

RAINFALL ON JAMAICA

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The areal and seasonal distribution of rainfall on the island of Jamaica in the British West Indies is affected by three major interacting controls: 1) location of highlands in the eastern and western portions of the island; 2) existence of seasonal changes in wind direction; and 3) periodic occurrence of tropical hurricanes.

AREAL DISTRIBUTION OF RAINFALL

Highlands are extremely important in the distribution of rainfall on Jamaica. The two largest highland areas over 3,000 feet in elevation, in eastern and western Jamaica, are both areas of heavy rainfall, as shown in Figure 1 (U. S. Weather Bureau, 1921-1952). The Blue Mountains in the east, the higher of the two areas, have the greater effect on the distribution of rainfall on the island.

In the Blue Mountains, where peaks over 6,000 feet stand within only 15 miles of both the north and south coasts, differences in rainfall between places on the north and south slopes of the mountains are very great. Both the wettest and the driest stations in Jamaica are located in this area. Within a distance of only 30 miles, between Fellowship to the north and Kingston to the south of the mountains, there is a difference in average annual rainfall of over 130 inches (Table 1). Fellow-

ship, on the wet northeastern slopes, has the highest annual rainfall on the island, more than 160 inches. Totals of more than 200 inches have been recorded there in some years. Two of the three other island stations recording more than 100 inches annually are on the northeastern slopes of the Blue Mountains, and the third is in the western highlands. Much of the highland rainfall is orographic, dropped when warm, moist, marine air is moved up the mountain slopes. Thus, the wettest areas in Jamaica are located in or near the two highlands; the driest areas are located along the northwestern and, especially, the southern coasts. Only 30 miles to the southwest of Fellowship, the city of Kingston, on the southern slope of the mountains, has a mean annual rainfall less than 30 inches, the lowest total recorded on the island.

Seasonal changes in atmospheric conditions and prevailing winds combine with the location of highland areas to affect the areal distribution of rainfall on Jamaica (Ward and Brooks, 1934:13-17). The winds throughout the year are easterly, coming from the "Azores" or "Bermuda" High. Variations from northeast to southeast, however, are associated with the periodic shifting of this high and the development of a low pressure area over the western Gulf of Mexico and the United States. With the advance of sum-

Rainfall on Jamaica

TABLE 1.—Average Monthly and Annual Rainfall on Jamaica*

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
<i>Island average</i>	3.47	2.62	2.65	4.81	8.99	6.51	5.73	7.84	7.95	10.43	8.00	4.84	72.15
Fellowship.....	11.80	9.10	5.47	9.56	14.85	13.63	14.30	14.08	13.25	17.54	23.13	16.47	160.74
Port Antonio.....	8.69	5.75	4.19	6.83	12.23	11.33	11.76	11.87	11.77	15.12	16.77	9.97	126.26
Darlston.....	3.12	3.65	5.13	11.37	17.99	11.94	12.32	17.39	15.06	16.48	8.04	3.14	124.82
Bath.....	6.15	4.24	3.25	5.63	10.73	11.09	8.93	11.56	13.75	18.50	13.79	9.36	116.99
Buff Bay.....	8.26	7.09	4.35	6.30	9.54	5.04	6.59	6.63	5.53	8.98	14.51	10.99	93.80
Cambridge.....	1.85	2.63	4.09	7.33	12.68	10.53	8.96	11.38	11.72	11.84	5.53	2.17	90.69
Stony Hill.....	2.06	2.62	2.01	4.99	8.10	5.16	5.06	9.31	14.96	13.24	8.24	3.25	78.99
Balaclava.....	1.78	3.23	4.09	8.61	11.95	4.74	5.03	9.58	9.12	13.06	5.45	1.95	78.99
Kempshot.....	2.99	2.69	2.87	5.05	10.44	8.20	5.50	6.78	8.04	10.04	8.88	3.39	75.29
Christiana.....	2.27	3.07	2.89	6.63	9.71	5.41	4.14	7.55	7.85	11.86	5.78	2.03	69.25
Morant Bay.....	2.69	1.52	1.40	2.44	6.70	7.48	5.51	7.22	9.75	12.30	7.30	3.83	68.14
Port Maria.....	5.49	3.81	3.57	3.83	6.45	3.38	3.80	5.22	4.83	7.68	11.06	7.74	66.85
Linstead.....	2.27	2.42	2.46	4.39	7.68	6.47	5.92	7.34	7.09	8.41	5.56	2.73	63.54
Morant Point Light.....	3.50	2.56	1.73	3.15	5.82	5.02	3.52	5.86	7.35	12.06	8.13	4.48	63.37
Savannah La Mar.....	1.74	1.97	3.25	4.71	8.07	6.17	6.17	7.21	7.49	8.35	3.67	1.83	61.15
Saint Ann's Bay.....	5.59	4.21	3.29	3.61	6.02	3.52	2.37	3.74	3.61	6.55	8.98	6.62	58.85
Chapelton.....	1.62	1.99	1.99	3.53	8.31	5.01	3.87	6.00	7.45	11.58	5.34	1.64	58.71
Negril Point Light.....	2.25	1.74	2.82	3.70	6.35	5.26	5.59	6.27	5.82	8.00	3.05	1.85	52.70
Montego Bay.....	2.64	1.68	1.89	2.90	6.75	5.36	2.99	4.85	6.16	7.09	6.25	2.73	51.81
Black River.....	1.97	1.78	2.17	3.83	5.99	3.67	4.00	6.04	4.91	8.09	4.32	2.04	49.19
Old Harbour.....	1.64	2.24	1.67	3.21	5.22	3.64	2.79	6.45	5.88	9.55	5.00	1.89	48.89
Alligator Pond.....	1.03	1.73	1.65	2.83	3.96	2.70	2.48	4.64	5.62	8.02	4.33	1.56	40.49
Spanish Town.....	1.01	1.69	1.37	2.41	4.29	2.71	1.89	4.67	4.33	8.12	4.62	1.50	38.82
Falmouth.....	2.15	1.95	1.71	2.32	3.69	2.67	1.70	2.85	3.30	5.79	6.08	3.19	37.71
Kingston.....	0.67	0.88	0.49	1.12	2.59	2.65	2.02	4.86	4.46	5.95	3.34	0.96	29.88

* Data in this table compiled from U. S. Weather Bureau, 1921-1932.

mer, southeasterly winds develop as the air flows into the North American low. With the onset of winter, the North American low disappears and the winds shift to the northeast. As the winds are shifting to the southeast in May or June, and to the northeast in September or October, two periods of relative calm occur. At these times, convectional thunder-showers bring large amounts of rainfall to all parts of Jamaica (Table 1). Ordinarily, convection is greatest in October which is the wettest month for the island; another period of active convection comes in May or June, giving rise to a secondary maximum over the island at that time.

Occasional tropical hurricanes may augment the October rainfall maximum on Jamaica. The highland areas often receive the greatest amounts of rain from these storms, but the effects of hurricanes are felt over the entire island. In the hurricane season, August to December, monthly amounts of 30 inches have been recorded in the western uplands, while monthly amounts in excess of 60 inches have been recorded in and near the eastern highlands. One exceptional storm in November, 1909, dropped a reported 94 inches of rain in only three days at Silver Hill Plantation in the Blue Mountains (Ward and Brooks, 1934:15). Even at Kingston, in the driest area of Jamaica, 17 inches of rain, or over one-half of the mean annual rainfall for the station, were recorded in one day during the passage of a hurricane in 1951.

Tropical hurricanes add markedly to the variability of rainfall on Jamaica. The periodic occurrence of

hurricanes establishes for all stations average annual rainfalls which are not equalled in most non-hurricane years. When no storms occur, stations on the island record rainfall below averages, and dry conditions may follow. When hurricanes do occur, floods and serious crop losses may result, and the island stations record rainfall above the average.

SEASONAL DISTRIBUTION

Topography, prevailing easterly winds, and hurricanes are controls of the areal distribution and annual variability of rainfall on Jamaica. With the exception of topography, they are also the controls of the seasonal distribution of rainfall on the island. Monthly and annual rainfall for all stations on the island have been compiled and recorded in Table 1.

For most of the island the wettest season of three consecutive months comes in August, September, and October; on the north and northeast coasts the wet period occurs later (Fig. 2). The heaviest rainfall occurs in late summer and autumn when both the land and the water off which the winds come are warmest, convection is most active, and hurricanes occur. Mean rainfall during the three consecutive wettest months varies from 57 inches at Fellowship in the northeast, and 39 inches at Darliston in the west, to 15 inches at both Kingston in the south and at Falmouth on the north coast. The wettest individual month varies from October in the central and southern areas to November along the northern coast (Table 1). Rainfall in individual wet months ranges from 23 inches at Fellowship to

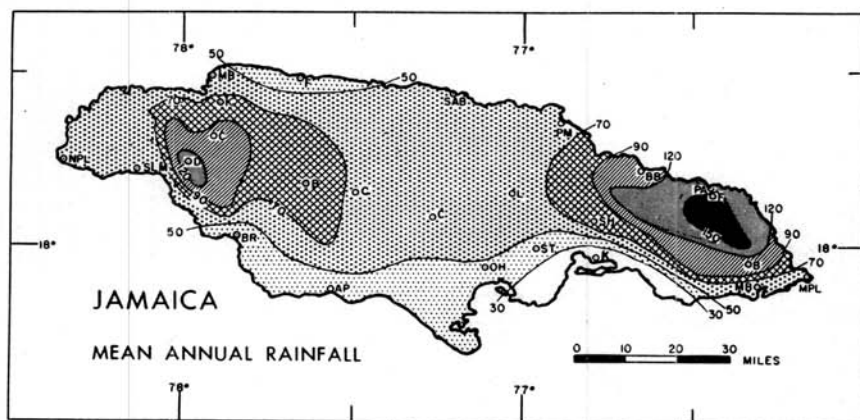


FIG. 1.—Mean annual rainfall on Jamaica.

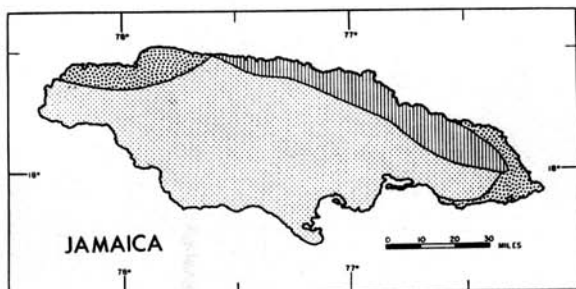
about 8 inches at many stations in the south.

A secondary wet season exists throughout the island in the period between mid-April and mid-August. This wet season is shorter in length and corresponds to the other period of shifting wind direction and strong convection. The secondary wet season is most important in the west, but many island stations record a secondary rainfall maximum in May or June. An exceptional area in the western highlands receives its greatest monthly rainfall in May, even though the wettest three-month season is from August through October.

The time of occurrence of the driest season varies areally more than the time of occurrence of the wettest season. The dry season occurs between mid-December and mid-April when nearly all hurricane activity has ended, convection is almost completely absent, and strong northeasterly winds prevail. During the three consecutive driest months (Fig. 3) mean rainfall varies from 24 inches at Fellowship to less

than 2 inches at Kingston. Some northeastern slopes, such as those near Fellowship, receive considerable amounts of rainfall even during the dry season. An exceptional area along the north coast has its driest season in June, July, and August, although it is nearly as dry in January, February, and March. Total rainfall is lowest over the entire island in March, but January is the driest month in central Jamaica, and February is the driest month in the west (Table 1).

Occasional drouths resulting in serious crop damage have occurred on the north and south coasts. For example, only 0.34 inches of rain were recorded at Kingston during the five-month period from December to May, 1944, and at Falmouth on the north coast only 0.11 inches of rain were recorded in one four-month period. Seventeen of the 25 stations in the study, including Fellowship in the wettest area on the island, have sometimes recorded no rainfall for a period of at least one month.



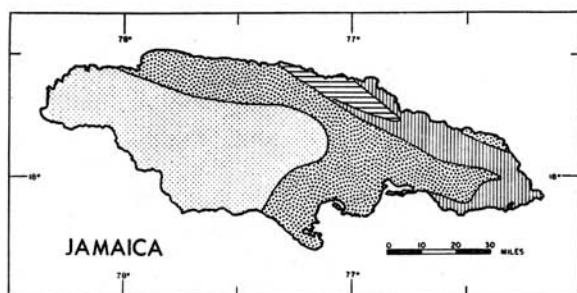
WETTEST THREE MONTH SEASON

□ AUGUST - SEPTEMBER - OCTOBER

▒ SEPTEMBER - OCTOBER - NOVEMBER

▓ OCTOBER - NOVEMBER - DECEMBER

FIG. 2.—Wettest three-month season on Jamaica.



DRIEST THREE MONTH SEASON

□ DECEMBER - JANUARY - FEBRUARY

▒ JANUARY - FEBRUARY - MARCH

▓ FEBRUARY - MARCH - APRIL

▒ JUNE - JULY - AUGUST

FIG. 3.—Driest three-month season on Jamaica.

SUMMARY

The gross pattern of rainfall distribution on Jamaica is associated with three factors: topography, changes in wind direction, and periodic hurricanes. The wettest areas are on windward slopes; great contrasts in rainfall, associated with topographic features, are to be found within very short distances. Tropical hurricanes bring large amounts of rainfall in some years, and none in others, so that extremely wet or dry years may occur in the same locality. Differences in the di-

rection and velocity of winds, in atmospheric pressures, and in the numbers of convectional storms are important to the details of the distribution of rainfall on Jamaica. Local irregularities in rainfall distribution still call for further investigation.

LITERATURE CITED

- U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU. 1921-1952. Climatological data, West Indies and Caribbean Section. San Juan, Puerto Rico, U. S. Gov't. Print. Office, 32 pp.
- WARD, ROBERT DEC., and CHARLES F. BROOKS. 1934. *Climatology of the West Indies*. *Handbuch der Klimatologie*, 2(1): 5-11, 13-17.