical Depression
1200Z	32.9	87.8		(dissipation stage)
1800Z	33.3	87.0		
18/0000Z	33.7	85.8		
0600Z	34.0	84.7		