

PRELIMINARY REPORT  
HURRICANE DAVID  
August 25 - September 7, 1979

The following is a summary of the major meteorological events that occurred in connection with Hurricane David. Many of the descriptions of damage and fatalities are extracted from a report authored by Dick DeAngelis of the Environmental Data and Information Services (EDIS) NOAA. This report is located in a publication of EDIS .. Mariners Weather Log, Vol. 23, No. 5.

A "best track" is attached. This is a listing of position coordinates every six hours, as well as the intensity parameters of minimum central pressure and maximum sustained wind speed. The best track is based on analysis of all available data. Also, a table of U.S. meteorological data is attached.

This is considered a preliminary report and the storm parameter estimates given here are subject to revision, if required. A final version will appear as part of the 1979 hurricane season article to be published in the April 1980 issue of Monthly Weather Review.

GENERAL

David may be regarded as a typical "Cape-Verde" hurricane. It moved off of the African coast in late August and a mostly smooth path was followed around the periphery of the Atlantic subtropical high pressure ridge.

This trajectory resulted in an impact on a large number of people. David was a continual threat to populated land areas from the time it approached the eastern Caribbean on August 29th until it lost tropical characteristics over New England on September 6th. Hurricane warnings were posted at various times for most of the Lesser Antilles, Puerto Rico, Hispaniola, the Bahamas, and from the middle Florida Keys northward to southern North Carolina. Gale warnings were extended in stages from the Carolinas north to Eastport, Maine.

Historically, there have been few storms whose effects were so widespread.

STORM TRACK

David's track basically resembles an outline of the Atlantic subtropical high pressure ridge. This track describes an arc extending across the tropical Atlantic and then roughly paralleling the Greater Antilles and the U. S. east coast. This similarity of storm track and pressure patterns is, of course, the observational basis for using pressure patterns to understand and forecast the motion of hurricanes.

During most of David's history, the subtropical ridge extended westward to the vicinity of the United States' east coast and David proceeded steadily across the Atlantic and into the eastern Caribbean. As it moved just south

of the eastern tip of the Dominican Republic, an abrupt turn to the north northwest was noted on August 31st, followed by another turn to the west. Then a mostly northwesterly course was resumed. This oscillation in course resulted in a landfall near Santa Domingo, after which the storm assumed a heading toward the United States.

During August 31st, a short wave trough in the westerlies moved off the United States' coast to a position north of the storm along longitude 70 degrees west. It is possible that such a trough could, with subtlety, weaken the subtropical ridge and be a factor in the change in course referred to above. It is also possible that the mountainous terrain of Hispaniola with peaks to 10,000 feet was a factor in David's motion, although the theoretical details of such an interaction are poorly understood.

A study of the storm track shows that there are several oscillations in the track. It could also be surmised that the zig-zag across Hispaniola is just the largest of these oscillations.

Late on September 2nd, as David was over Andros Island and approaching south Florida, the track heading was 310 degrees...David was heading directly for Miami. Less than 12 hours later, the heading had changed to 330 degrees, a change of 20 degrees. Because of the orientation of the southeast Florida coast relative to the track, this small change in course resulted in a landfall north of Palm Beach rather than at Miami. This 20 degree change appears to be part of one of the oscillations discussed above. In any case, the understanding...much less the ability to forecast...such events is quite limited. Yet the impact of these small-scale changes can be quite large.

#### METEOROLOGICAL EFFECTS, FATALITIES AND DAMAGES.

David was first identified as a tropical weather system on August 22nd, while moving westward from Africa into the tropical Atlantic. Satellite surveillance indicated substantial concentrated convection and organization as this system passed to the south of the Cape Verdes. On August 25th, it was assigned tropical depression status, and was named Tropical Storm David on the 26th while located midway between the Cape Verdes and the Lesser Antilles.

With this auspicious start, conditions remained favorable for David's strengthening. Hurricane intensity was reached by the 27th. The naming of David and the upgrading to hurricane status was based solely on satellite data. Reconnaissance aircraft began monitoring the storm on the 27th. Deepening occurred at the rate of 1.5 mb/hr for 36 hours, beginning when David became a hurricane. On August 29th David moved directly across Dominica with maximum winds estimated at 125 knots. This estimate is based on aerial reconnaissance data and should qualify David as the most intense storm to affect Dominica during this century.

Dominica took the brunt of the storm. Winds were estimated in excess of 100 knots, and rainfall up to 10 inches caused extensive flooding. The capital, Roseau, was devastated, resembling an air raid. The city was without food, water, or shelter for several days. Damage was heaviest over the southwest portion of the island. Roads to and from the capital were made impassible by landslides, washouts, and fallen trees. Some shipping was possible to the port of Roseau, but the pier was partially damaged. Death estimates have reached into the 50's with 180 reported injured. Some 60,000 people were made homeless--nearly three-fourths of the island's population. Crop damage was extensive. About three-fourths of the banana and coconut crops was destroyed.

On Martinique winds at Fort St. Louis were measured at 89 knots. Fifteen-foot waves battered the port of Fort de France. There were no deaths, 20 to 30 injuries, and 500 people left homeless. Crop damage, mainly bananas, was estimated at \$50 million. On Guadeloupe the southern region of Basse Terre was hit severly. The dock at the main banana port was destroyed. Crop damage was estimated at \$100 million; the banana crop in Basse Terre was completely destroyed. No deaths, few injuries, and several hundred homeless were reported on the island. Marie Galante and Les Saintes, a small island group, were both devastated by the storm.

More strengthening occurred as the storm moved into the Caribbean. Moving west northwestward, the eye passed about 70 n.mi. south of Puerto Rico, where torrential rainfall was the primary effect. Severe flooding occurred over many sections of Puerto Rico on August 31st. Rainfall totals from David reached to near 20 inches in the central mountains, 19 inches in the southwest and lesser amounts elsewhere.

St. Croix reported some flooding with rainfall amounts of 10-12 inches.

Puerto Rico was declared a disaster area. The death count was seven. Three deaths in Toa Baja and one in Guaynebo were accidents involving electrocution from loose electric wires. A person in San Sebastian was killed by a falling tree. Agricultural losses were reported as severe.

Winds continued to increase before landfall in the Dominican Republic. Aerial reconnaissance reported 150 knot winds and a central pressure of 924 millibars. This is the maximum intensity of the hurricane and occurred at 1800 GMT on August 30, while located south of Puerto Rico.

Maintaining winds close to 150 knots, David made landfall on the afternoon of the 31st just west of Santo Domingo on the south coast of the Dominican Republic. The year 1930 was the last time that a storm of such intensity directly affected the Dominican Republic.

Floods were the great killer. They isolated communities, swept villages away, and were mainly responsible for more than 1,000 deaths that have been estimated so far. The port of Santo Domingo was closed for several days to permit soundings in the channels. At the Sea-Land terminal in Rio Haina a rail-mounted container crane collapsed. Most roads were heavily damaged as were the cities of Jarabacoa, San Cristobal, and Bani.

In the mountain village of Padre las Casas several hundred people were killed when a church and school they were using as a haven was swept away by a rampaging river. Crop damage was severe and widespread. Almost 70 percent of the crops were destroyed, 150,000 were left homeless. President Guzman was reported to have estimated the agricultural, industrial and other property losses at \$ one billion U.S. dollars.

Crossing Hispaniola on September 1st while moving in a northwesterly direction, David emerged over the Windward Passage in a much weakened state. Maximum winds were reduced to 60 knots as a result of passage over the mountainous terrain.

The path continued across the eastern tip of Cuba and then northwestward toward Florida. Intensification began anew as warm Bahamian waters were encountered, but David did not regain its previous strength. It crossed Andros Island in the western Bahamas on September 2nd. During that afternoon Andros Island reported 60-70 knot winds shortly before the eye arrived. Up to 8 inches of rainfall was reported in the Bahamas.

Early on the 3rd (Labor Day) David was less than 150 n.mi. away from the southeast Florida coast, when aerial reconnaissance reports indicated that the central pressure had dropped to 965 millibars. The report is questionable because within a few hours, the pressure was back up to 980 millibars.

David moved inland just north of Palm Beach at approximately 1600 GMT on the 3rd. At this time the eye diameter was 20 to 30 n.mi. The eye passed over a number of coastal cities in a zone from Jupiter in Martin County northward to New Smyrna Beach (just south of Daytona Beach), where it moved offshore. Since the storm was moving almost due north at about 10 knots, some locations were within David's eye for periods of about two hours.

Minimum pressure along the central Florida east coast was in the lower 970 millibar range. Highest surface winds experienced in Florida were gusts to 75 knots at South Melbourne Beach and a 74 knot gust at Jupiter. Heavy surf and rainfall amounts in the 5-10 inch range accompanied the storm. Vero Beach measured 8.92 inches and up to 12 inches were estimated in the vicinity of the city.

Changing very little in intensity, David made its final landfall just south of Savannah Beach, Georgia, during the afternoon of the 4th. Savannah reported 50 knot sustained winds and 970 millibars pressure. Pressure-wind relationships suggest that 75-80 knot winds may have occurred on the beach in the landfall area. Tides were generally 3 to 5 feet above normal. Two people were drowned in the heavy surf off Jekyll Island. To the north gusts along the coast ranged from 50 to 60 knots. Charleston reported 49 knot gusts. Several tornadoes occurred between Charleston and Myrtle Beach. Rainfall was heavy in some areas with Savannah receiving 6.86 inches. There were reports of up to 10 inches in interior South Carolina. Flooding was light to moderate. However, in North Carolina major flooding was reported on the Lumber River.

The storm accelerated to the north, then to the northeast as it moved across the middle Atlantic states into New England. Sustained winds gradually decreased to near 40 knots. Raleigh and Greensboro reported gusts to 31 knots. To the east Elizabeth City was drenched by 8.52 inches of rain. Tornadoes touched down in Maryland, Virginia, Pennsylvania, Delaware and New Jersey. Wilmington, Delaware recorded a 46 knot gust, while winds at Richmond gusted to 39 knots. Wind and rain were responsible for widespread power outages all along the eastern seaboard. In the New York metropolitan area, 2.5 million people were without electricity.

David lost its tropical characteristics on September 6th, by the time it reached New England. As an extratropical storm it moved across New Brunswick and Newfoundland on the 7th and into the far North Atlantic by the 8th.

Fatality estimates in the United States <sup>5 deaths</sup> ~~range from 10 to 20.~~ Although U.S. damage was generally light in most areas, the total losses will be substantial, due to the large total area affected. Rainfall flooding, several tornadoes, minor to occasionally moderate beach erosion, and agricultural losses will all figure in the damage totals. A dollar damage ~~estimate~~ is not available at this time.

Miles Lawrence  
National Hurricane Center

10/17/79

## PRELIMINARY BEST TRACK

## HURRICANE DAVID

26 Aug. - 8 Sept. 1979

DATE	TIME (GMT)	LAT.	LONG.	PRESSURE (MB)	WIND (KT)	STAGE
8/25	1200	11.7	36.1	1008	25	Tropical Depression
	1800	11.7	38.2	1007	25	
8/26	0000	11.7	40.3	1006	30	Tropical Storm
	0600	11.6	42.2	1005	35	
	1200	11.6	44.0	1003	40	
8/27	1800	11.6	45.5	998	45	Hurricane
	0000	11.7	47.0	990	55	
	0600	11.8	48.5	980	65	
8/28	1200	11.8	50.0	966	80	Hurricane
	1800	11.9	51.5	954	95	
	0000	12.2	52.9	947	115	
8/29	0600	12.5	54.4	941	125	Hurricane
	1200	12.8	55.7	938	130	
	1800	13.2	56.9	941	125	
8/30	0000	13.7	58.0	944	120	Hurricane
	0600	14.2	59.2	942	120	
	1200	14.8	60.3	938	125	
8/31	1800	15.3	61.6	933	125	Hurricane
	0000	15.6	62.8	929	130	
	0600	16.0	64.2	925	140	
9/01	1200	16.3	65.2	924	145	Hurricane
	1800	16.6	66.2	924	150	
	0000	16.8	67.3	927	145	
9/02	0600	17.0	68.3	928	145	Hurricane
	1200	17.2	69.1	927	145	
	1800	17.9	69.7	926	150	
9/03	0000	18.8	70.4	953	130	Hurricane
	0600	19.3	72.0	978	100	
	1200	19.7	73.7	1002	65	
9/04	1800	20.6	74.6	1002	60	Tropical Storm
	0000	21.3	75.2	997	65	
	0600	21.9	75.5	990	70	
9/05	1200	23.0	76.3	984	70	Tropical Storm
	1800	23.9	77.4	979	75	
	0000	24.6	78.3	976	80	
9/06	0600	25.3	79.1	974	80	Tropical Storm
	1200	26.3	79.6	973	85	
	1800	27.2	80.2	972	85	
9/07	0000	28.0	80.5	971	85	Tropical Storm
	0600	29.1	80.8	970	85	
	1200	30.2	80.9	970	85	
9/08	1800	31.5	81.2	970	80	Tropical Storm
	0000	32.5	81.1	972	65	
	0600	33.5	80.9	976	55	
9/09	1200	34.9	80.6	980	45	Tropical Storm
	1800	36.2	80.1	984	40	

HURRICANE DAVID

DATE	(GMT)	LAT.	LONG.	PRESSURE (MB)	WIND (KT)	STAGE
9/06	0000	37.6	79.5	987	40	Extratropical
	0600	39.2	78.5	989	40	
	1200	41.5	76.3	991	40	
	1800	43.3	73.7	992	40	
9/07	0000	45.0	70.0	991	45	
	0600	46.5	66.0	988	50	
	1200	47.5	61.5	987	50	
	1800	50.0	57.0	986	55	
9/08	0000	52.5	52.5	985	60	

METEOROLOGICAL DATA (U.S.)  
HURRICANE DAVID, AUG. 25-SEPT. 7, 1979

LOCATION	PRESSURE INCHES		WIND (MPH)			TIDE (FT)		RAINFALL (INCHES)	
	MINIMUM	TIME*	SUSTAINED	TIME*	PEAK GUST	TIME*	HEIGHT ABOVE MSL		
FLORIDA									
DAYTONA BEACH WSO	29.89	4/0208	NE34	3/1755	NE55	3/1728	3.6	4/0000	3.28
Beachfront					66	3/2000			
Halifax River							3		
FEDHAVEN					45				1.80
FT. DRUM									8.10
FT. PIERCE USCG	28.73		NE70		95		4		
ISLAMORADA			30		40		2		
JACKSONVILLE WSO					45				
JENSON BEACH	28.70	3/1300							
JUPITER	28.73				85				3.55
Highway AIA					92				
JUPITER INLET USCG			ENE60		80				
KEENANSVILLE									7.30
KENNEDY SPACE CENTER			WSW44	4/0100	77		5		6.89
KEY WEST WSO	29.58	3/0500	N26	4/0357	NE39		0.8**		0.03
USCG			N25		36		2		
MARATHON USCG			25		35				
MARINELAND	29.12	4/0315			67	3/2200			2.60
MAYPORT USCG	29.66		ENE30		45				
Bar Pilot					52				
MELBOURNE	28.68		ENE31	3/1550	70	3/1448			
MIAMI AIRPORT	29.31		WSW30	3/1050	44				
MIAMI HARBOR USCG	29.50				NE58				
MIAMI BEACH			NE58	3/0300	69				
ORLANDO WSO			NNE35	3/1458	N54	3/1535			
Herndon Airport	29.20	3/2330	N28		52	3/1553			3.71
ORLANDO					60				3.49
PALM COAST	28.97	4/0354			68	3/1939			
PATRICK AFB					90				
PONCE INLET USCG			ENE40		60		3		
PORT CANAVERAL USCG			NE60		80		4		
SOUTH MELBOURNE BEACH			E61		86	3/1600			
SEBRING									3.38
STUART	28.80	3/1300			N69	3/1100			
WEST PALM BEACH WSO	28.87		N58	3/0925	N75	3/0942	1.5		2.17
Sikorsky Acft.					83				5
VERO BEACH	28.36	3/1400							8.92
WHITE CITY	28.69	3/1517							7.91

\* Eastern Standard Time  
\*\* Above mean low water.



LOCATION	PRESSURE INCHES		WIND (MPH)				TIDE (FT)		RAINFALL (INCHES)
	MINIMUM	TIME*	SUSTAINED	TIME*	PEAK GUST	TIME*	HEIGHT ABOVE MSL	TIME*	
GEORGIA									
Savannah WSO	28.65	4/0417	E58	4/1707	E68	4/1707			6.86
" River							12**		
St. Simon			NE40		45				
Tybee Island							13**		
SOUTH CAROLINA									
Columbia WSFO	29.26	5/0330	NE28	4/1656	NE43	4/1520			5.26
Conway									7.43
Dillion									7.65
Eutawville									9.21
NORTH CAROLINA									
Atlantic Beach			SSE53	5/1015					
Brunswick County							5		
Cape Hatteras WSO	29.84	6/0200	SSW35	6/0155	S43				10.73
Elizabeth Town							1.4		7.15
Frisco									
Hatteras									6.65
Havelock-Cherry Point			S41	5/1432					
Hobucken							1.6		
Jacksonville-New River			SSE54	5/0447					
Lake Waccamaw									8.75
Neuse River							2		
Pamlico River							2.7		
Pender County							4		
Raleigh WSFO	29.12	5/1353	SSE23	5/0953	E36	5/0743			2.67
Wilmington WSO	29.72		SE46	5/0232					7.38
Wrightsville Beach			SE44	5/0325	60				
VIRGINIA									
Richmond WSO	29.40		S30	5/1900	SE45	5/1602			2.71
Montebello									6.6
DELAWARE									
Wilmington WSO	29.49	6/0553	37	6/0128	53	6/0203	4.0	5/2000	1.96
NEW YORK									
Binghamton WSO	29.39	6/0904	24	6/0445	35	6/0435			1.87
NEW HAMPSHIRE									
Mt. Washington					174	6/1500			

