

Atlantic Tropical Systems of 1979

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ABSTRACT

The 1979 hurricane season produced 85 "tropical systems" of which 27 acquired the closed circulation of a depression. 52 of these originated over the African Continent. African seedlings initiated 7 of the 8 named Atlantic storms and 7 of the 10 East Pacific storms.

1. Introduction

This is the twelfth consecutive year a seasonal summary has been completed. An article by Hebert (1980) describes the systems that strengthened into named storms or hurricanes. The general philosophy used in our counting method was presented in previous articles by Simpson *et al.* (1968, 1969).

1979 will be remembered in the Atlantic as the year the tropics came alive. Hebert (1980) lists the following significant events: 1) David, the first major hurricane in Dominica this century, also devastated the Dominican Republic; 2) Frederic was the costliest hurricane in United States history; 3) five named storms crossed the United States coastline; 4) Tropical Storm Claudette produced record rains in Texas; and 5) severe flooding in Jamaica during a June depression killed 33 people. The increase in storm activity observed in 1979 was a sharp contrast to the lull that has prevailed throughout most of the past decade.

The tropical Atlantic was relatively quiet during the decade of the seventies. Not only were there fewer named storms than normal, but most of the major hurricanes that did form remained over the ocean. Coastal disasters caused by hurricanes in the seventies were few. Environmental conditions over the tropics have been unfavorable for severe hurricane activity in recent years. Cold water and strong upper westerlies over the hurricane breeding grounds discouraged development, and the development that did occur was frequently over the subtropical regions of the Atlantic.

Hebert (1976) and Lawrence (1978) both suggested conditions were returning to normal. In 1978 there was a sharp increase in the number of depressions and named storms but we were fortunate the major hurricanes remained at sea. We were not so lucky last year. Hebert (1980) showed that many countries around the eastern and northern Caribbean and most coastal areas of the United States came under the influence of a named storm in 1979.

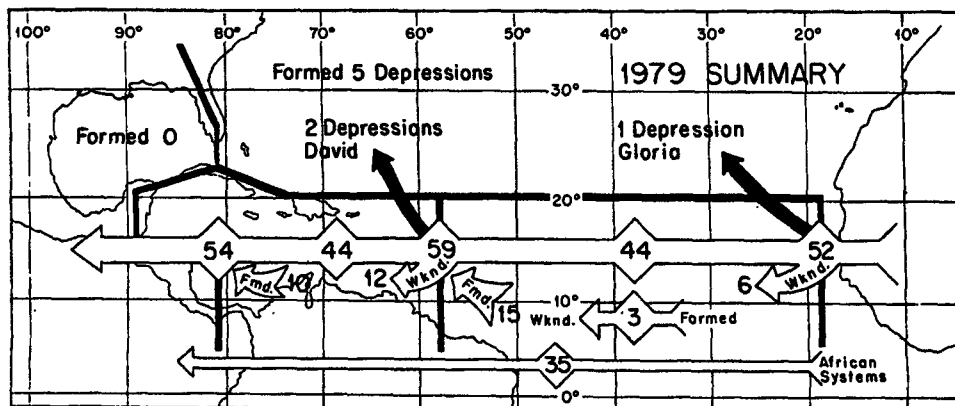


FIG. 1. Summary of tropical disturbances that passed three key stations (Dakar, Barbados, San Andres) in 1979 and those maintaining their identity while crossing the Atlantic and Caribbean.

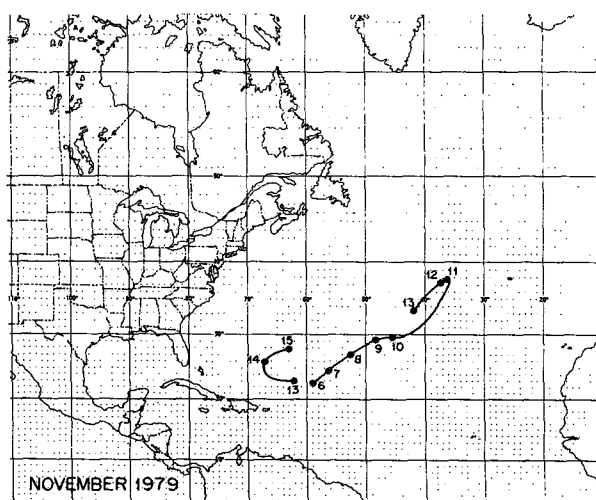
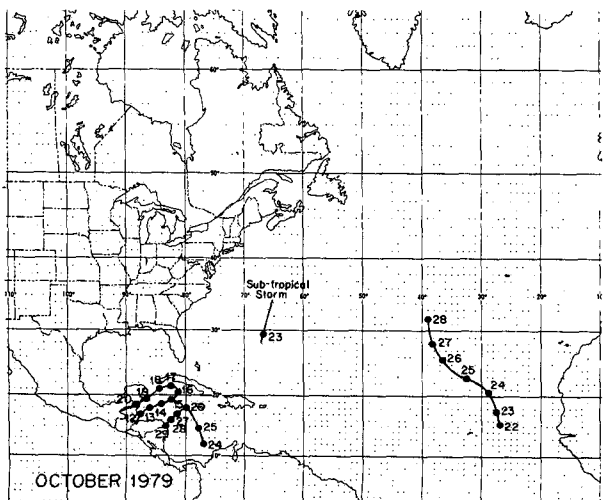
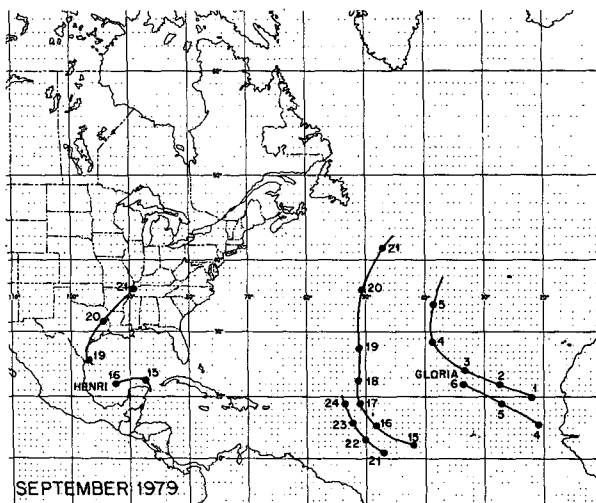
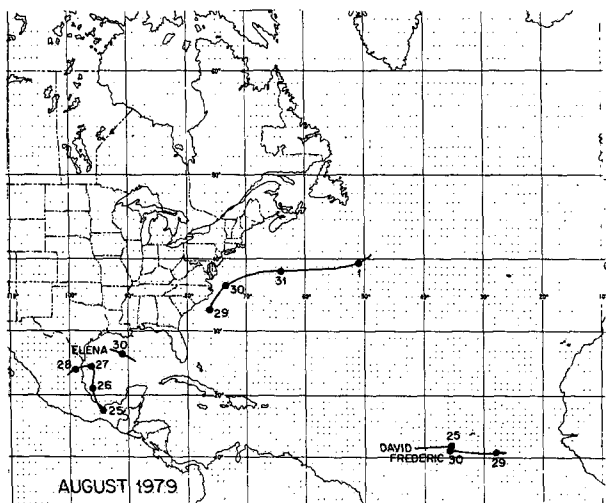
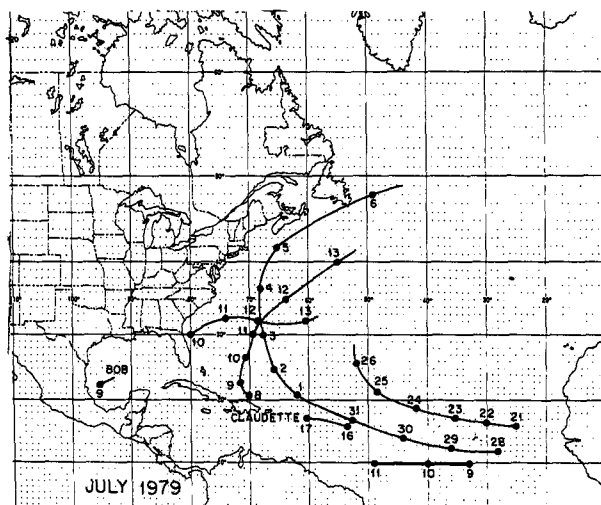
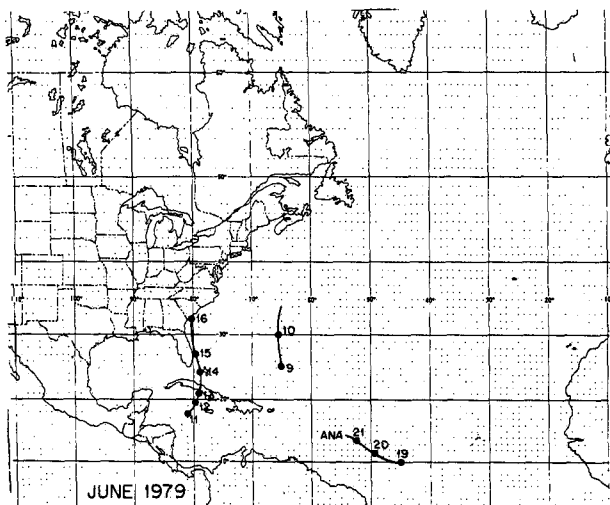


FIG. 2. Tracks of 1979 depressions.

TABLE I. Summary of the tropical systems of 1979.

Date Dakar passage	Nature	Formed Atlantic	Date weakened Atlantic	Date Barbados passage	Nature	Date weakened Caribbean	Date formed Caribbean	Date San Andres passage	Nature	Date formed Gulf	Date formed Atlantic	Date formed North Atlantic	Atlantic depression	Atlantic storm	Pacific depression	Pacific storm
5/2	wave			5/10	wave	5/12	5/6	5/6	ITCZ							
5/9	wave	5/6	5/13	5/13	ITCZ	5/15	5/9	5/10	ITCZ							
5/11	wave			5/17	wave	5/19										
5/19	wave			5/25	wave		5/22	5/22	ITCZ							
5/25	wave	5/24		5/26	ITCZ		5/29	5/28	ITCZ						#2	Andres
5/27	wave			5/31	wave			5/31	wave						#3	
5/30	wave			6/1	wave			6/3	wave				#2			
				6/6	wave			6/6	wave							
				6/7	ITCZ	6/10						6/9	#1			
6/5	wave			6/13	wave		6/14	6/15	ITCZ							
6/11	wave			6/18	wave			6/17	wave						#4	Blanca
6/15	wave			6/22	wave			6/22	wave							
				6/25	storm			6/26	wave					Ana		
6/21	wave	6/19		6/27	wave			6/29	wave							
6/23	wave			6/29	wave			7/1	wave							
				7/1	surge			7/3	wave							
6/29	wave	6/28		7/1	wave			7/5	wave							
				7/5	wave		7/7	7/10	wave				#5	Bob	#6	Carlos
7/2	wave			7/9	wave			7/13	ITCZ			7/10	#6		#7	Dolores
7/7	wave			7/12	wave			7/18	wave							
7/9	wave			7/15	wave	7/13		7/18	wave							
7/11	wave			7/16	dep			7/20	wave							
7/15	wave	7/15	7/17	7/20	wave			7/23	wave							
				7/22	wave			7/26	wave							
7/18	wave	7/21		7/23	wave	7/23		7/31	wave							
7/20	wave			7/27	wave			8/3	wave							
7/23	wave			7/30	wave			8/7	wave							
7/26	wave			7/31	dep			8/10	wave							
7/30	wave			8/4	wave			8/17	wave							
8/2	wave			8/7	wave			8/20	wave							
8/5	wave			8/10	wave	8/13		8/17	wave							
8/9	wave			8/14	wave			8/20	wave							
8/10	wave			8/16	wave											

TABLE 1. (Continued)

Date Dakar passage	Nature	Formed Atlantic	Date weakened Atlantic	Date Barbados passage	Nature	Date weakened Caribbean	Date formed Caribbean	Date San Andres passage	Nature	Date formed Gulf	Date formed Atlantic	Date formed North Atlantic	Atlantic depression	Atlantic storm	Pacific depression	Pacific storm	
8/13	wave			8/18	wave			8/23	wave				#11				
8/17	wave	8/16	8/18	8/22	wave			8/25	wave				#13	Elena			
8/19	wave			8/25	wave			8/28	wave				#15				
8/22	wave			8/29	hurrr								#12	David			
8/25	wave		8/27														
8/28	wave			9/2	storm			9/7	dep				#14	Frederic			
8/31	wave			9/6	wave			9/13	wave				16, 18	Henri			
9/4	wave	9/7		9/11	wave			9/16	wave				#17	Gloria			
				9/17	wave	9/18	9/22	9/19	ITCZ								
9/8	wave			9/21	wave			9/23	ITCZ				#19				
9/16	wave			9/24	wave			9/26	wave				#21		#12	Hilda	
9/18	wave		9/21		wave			9/29	wave								
9/21	ITCZ		9/25		wave			10/1	wave								
9/24	wave	9/26		9/28	wave			10/4	wave								
				9/29	ITCZ			10/7	wave								
9/27	wave			10/3	wave			10/10	wave				#22				
		10/3		10/5	wave			10/12	wave								
		10/4		10/8	wave			10/15	wave								
		10/5		10/10	wave			10/19	wave								
10/4	wave			10/13	wave			10/21	wave						#13	Ignacio	
10/6	wave			10/17	wave			10/28	dep				#25				
10/10	wave			10/21	wave	10/22	10/23	11/2	wave				#23				
				10/26	wave								#24				
10/13	wave																
10/18	wave																
		10/22															
10/23	wave		10/24														
10/27	wave		10/31														
			10/28														
11/2	wave	11/3		11/7	ITCZ		11/8	11/9	ITCZ								
11/5	wave			11/9	wave	11/10		11/13	wave								
				11/15	wave												
11/13	wave	11/16		11/18	wave	11/23		11/22	wave				#26				
				11/20	wave								#27				
11/16	wave			11/23	wave	11/29		11/27	wave								
		11/25		11/27	ITCZ												
																#14	Jiminea

TABLE 2. Summary of 1979 tropical systems according to type and geographical area of formation. The numbers in parentheses indicate systems that were counted in a weaker stage.

	Africa	Tropical Atlantic	Subtropical Atlantic	Caribbean	Gulf of Mexico	Total
Waves	51	9	0	0	0	60
ITCZ	1	9	0	9	0	19
Depressions	0	(12)	5 (2)	1 (3)	(4)	6 (21)
Named storms	0	(4)	(1)		(3)	(8)
Total	52	18 (16)	5 (3)	10 (3)	0 (7)	85 (29)

2. Census of 1979 tropical systems

The systems observed during the 1979 hurricane season are given in Table 1 and results for several categories are summarized in Table 2 and Fig. 1. Table 1 describes the history of the 85 systems, giving the dates when they passed three key stations: Dakar, Senegal; Barbados; and San Andres Island. The table also lists the spawning date of seedlings that formed and weakened along the intertropical convergence zone (ITCZ) in the Atlantic and the dates of formation of subtropical cyclones or depressions over the Gulf of Mexico and the Atlantic north of 20°N. The Atlantic and eastern Pacific storms that were initiated by Atlantic seedlings are listed in the last four columns.

Table 2 summarizes the systems according to type and geographical area of formation. The numbers in parentheses indicate systems that were counted in a weaker stage of development. For example, Ana, Claudette, David and Frederic formed in the tropical Atlantic south of 20°N and were initiated by African waves. Once again, we see that nearly half the systems were wave perturbations in the trades whose origin was over Africa. This observation has been true every year we have completed the survey and stresses the importance of Africa as a source for Atlantic disturbances.

Fig. 1 tabulates the total number of systems passing Dakar, Barbados and San Andres Island, as well as the number that maintained their identity while traversing the Atlantic and Caribbean. Statistics are also presented on the seedlings that developed within four geographical areas: the Gulf of Mexico, the Caribbean Sea, and the subtropical and tropical Atlantic where latitude 20°N has been used as a dividing line. Of the 52 African systems, 44 were tracked to the Caribbean and 35 all the way to the Pacific. Over the tropical Atlantic, 18 disturbances formed with 15 eventually passing through the Antilles. Three of the disturbances identified along the ITCZ were followed for at least 48 h before dissipating. A total of 59 systems crossed the Antilles (44 from Africa plus 15 that formed in the Atlantic) of which 44 maintained their identity to Central America. These 44 combined with another 10 that formed in the Caribbean resulted in 54 seedlings entering Central America.

The first wave of the season moved by Dakar on 2 May and was tracked all the way to the Caribbean. The last African disturbance of the summer moved off the continent on 16 November.

The depression tracks for the months June–November are shown in Fig. 2. There were no off-season depressions in 1979. The first depression of

TABLE 3. Summary of the type of seedling that initiated Atlantic named storms and depressions during 1979 compared with annual averages from previous years.

Year	Tropical		Baroclinic		Totals
	African systems	Disturbances	Upper troposphere	Lower troposphere	
Named storms					
1979	7	1	0	0	8
11-year average (1967–77)	4.0	1.5	1.5	1.0	8.0
Active period (1967–71)	4.5	2.5	1.5	1.0	9.5
Inactive period (1972–77)	3.5	1.0	1.0	1.5	7.0
Depressions					
1979	18	2	0	7	27
11-year average (1967–77)	10.0	3.0	4.0	6.5	23.5
Active period (1967–71)	12.5	4.0	4.0	4.0	24.5
Inactive period (1972–77)	8.5	2.0	4.0	8.0	22.5

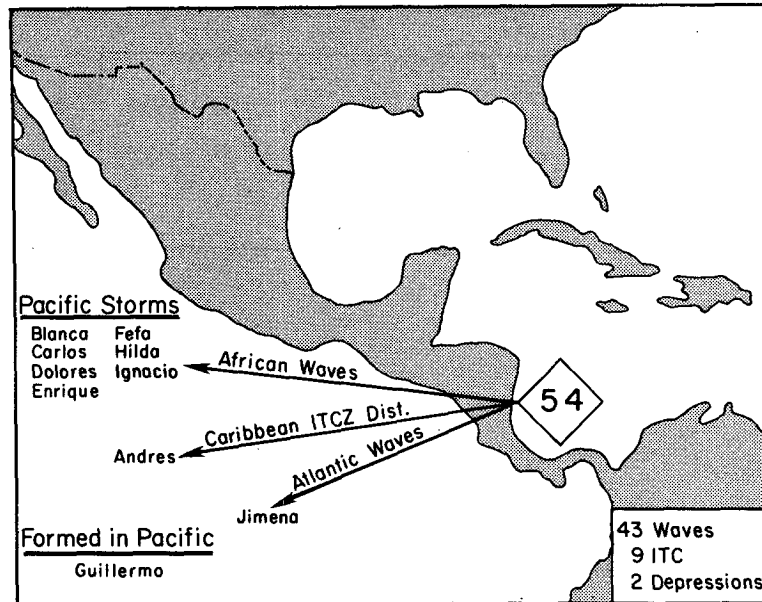


FIG. 3. Summary of the type of seedlings that initiated east Pacific storms in 1978.

the season formed along an old baroclinic zone east of the Bahamas on 9 June. The last depression of the season formed in the same area along another baroclinic zone on 13 November.

Three of the depressions that did not strengthen into storms were noteworthy and deserve special comment.

The first was a June depression in the western Caribbean. This system was initiated by an African wave that left the continent on 30 May. The wave interacted with a quasi-stationary trough of low pressure in the western Caribbean on 11 June and generated a depression. The depression moved slowly northward and maintained a convergence zone over Jamaica for two days. Heaviest rains occurred over the western portion of the Island on the 12th. The highest recorded rainfall for the 24 h period ending on 0700 LT on the 13th was 34 inches. Several locations reported rainfall amounts

in excess of 25 inches. Disasterous floods over Jamaica killed 33 people and caused extensive damage. The Jamaican Meteorological Service describes the event as "one of the Islands worse meteorological disasters during the decade of the seventies."

The second depression was a low that formed off the coast near Brownsville, Texas, on 19 September. This low appeared during the same period Tropical Storm Henri was drifting aimlessly over the southern

TABLE 4. Results of 1979 compared with averages and ranges from previous years.

	10-year average (1968-77)	Range	1979
Total systems	104	85-113	85
Dakar systems	58	52-69	52
Barbados systems	60	44-74	59
San Andros systems	54	40-67	54
Depressions	25	22-34	27
Names storms	8	4-13	8
Subtropical storms	—	0-4	1

$$\text{Ratio} = \frac{\text{No. tropical depressions}}{\text{Total No. depressions}}$$

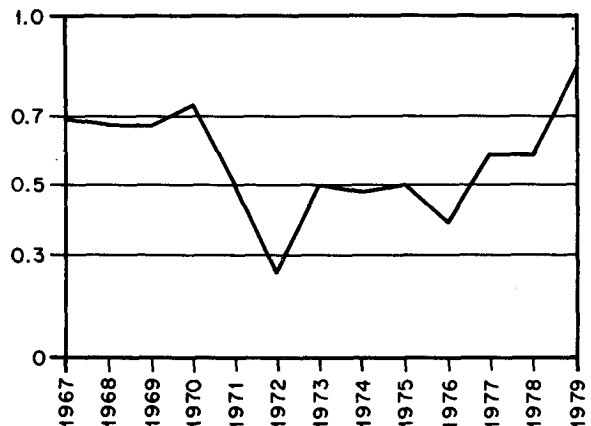


FIG. 4. Ratio of the number of depressions of tropical origin to the total number of depressions, 1967-79.

TABLE 5. Geographical area of depression formation in 1979 compared with annual averages from active and inactive periods.

Period	Africa	Tropical Atlantic	North Atlantic	Caribbean	Gulf of Mexico	Total
1979	0	12	7	4	4	27
Active period (1967-71)	5	4	8	4	3	24
Inactive period (1972-76)	1	4	13	2	3	23

Gulf of Mexico. The low formed along an old baroclinic zone that had persisted along the Texas coast for several days.

Weather reconnaissance planes were dispatched to investigate on both the 19th and 20th. They found no evidence of a warm central core; thus, no name was assigned to the system even though winds of 40-50 mph were reported. Gale warnings were posted on the Texas coast for a nontropical low.

The low spread heavy rains of 10-15 inches from Corpus Christi to southwestern Louisiana.

The third depression formed along an old baroclinic zone northeast of Puerto Rico on 8 November. This system moved northeastward and appeared to be making contact with the westerlies. But, strong pressure rises north of the Azores blocked the northward motion on 11 November and the low hesitated, then turned back toward the southwest before finally weakening on the 13th.

Several ships passing through this system from the 9th through the 12th reported winds of 30-35 kt.

Table 3 summarizes the type of seedlings that spawned the Atlantic named storms and depressions in 1979. All eight of the named storms were initiated by systems of a tropical type, i.e., either African systems or disturbances along the ITCZ. This is the first year since we started the seasonal summaries in 1967 that not one named storm developed from a baroclinic disturbance. Twenty of the 27 depressions developed from tropical-type disturbances. Upper cold lows did not account for either a depression or a named storm in 1979.

In the Pacific, nine of the 10 named storms were initiated by disturbances whose origin was on the Atlantic side of Central America; and African systems were responsible for seven of the storms (Fig. 3). Only one named storm, Guillermo, originated in the Pacific along the ITCZ.

3. Comparison with other years

Table 4 compares the tropical systems in 1979 with averages and ranges for the 10-year period 1968-77. During the past 12 years, 1970 was the only other year with as few systems as the 85 observed in 1979. There are two reasons for this decrease: 1) the number of Dakar systems was 10% below normal—in recent years only 1974 produced as few Dakar systems, and 2) no systems developed in the Gulf

of Mexico. In a normal year we would expect at least four.

Even though the total number of systems was nearly 20% below normal, the number of depressions was 10% above normal. This implies either greater instability of the disturbances or environmental conditions more favorable for development. The latter is consistent with the results shown in Table 5 where the geographic area of depression formation in 1979 is compared with other years. In 1979 16 of the 27 depressions formed over the waters of tropical Atlantic (south of latitude 20°N) or in the Caribbean Sea. This pattern is typical of the trends noted during the active hurricane period extending from 1967 to 1971.

In contrast, inactive years feature depressions in the Gulf of Mexico and North Atlantic.

The character of a hurricane season was shown by Frank (1974) to be related to the simple ratio of the number of tropical-type depressions divided by the total number of depressions during the season, in 1979 this ratio was 0.74. This is the highest value observed during the past 12 years. Fig. 4 shows the trend of this parameter since 1967. During active years the ratio was generally above 0.50. During the inactive period from 1972 to 1976, values were less than 0.50. The last three years, the ratio has been on the rise, and hurricane activity has increased.

In summary, the 1979 hurricane season featured fewer but stronger systems, primarily because environmental conditions over the tropical Atlantic were more favorable for development. In response, major hurricanes once again emerged from the deep tropics and either threatened or devastated people living in the area extending from the Antilles to the United States.

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