

Atlantic Tropical Systems of 1972

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ABSTRACT—The 1972 hurricane season produced 113 “seedlings” of which 24 acquired the closed circulation of a depression. This was the largest number of tropical systems observed since the National Hurricane Center began keeping records in 1968. The reason for this high number was the unusual development of many subtropical cyclones in temperate latitudes.

1. INTRODUCTION

The 1972 hurricane season was the quietest in recent years when measured both in terms of total number of named storms and strength of the storms/hurricanes that did develop. Simpson and Hebert (1973) have indicated that one has to go back in the record books over 40 yr to find a year with less activity—1930, with only two hurricanes, was the most recent year to have less than the four named storms recorded in 1972.

What were the reasons for the lack of activity? It is impossible to establish the primary cause or causes, but one can examine a number of factors that were directly related. Simpson and Hebert (1973) mentioned two possibilities. First, the ocean-surface temperatures over the tropical Atlantic between Africa and the Antilles were colder than normal during August and September. Second, the westerlies were stronger than normal over the Caribbean Sea in the upper troposphere during most of the summer. The mean 200-mb winds for August and September showed a westerly component in excess of 25 kt over the Antilles, while long-term mean wind speeds over the eastern Caribbean for these same 2 mo are less than 10 kt. At 200 mb, westerly winds in excess of 50 kt were observed over Barbados on 10 different days during August and September. These high winds over the Caribbean were not the result of an anomalous southward displacement of the polar westerlies; instead, they represented the presence of a well-organized mid-Atlantic upper tropospheric trough. The strong vertical shears produced by this feature severely dampened the development potential of trade-wind disturbances as they approached the Antilles.

2. CENSUS OF 1972 TROPICAL SYSTEMS

There is another important question that one might ask. Were there fewer seedlings in 1972 than in previous active years? Perhaps there were fewer opportunities for storm development; if so, this would be an important factor in explaining a quiet summer. Statistics of the 1972 hurricane season are tabulated in table 1, and several categories

are summarized in table 2 and figure 1. In 1972, there were 113 independent tropical systems (table 2), 24 depressions, and four named storms. The philosophy of our counting procedure was given in previous annual articles (Simpson et al. 1968, 1969) and will not be repeated here.

Table 1 presents pertinent information describing the history of the 113 systems, giving the dates when the systems 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 over the Atlantic north of latitude 20°N. Atlantic and Pacific storms that were initiated by Atlantic seedlings are listed in the last two 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, the two depressions that formed over the tropical Atlantic (south of latitude 20°N) were spawned by tropical waves that originated in Africa. There are two important statistics in table 2. First, over half of the systems were tropical waves; second, nearly half of the systems originated in Africa. The latter statistic has been observed every year that we have completed the survey and stresses the importance of Africa as a breeding ground of Atlantic seedlings.

Figure 1 tabulates the total number of systems that passed Dakar, Barbados, and San Andres Island as well as the number that maintained their identity while traversing the Atlantic and Caribbean. Statistics on the seedlings that developed within four broad geographical areas are also presented in the figure. The areas are the Gulf of Mexico, the Caribbean Sea, and the subtropical and tropical Atlantic where latitude 20°N is used as the dividing line. Forty-five of the 57 African systems were tracked to the Caribbean, and 29 were traced all the way to the Pacific Ocean. Twenty-one disturbances formed over the tropical Atlantic with 11 eventually passing through the Antilles. Another 10 were identified along the ITCZ and followed for at least 48 hr before dissipating. A total of 56 systems passed through the Antilles (45

TABLE 1.—Summary of the history of tropical systems in 1972

Dakar passage	Nature	Formed in Atlantic	Nature	Weakened in Atlantic	Barbados passage	Nature	Weakened in Caribbean	Formed in Caribbean	San Andres passage	Nature	Formed in N. Atlantic	Atlantic storm	Pacific storm
May 25	Wave				May 31				June 4	Wave	5/23	Dep.	
May 29	Wave				June 3	Wave			June 6	Wave			
		6/1	ITCZ	×									
June 1	Wave				June 7	Wave		×	June 8	ITCZ			
		×			June 10	ITCZ	×		June 10	Wave			
June 7	Wave				June 13	Wave	×						
		6/12	ITCZ	×									
June 12	Wave				June 18	Wave	×						
								×					
								×	June 20	ITCZ	6/18	Agnes Dep.	
June 15	Wave	6/16	ITCZ	×									
June 16	Wave			×	June 21	Wave			June 23	Wave			
		6/19	ITCZ	×									
											6/23	Dep.	
								×	June 25	ITCZ			
June 19	Wave				June 25	Wave		×	June 26	ITCZ			
June 22	Wave			×					June 28	Wave			
		×			June 27	Wave	×						
June 24	Wave				June 29	Wave			July 1	Wave			
June 27	Wave				July 2	Wave	×						
		×			July 4	Wave			July 7	Wave			
June 30	Wave				July 6	Wave			July 8	Wave			
July 2	Wave			×									
								×	July 10	ITCZ			
July 4	Wave				July 9	Wave			July 11	Wave			
											7/11	Dep.	
July 7	Wave				July 13	Wave	×						
July 9	Wave			×									
July 11	Wave				July 15	Wave			July 17	Wave			
July 14	Wave				July 19	Wave	×						
											7/16	Dep.	
July 16	Wave				July 21	Wave			July 23	Wave			
July 19	Wave				July 23	Wave			July 25	Wave			
		7/21	ITCZ	×									
											7/21	Dep.	
		7/22	ITCZ	×									
July 24	Wave				July 28	Wave			July 3	Wave			
July 26	Wave			×									
July 29	Wave				Aug. 4	Wave			Aug. 7	Wave			
											7/31	Dep.	
								×	Aug. 1	ITCZ			
Aug. 2	Wave				Aug. 6	Wave			Aug. 8	Wave			
		×			Aug. 7	ITCZ	×						
Aug. 3	Wave				Aug. 8	Wave			Aug. 10	Wave			Estelle
Aug. 5	Dep.				Aug. 10	Wave			Aug. 13	Wave		Dep.	
		8/8	ITCZ	×									
Aug. 9	Wave				Aug. 15	Wave			Aug. 18	Wave			Gwen
		8/11	ITCZ	×									
Aug. 12	Wave			×							8/12	Dep.	
		×			Aug. 14	Wave	×						
Aug. 13	Wave				Aug. 19	Wave	×						
								×	Aug. 21	ITCZ			
		×			Aug. 20	ITCZ			Aug. 23	ITCZ			
Aug. 16	Dep.				Aug. 23	Wave	×						
											8/2	Betty	Hyacinth
								×	Aug. 25	ITCZ			
Aug. 19	Wave				Aug. 25	Wave			Aug. 27	Wave			
Aug. 22	Wave				Aug. 28	Wave			Aug. 31	Wave			
Aug. 25	Wave				Aug. 30	Wave			Sept. 1	Wave			
											8/29	Carrie Dawn	
Aug. 28	Wave				Sept. 1	Wave			Sept. 4	Wave			

TABLE 1.—Concluded

Dakar passage	Nature	Formed in Atlantic	Nature	Weakened in Atlantic	Barbados passage	Nature	Weakened in Caribbean	Formed in Caribbean	San Andres passage	Nature	Formed in N. Atlantic	Atlantic storm	Pacific storm
Aug. 30	Wave				Sept. 5	Wave			Sept. 9	Wave	9/1	Dep.	Iva
		9/1	ITCZ	×									
Sept. 1	Wave				Sept. 7	Wave	×				9/3	Dep.	
Sept. 3	Wave				Sept. 9	Wave	×						
Sept. 5	Wave				Sept. 10	Wave		×	Sept. 7	ITCZ			
Sept. 7	Wave				Sept. 13	Wave			Sept. 13	Wave			
Sept. 9	Wave				Sept. 15	Wave			Sept. 16	Wave			
Sept. 13	Wave				Sept. 19	Wave			Sept. 18	Wave			
Sept. 14	Wave				Sept. 20	Wave	×		Sept. 22	Wave			
Sept. 16	Wave				Sept. 23	Wave			Sept. 26	Wave	9/19	Charlie	Joanne
								×	Sept. 28	ITCZ		Dep.	
Sept. 17	Wave	×	ITCZ	×	Sept. 27	Wave	×						
Sept. 19	Wave			×									
Sept. 22	Wave			×	Sept. 30	Wave	×						
		×			Oct. 2	ITCZ	×						
		×			Oct. 4	ITCZ	×						
Sept. 28	Wave				Oct. 7	Wave	×						
											9/29	Dep.	
											10/1	Dep.	
								×	Oct. 2	ITCZ			
								×	Oct. 4	ITCZ			
								×	Oct. 9	Wave			
								×	Oct. 12	Wave			
Oct. 2	Wave				Oct. 11	Wave			Oct. 14	Wave			
Oct. 5	Dep.			N. At- lantic									Dep.
		×											
Oct. 7	Wave				Oct. 12	Wave			Oct. 16	Wave			
					Oct. 16	Wave	×						
								×	Oct. 16	Wave			
								×	Oct. 19	ITCZ			
Oct. 10	Wave				Oct. 19	Wave			Oct. 22	Wave			
								×	Oct. 26	Wave			
Oct. 12	Wave			N. At- lantic									Dep.
Oct. 16	Wave			×									
Oct. 20	Wave			×									
		×			Oct. 26	Wave	×						
Oct. 22	Wave				Oct. 29	Wave	×				10/22	Dep.	
		×			Oct. 30	ITCZ	×						
Oct. 25	Wave				Oct. 31	Wave	×						
Oct. 29	Wave			×							11/1	Delta	

TABLE 2.—Summary of 1972 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	Sub-tropical Atlantic	Caribbean	Gulf of Mexico	Total
Waves	54	5	—	4	—	63
ITCZ	0	16	—	13	—	29
Depressions	3	(2)	17 (1)	1	0	21 (3)
Named storms	0	0	— (3)	— (1)		— (4)
	57	21 (2)	17 (4)	18 (1)	0	113 (7)

from Africa plus the 11 that formed in the Atlantic); 32 of these maintained their identity while traversing the Caribbean. Seventeen disturbances developed over the Caribbean, which when added to the number from the Antilles, gives a total of 49 seedlings entering Central America.

The depression tracks for May through November are shown in figure 2. The first depression of the year originated off the Carolina coast in May as a subtropical cyclone that eventually attained gale-force winds before moving onto the Georgia coast south of Brunswick, Ga. Warnings were issued on the stronger subtropical cyclones

for the first time this year; the cyclones were identified by the phonetic alphabet. The Georgia cyclone was designated Alfa in the public bulletins. Three other subtropical-type depressions warranted special attention and were designated Bravo, Charlie, and Delta. The tracks of these cyclones are given by Simpson and Hebert (1973).

Figure 3 summarizes the source of Eastern Pacific storms and hurricanes. Half of the storms were initiated by seedlings that originated on the Atlantic side of Central America, and the other six formed along the Pacific ITCZ. Four of the storms were spawned by systems that could be traced back to Africa.

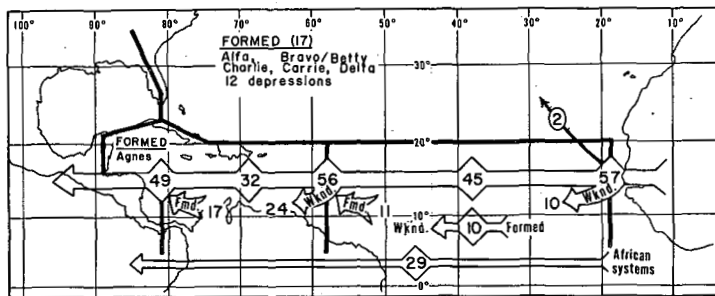


FIGURE 1.—Summary of the tropical systems that passed three key stations (Dakar, Barbados, and San Andres) in 1972 and those maintaining their identity while crossing the Atlantic and Caribbean.

3. COMPARISON WITH OTHER YEARS

Table 3 compares the number of tropical systems in 1972 with averages determined over the previous 4 yr within several categories. The 4-yr averages will be referred to as normals, although we are quick to confess that we would be most surprised if the long-term true normals turn out to be exactly these numbers. The total number of systems in 1972 was above normal even though it appears that the frequency of occurrence of systems of pure tropical origin was near normal. For example, the most prolific source region of Atlantic tropical systems is Africa, and the number of seedlings emerging from this continent in

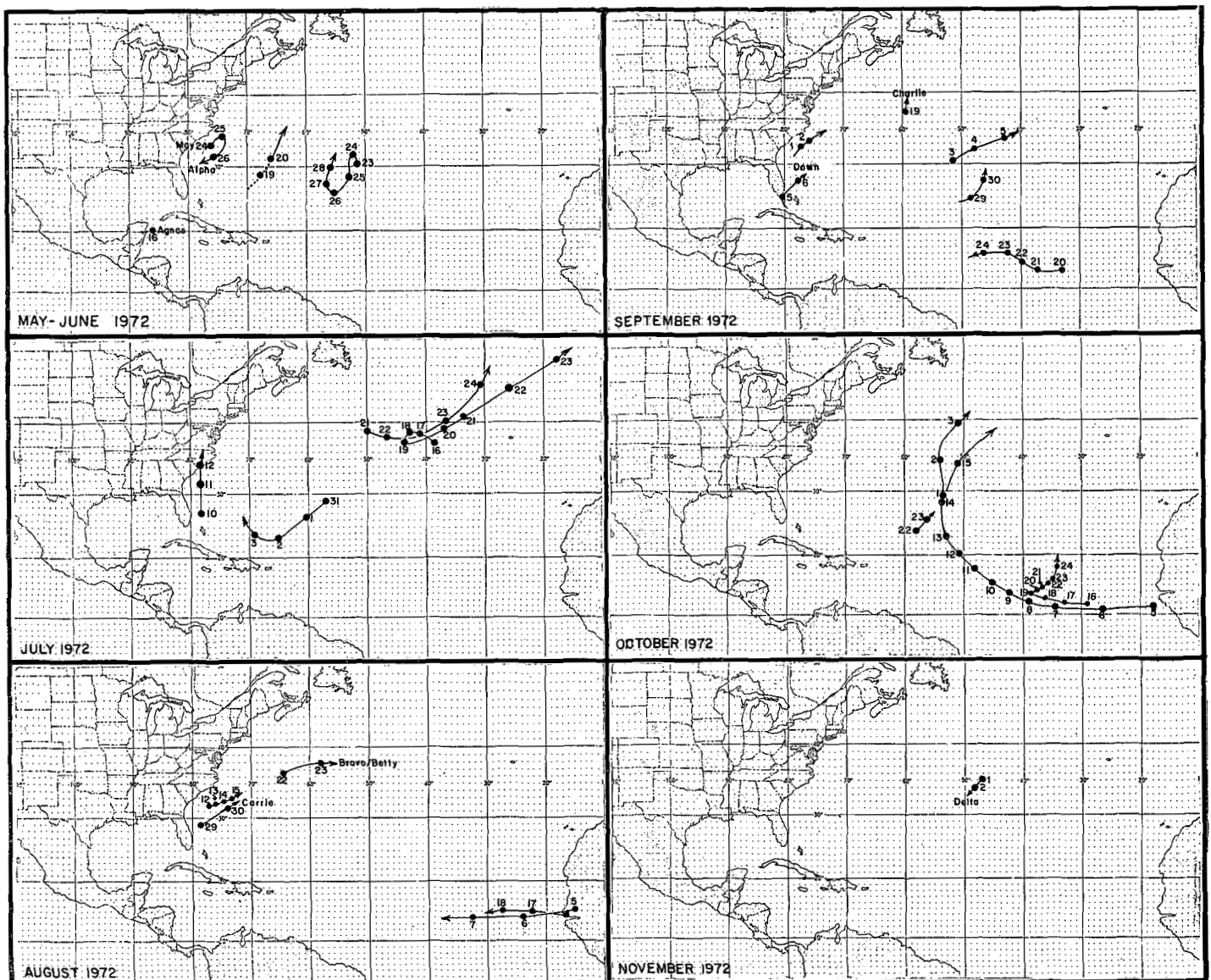


FIGURE 2.—Tracks of tropical depressions in 1972.

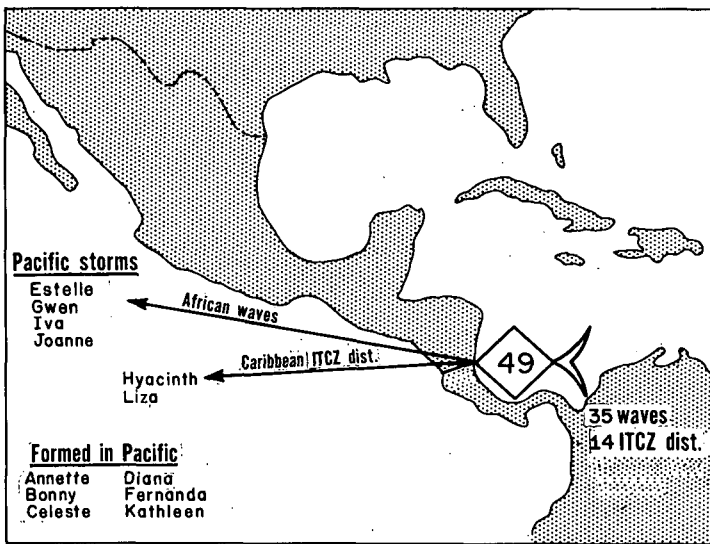


FIGURE 3.—Summary of the type of seedlings that initiated Pacific storms in 1972.

TABLE 3.—Four-year summary of tropical systems within several categories compared with the results for 1972

	1968	1969	1970	1971	4-yr. avg.	1972
Total systems, all types	107	105	85	103	100	113
Dakar systems	57	58	54	56	56	57
Barbados systems	59	44	53	56	53	56
San Andres systems	40	43	45	58	46	49
Depressions	19	28	24	23	24	24
Named storms	7	13	7	12	10	4

1972 was nearly normal. The overall increase of systems in 1972 is due mainly to the unusual number of cyclones that developed in the subtropical latitudes. Some of these were downward reflections of strong upper troposphere cold Lows, while others represent developments associated with baroclinic zones in the lower or middle troposphere. In our counting system, upper cold Lows are not included unless they influence the troposphere below 700 mb. The slight increase in the number of systems passing the Antilles and San Andres Island noted in 1972 represents the inclusion of more cold Lows than were counted in previous years.

Even though the number of depressions was exactly normal, the nature of these depressions was extremely abnormal. Eighteen of the 24 formed in the subtropical latitudes north of latitude 20°N, mostly associated with baroclinic zones in either the upper or lower troposphere. Of the five depressions that either moved off the African coast as Lows or formed over the tropical Atlantic between Africa and the Caribbean, none maintained a circulation as far west as the Antilles. Cold water over the Atlantic and strong westerlies in the upper troposphere over the Caribbean offered very hostile conditions to the African systems as they proceeded westward toward the Antilles.

The story of the 1972 hurricane season is told in table 4, which summarizes the type of seedlings that initiated Atlantic named storms and depressions for the past 6 yr. The seedlings have been grouped into two main categories according to their energy sources. Tropical systems are

TABLE 4.—Summary of the type of seedling that initiated Atlantic named storms and depressions during the period 1967–71 compared with the results for 1972

Year	Tropical		Baroclinic		Totals
	African systems	Disturbances	Upper trop.	Lower trop.	
<i>Named storms</i>					
1967	4	3	0	1	8
1968	2	3	1	1	7
1969	7	3	2	1	13
1970	4	2	1	0	7
1971	6	1	4	2	13
Totals	23	12	8	5	48
1972	1	0	1	2	4
<i>Depressions</i>					
1967	15	5	4	5	29
1968	8	5	3	3	19
1969	11	8	3	6	28
1970	17	2	3	4	26
1971	11	1	7	4	23
Totals	62	21	20	22	125
1972	6	0	6	12	24

those feeding primarily on latent heat and occurring mainly along the ITCZ. African disturbances have also been listed under the tropical category even though their energetics are not clearly understood. The second category of seedlings would be those initiated by baroclinic instabilities and would include upper tropospheric cold Lows and low-level depressions associated with old baroclinic zones. These systems generally develop over the subtropics and are frequently referred to as subtropical cyclones.

During the 5-yr. period 1967–71, approximately 75 percent of the named storms and depressions were initiated by seedlings of the tropical type and only 25 percent by baroclinic seedlings. The opposite was true in 1972 with 75 percent of the depressions and storms spawned by the baroclinic seedlings. In a normal year, African systems initiated approximately half of the Atlantic storms and depressions. In 1972, however, only one storm (Dawn) and only six of the 24 depressions came from this source.

In conclusion, the summer of 1972 featured an abundance of seedlings, but anomalous conditions in the environment discouraged development.

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