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A REPORT

ON

THE HURRICANE

OF

NORTHERN JAMAICA,

August 20th 1944

By

The Government Meteorologist

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THE HURRICANE OF AUGUST 20th, 1944

1. *History*: The hurricane which traversed the north coast of Jamaica on Sunday, August 20th, 1944, was the only appreciable storm development during that month in the Caribbean. Two other tropical depressions formed in the eastern Caribbean, but did not develop.

The hurricane was first observed east of the Grenadines on the 16th, being noted as a tropical storm moving WNW over Grenada during the night of the 16–17th. It had probably formed some days earlier as it showed considerable activity at Grenada. It continued to move WNW, at a speed of 12–13 m.p.h., and developed into a hurricane of small area but severe intensity, striking Jamaica on the 20th. Passage over Jamaica did not affect its course, but temporarily reduced its intensity. It continued to Grand Cayman, then curved to a more westerly track, crossing Cozumel Island, the north of the Yucatan Peninsula, and finally reaching the coast of the Mexican Mainland near Tampico on the 24th, and dying out there.

2. *Previous Hurricanes of Recent Years*: Hurricanes which have affected Jamaica during recent years are listed below. It will be noted that there is no periodicity in their occurrence.

August, 1944: Hurricane traversed north coast.
October, 1933: Hurricane traversed western districts.
September, 1917: Hurricane traversed northern half of Island.
August, 1916: Hurricane traversed south coast.
November, 1912: Hurricane traversed western districts.
August, 1903: Hurricane traversed north coast.
August, 1886: Hurricane traversed the Island from Morant Bay to Montego Bay.
August, 1880: Hurricane traversed Central districts from Kingston to St. Ann's Bay.

3. *Course over Jamaica*: The course of the centre of the hurricane over Jamaica, with approximate times at which it passed various points, is shown on the map, Figure I, at the end of this Report. It first struck the coast at Boston at about 11.30 a.m., E.S.T. (1630 G.M.T.) and moved in a west northwesterly direction, which took it along the coast to Annotto Bay, and then overland to some point between Falmouth and Montego Bay from whence it passed out to sea at some time between 5.30 and 6.00 p.m., E.S.T. Its average speed over Jamaica was 18 m.p.h., a high speed for such a destructive storm; but there is some evidence that its speed over the eastern half of the Island was of the order of 15 m.p.h., gradually increasing to 20–22 m.p.h. in the western half. The exact track of the centre over the western parishes is rather difficult to determine.

4. *Characteristics*: (a) *Pressure*. No sequence of barometer readings from a station in the path of the storm is available, but the minimum pressure at one point on the path, Harmony Hall, Duncans, Trelawny (recorded by G. Dewar, Esq.) was approximately 980 millibars (28.84 inches). A barograph record made at Montego Bay (by W. Pocock, Esq., using a barograph loaned by R. Grubb, Esq.), showed a minimum pressure of about 984 millibars (28.96 inches). The centre passed about 2-3 miles north of Montego Bay, but the town appears to have experienced the outer part of the eye of the storm as a definite lull was reliably reported. Investigation of the sequence of readings from Morant Point Lighthouse, indicated a minimum pressure of the order of 978 millibars (28.66 inches) at the centre before it struck the Island.

The readings recorded at some observing stations were as follows (times in local time, E.S.T., 24 hour clock, and pressures in millibars and corrected to mean sea level):—

Palisadoes Airport

Time	Pressure
0700 hrs.	1009.2 mbs.
0900 "	1008.3 "
1000 "	1006.2 "
1100 "	1003.5 "
1200 "	1002.4 "
1300 "	1000.2 "
1400 "	1002.1 "
1500 "	1006.0 "
1600 "	1007.8 "
1900 "	1011.3 "

Vernam Field (U.S.A.A.F.)

Time	Pressure
1200 hrs.	1008.5 mbs.
1300 "	1007.1 "
1400 "	1005.4 "
1500 "	1004.4 "
1600 "	1004.4 "
1700 "	1005.8 "
1800 "	1007.1 "
1900 "	1008.8 "

The figures from Morant Point are not available but from 3 a.m., the pressure fell with increasing rapidity until after 9 a.m. the graph becoming almost a straight line, indicating a uniform rate of fall of 0.9 millibars per mile distance from the centre (Morant being approximately 27 and 12.5 miles from the centre at 9 and 10.30 a.m. respectively). Assuming that this rate of fall was maintained to the boundary of the eye, that the eye was about 5 miles in diameter, and that the isobars were circular, the pressure at the boundary of the eye at 10.30 a.m. would be 10 x 0.9 *i.e.* 9.0 m.b. less than at Morant where a minimum pressure 987 mb. was recorded at about 10.30 a.m. It can be assumed that there was no great change in pressure within the eye and that therefore the minimum pressure at this time was of the order of 978 millibars.

The graph for Palisadoes shows until about 10.45 a.m. an increasing rate of fall almost identical with that at Morant but then the rate becomes irregular and a minimum of 1000 mb. is reached at about 1 p.m.

Palisadoes was 25 miles from the storm centre at its nearest point, and by comparison with the Morant readings a minimum pressure of 1000 millibars was to be expected. The irregular shape of the Palisadoes curve is difficult to explain, unless either the storm was asymmetrical or it was distorted by contact with the mountains.

The graph for Vernam Field showed a less steep fall than at Morant with a minimum of 1004.4 millibars. Vernam Field being 35 miles distant from the storm centre at its nearest point, a minimum of 1003.5 millibars was to be expected by comparison with the Morant readings. The discrepancy between the observed and expected readings, though small, may indicate either that some filling up had occurred, or that the pressure gradient decreased outwards from the centre. (Pressure gradient is change of pressure over a unit of distance).

The graph for Negril showed a slower rate of fall than at Morant and a minimum of 1001 mbs. was reached at 6.30–7.00 p.m. Negril being 24 miles from the storm centre at its nearest point, a minimum of 1000 millibars would be expected by comparison with the Morant readings.

From the above readings and remarks the following points may be noted:—(a) The area of excessively large pressure gradient on the south side of the hurricane was comparatively small, being of the order of 30–35 miles radius. The area was probably slightly greater on the north side. (b) The minimum pressures at Vernam Field and Negril are evidence in favour of the theory that filling up occurred in the western section of the landtrack, but that deepening was renewed once the hurricane passed out to sea. (It had been over the sea some 1½–2 hours when the Negril minimum was recorded).

(b) *Wind.* For purpose of analysis the wind the Island can best be divided into three sections, viz. (1) the area north of a line from Manchioneal to Lucea, *i.e.* within 7–8 miles of the path of hurricane (2) the area between that line and a line joining Yallahs and South Negril Point; (3) the area to south of the last-mentioned line.

The boundaries of these areas are of course artificial and serve merely as rough guides.

Area 1. No instrumental observations of wind force or direction are available from places in the path of the hurricane, but it is possible to make one fairly reliable estimate of the speed at Annotto Bay shortly before the centre passed that town, and after the hurricane had travelled along the coast for some two hours. Two railway vans, weighing 14½ tons each, situated approximately at 90° to the wind direction, were overturned, from which fact it may be deduced that the wind speed was of the order of 100–120 m.p.h.

At places in the path of the eye of the storm, which included practically all coastal areas, the sequence of wind changes was NE, increasing in force and backing to N, NNW, and in some cases WNW, followed by a lull of 10–20 minutes, after which a S-SE wind sprang up, gradually backing ESE-E. South of the eye the change was from NE to NW to SW to E, but some places, *e.g.* Alexandria, St. Ann, 4 miles away from the eye path reported a lull between the NW-W winds and the SE-S winds. It may be that the lull was more due to local screening from the intervening winds between W and SE, rather than being connected with the storm eye.

The strongest winds occurred between Manchioneal and western St. Mary. From Manchioneal to Boston Bay (near Priestman's River) the mountain ranges run almost parallel to the coast and quickly rise to 1,000 feet, and within a few miles to 3,000 feet. Consequently the N and NNW winds ahead of the centre were magnified along this coast by funnel action against the mountains. Generally speaking the winds east of the centre were much weaker than those ahead over the whole area, but this was particularly so from Manchioneal to Annotto Bay, due to the shielding effect of the mountain mass to southward. From Annotto Bay to Montego Bay there are some reports from exposed hilltops of the winds east of the center being as strong as those ahead. In the valleys, particularly in St. Mary, extreme north of St. Andrew and extreme north of St. Catherine, the winds sometimes became locally magnified by funnel action.

Area 2. The eastern half of this area was shielded from the strong north winds ahead of the hurricane except where there was a north-south valley—as at Stony Hill and Bog Walk—and generally experienced its first strong winds from some westerly point, backing gradually through S to SE. Windspeeds were of the order of 30–50 m.p.h. but locally greater, an estimated maximum of 60 m.p.h. being recorded at exposed Palisadoes, where the rain was driven into the Dines Pressure Tube Anemometer and caused fictitiously high readings. The western half of the area experienced NW winds ahead of the storm, backing gradually through SW to SE. The winds as reported, except in coastal areas, were not so strong as in the eastern half of the area.

Area 3. Except in coastal areas the winds ahead of the hurricane were comparatively light – 10–15 m.p.h.—from WNW–WSW, backing gradually through S to SE and increasing in velocity to 15–25 m.p.h. and becoming squally. Vernam Field recorded winds of less than 10 m.p.h. until the direction turned to S, after which the velocity increased to 20 m.p.h. for a period of a few hours and backed to SE.

The following points are noteworthy: (a) the small area of the hurricane in which the wind actually exceeded hurricane force (75 m.p.h.); (b) the area in which the wind exceeded 30 m.p.h. was not more than 30 miles radius on the south side of the centre.

(c) *Upper winds*: Two upper air ascents were made with wind finding balloons at Palisadoes during the hours preceding the hurricane. The results are given below. The sharp increase of wind above 6,000 feet on the second ascent is noteworthy and indicates that the mountains shielded the Kingston area from the strong N and NE surface winds which preceded the storm but did not greatly interrupt the strong flow at 6,000'.

Upper winds at 22.30 hours E.S.T.

Surface	WSW	8 m.p.h.
1,000 feet	200°	3 "
2,000 "	300°	3 "
3,000 "	360°	7 "
4,000 "	030°	8 "
5,000 "	..	..

Upper winds at 0900 hours E.S.T.

Surface	NW	3 m.p.h.
1,000 feet	290°	8 "
2,000 "	310°	12 "
3,000 "	340°	9 "
4,000 "	350°	9 "
5,000 "	010°	12 "
6,000 "	020°	18 "
7,000 "	030°	35 "
8,000 "	030°	40 "
9,000 "	030°	60 "

No measurements of upper wind were possible during and after the passage of the hurricane, the cloud being too low.

(d) *Weather*: Although heavy rains had fallen the previous afternoon and night in certain areas, there was comparatively little rain immediately ahead of the hurricane, or in the central area, but behind it there were appreciable falls. The total fall for the Island during the 24 hours commencing 7 a.m. on the 20th is shown on the map, Fig. II at the end of the Report. Contours of rainfall are drawn at intervals of 4 inches. There were no reports of thunder or lightning in the central area, but some moderate to heavy thunderstorms occurred 3 to 12 hours after the storm, principally in the south-eastern areas. There were reports of low stratus cloud with a base of about 100 feet in the eye of the storm, but this was not exceptional as this type of very low stratus has been observed previously during calm periods immediately following a shower of rain. The lowest cloud bases at Palisadoes were recorded during the rain and thunderstorms following the hurricane, being down to 800 feet at times. The lowest ceiling cloud recorded at Vernam Field was 1,500 feet, again during the rain following the hurricane.

(e) *Temperature.* A continuous record of temperature is available from the Orange River Experimental Station of the Department of Agriculture. This station was in Area 1 near the path of the hurricane centre. The readings show the small diurnal variation of temperature which is to be expected with much cloud and high wind on any occasion, and the trace offers no abnormal features.

(f) *State of Sea.* Very heavy swell on the open sea was noted at Palisadoes when the centre was still 70 miles distant, and appeared to be unchanged 2 hours later when the centre was about 35 miles nearer. No further readings were possible. Morant Point Lighthouse reported very heavy swell from an ENE direction when the centre was over 50 miles distant.

It is noteworthy that the area of very heavy swell was considerably larger than the area of winds greater than 30 m.p.h.

5. *Damage.* Well over 30 people were killed, principally by falling building and trees and by zinc sheets and lumber carried by the wind. Heavy damage was caused by wind and flood water, totalling, at a conservative estimate, £3,000,000. The deaths mainly occurred in Portland, St. Mary and St. Ann.

The damage may be broadly classed under the following headings: Buildings, Bananas, Coconuts, Citrus, Other Crops, Other Damage.

Buildings. The main damage to buildings occurred in Portland, St. Mary, St. Ann, northern Trelawny, northern St. James, northern St. Andrew, northern St. Catherine and eastern St. Thomas, the first three suffering heavy destruction, and fourth one considerable damage to large buildings. Small single or double roomed dwellings of light construction were either blown down or crushed by falling trees. Larger dwellings, which were damaged, mostly remained intact until a shutter or window was blown open, after which the roof was easy prey for the wind. In some cases, where the wind was able to get beneath a building, it was lifted bodily several yards. Several large buildings, particularly churches, had their roofs completely removed and suffered much internal damage.

Bananas. Exceedingly heavy damage to bananas occurred in all the principal banana-growing areas. In many cases properties suffered a total loss of bananas.

Coconuts. Heavy damage to coconuts occurred in nearly all the principal coconut-growing areas. The loss is very serious as coconut trees require several years before fruition, and a considerable local industry in processing coconuts had been established. The destruction of coconut trees had a secondary effect, in combination with the destruction of other trees, in that in many areas the roads and railways became strewn with tree trunks which had to be cleared before any wheeled traffic could pass. It may be noted that nearly all the broken coconut trees broke at the bole and fell immediately, and were not carried in the wind.

Citrus. Citrus crops suffered little damage, due largely to the fact that they are mainly situated in the southern half of the Island.

Ground Crops and Pimento. These crops suffered badly in Portland, St. Mary and St. Ann where livestock also suffered some loss, but were not badly damaged in several of the other parishes. Sugar cane and coffee were not much affected; it was estimated that there was 5% damage to the former.

Other Damage. A ship of the Royal Navy was driven on to the rocks off Rio Bueno. Two railway waggons were overturned at Annotto Bay. Flood waters caused the collapse of the central portion of the Olivier Bridge in St. Thomas, much damage to river banks and roads by scouring. Many roads were blocked by land slides.

6. *Conclusion.* The meteorological facts of note have mostly already been indicated, but the question of whether any filling up and weakening of the storm occurred needs mention. The barometric evidence, viz: minimum pressures at Vernam Field and Negril 1 millibar greater than would be anticipated from the Morant readings, is meagre. There is little doubt however that the general velocity of the wind ahead of the storm was less in the west of the Island than in the east, as evidence by the lesser damage to trees and *small* buildings in the west. It seems therefore that the storm did weaken during its passage over land. This would be consistent with the fact that its speed of translation increased in the west, since correlations have shown that the more intense the circulation the slower the speed of the whole system. Friction over the land would also diminish the force of the wind.

The dimensions of the eye of the storm are of interest. It has been assumed above (para. 4 (a)) that the diameter was 5 miles before it struck the Island. This was based on reports that the lull was of the order of 15–20 minutes in extreme eastern districts. East of Annotto Bay all the available reports come from coastal stations, and without exception report a lull. West of Annotto Bay lulls of duration varying from 15 to 30 minutes are reported from places situated in a belt 8–10 miles wide. It therefore appears that the eye was increasing in diameter in the west of the Island, and that this factor may be connected with the weakening of the storm.

The effects of the hurricane demonstrated the worth of solid buildings as against lightly constructed ones, and the wider questions of preparations and insurance against events of this nature will doubtless have been discussed more appropriately elsewhere.

J. T. GILBERT, B.Sc.,
Meteorological Officer.

Meteorological Office,
Palisadoes, Kingston,
July, 1946.

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Thanks are due to the many officials and private persons who have contributed information in large or small measure to assist in the compilation of this Report.

Most of the material was gathered and examined by Mr. S. H. Harvey, the Meteorological Officer at the time of the Hurricane, but due to circumstances he was unable to complete the work before his return to England.

J. T. G

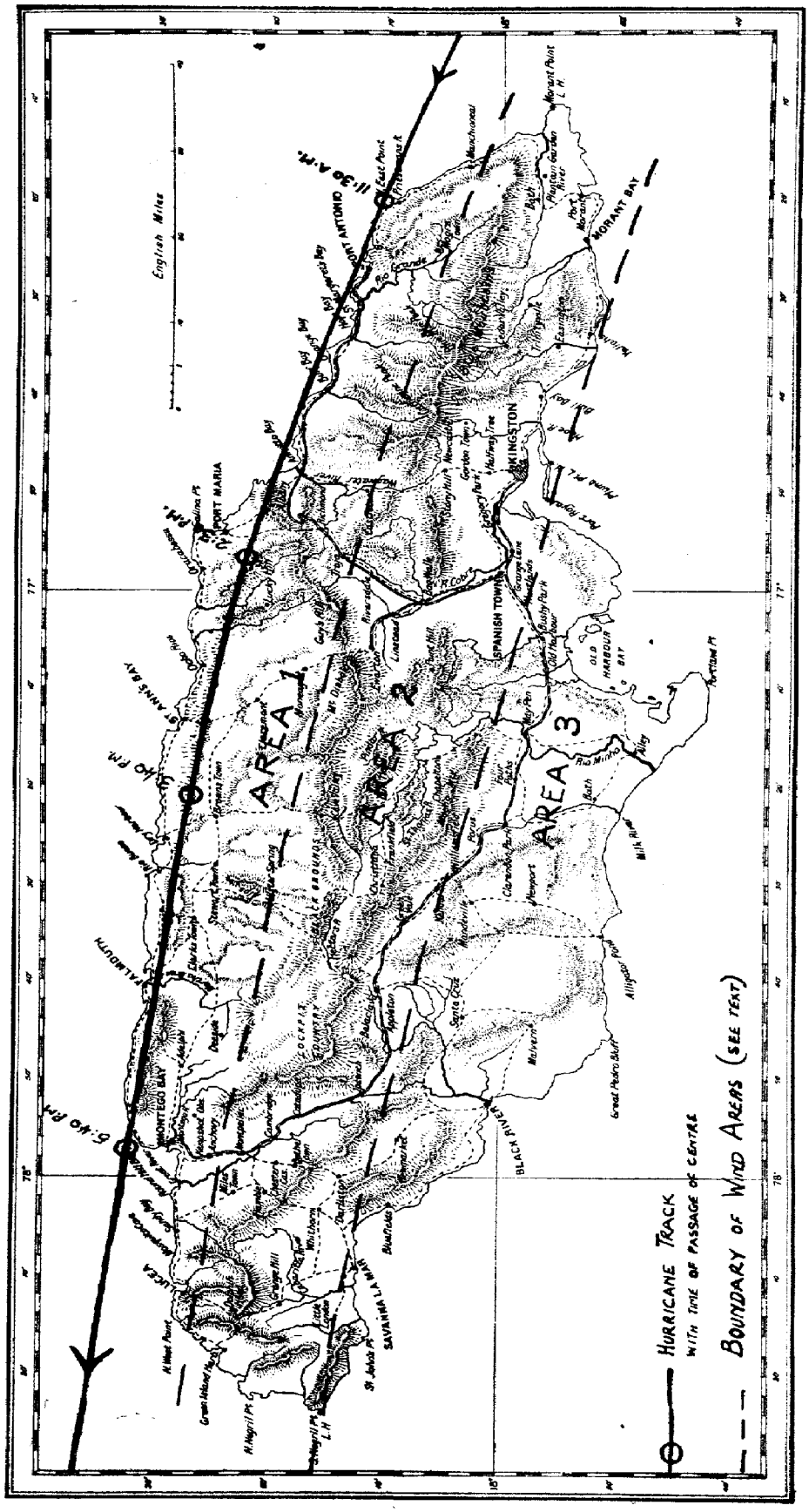
THE HURRICANE OF 20th AUGUST 1944
AREA 1
AREA 2
AREA 3
KINGSTON
SPANISH TOWN
PORT MARIA
MONTEGO BAY
MORANT BAY
HURRICANE TRACK
WITH TIME OF PASSAGE OF CENTRE
BOUNDARY OF WIND AREAS (SEE TEXT)

Fig. 1

MAP SHOWING RAINFALL DURING 24 HOUR PERIOD COMMENCING 7 A.M. 20th AUGUST 1944

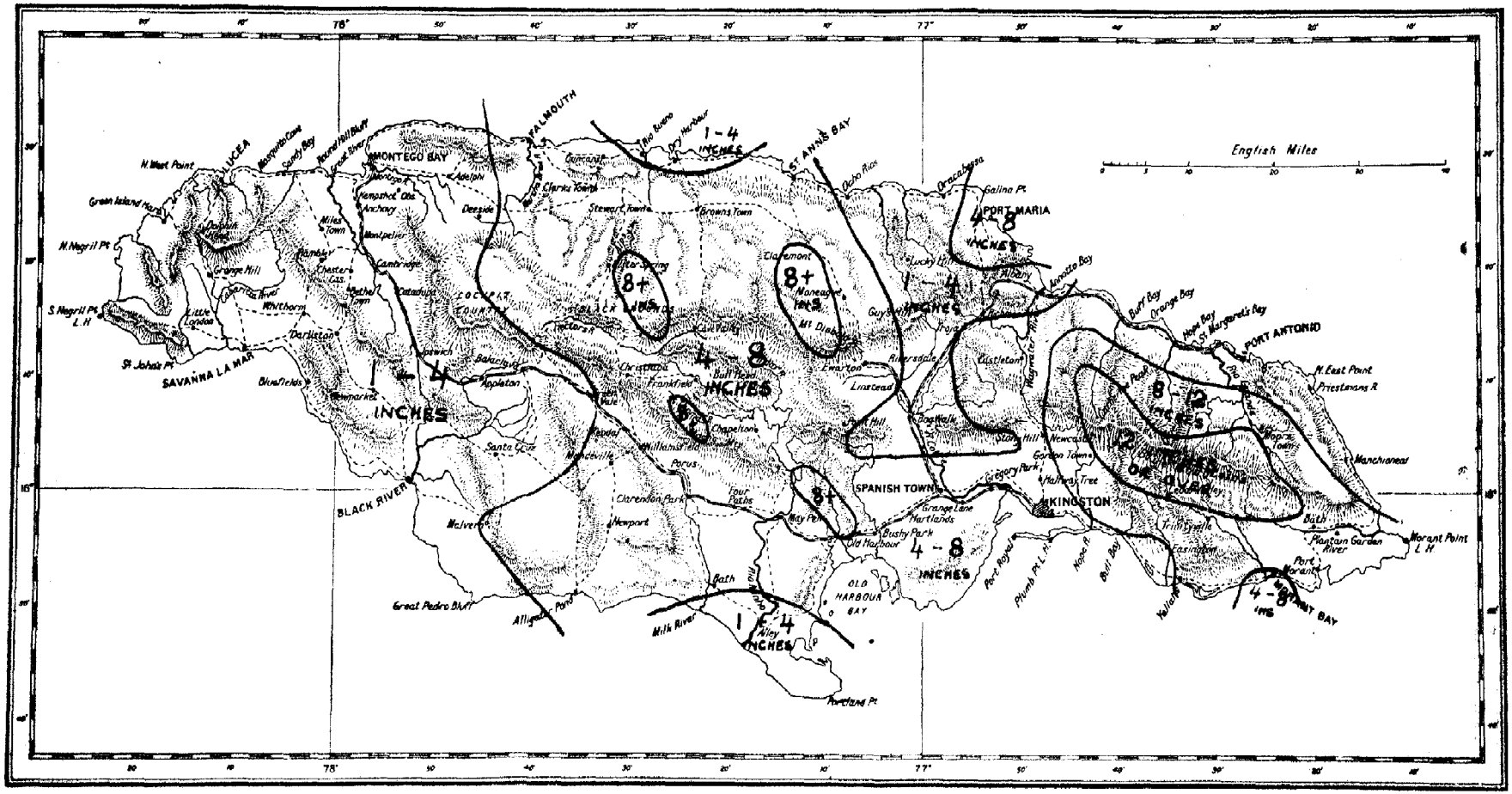

Fig. 2