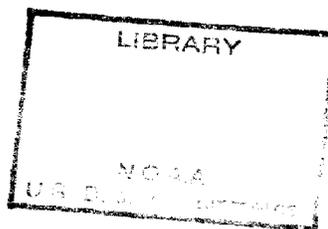


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A REPORT



ON

THE HURRICANE

OF

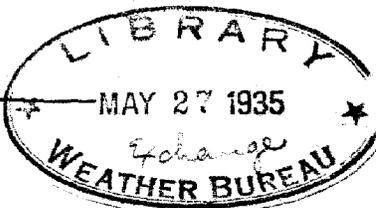
WESTERN JAMAICA,

October 29th, 1933

BY

~~55607~~

The Government Meteorologist.



JAMAICA
GOVERNMENT PRINTING OFFICE KINGSTON

1934.

National Oceanic and Atmospheric Administration

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HURRICANES IN JAMAICA.

RECURRENT PERIODS OF ACTIVITY AND TRANQUILITY.

1. From the year 1917, September 23rd, when the Island was visited by a disastrous hurricane—which passed near Manchioneal (east of Jamaica) and continued in a west-north-westerly direction, through the country, towards the western section—there has been no hurricane traversing the Island (until 1933), during an interval of sixteen years. It may be noted, however, there were several hurricanes or weather disturbances, passing in proximity to the Island occasioning very high winds, or gales, disastrous to cultivation or otherwise, as, for example, what was experienced during the hurricane which recently curved around to the west of Negril Point in November, 1932.

2. But this, apparently prolonged period of tranquility is certainly superseded by a more extended lapse of time, dating from October of the year 1844 to October, 1874 shewing an interval of 30 years. The beginning of this period of 30 years, in October, 1844, marked the occurrence of a storm which passed over the western half of Jamaica; and in the year 1874, also in October, another storm passed over the eastern half of Jamaica, moving through from Kingston to St. Ann's Bay. There is also a record of a long period of the absence of such visitations, dating so far back as from the year 1786 to 1812, covering 26 years, and, furthermore, the late Mr. Maxwell Hall quotes in Vol. II, page 6 of his Introduction to the Weather Reports, that in Long's "History of Jamaica," Vol. I, page 364, (published in the year 1774), there is on record "The English, from their first settlement in 1655 to 1689, a space of 34 years, never were afflicted with any of these terrible winds."

Summarizing now, in chronological sequence, we have gaps of 34, 26, 30 and 16 years elapsing without the advent of hurricanes across this Island.

On the other hand, there was a frequency of such disasters occurring, as it were, in groups, as may be exemplified in the four hurricanes seriously affecting the Island between the three years 1812 and 1815; and still another group of four during a more recent period, a century after, between the year 1915 and 1917, which disturbances either passed over, or quite near to the coast so as to cause material damage. Referring still very much farther back, into the 18th century, between the years 1780 and 1786, a period of six years, there appears on record a third group of five disturbances mentioned.

3. Special attention is invited to the fact that the year 1933, between the months of June and October, may be regarded as being unsurpassed, and without parallel, in claiming the unique distinction of the highest record of at least fifteen hurricanes or weather disturbances, moving in Central American waters or in the Caribbean region, during the period mentioned. Nine of which storms may be classed as attaining hurricane force at one section or another along their tracks, and five of these fifteen disturbances coursed dangerously near to the south coast of the Island; one near to the north coast, and one, terminating the season, with the disastrous hurricane, which swept across the western parishes of this Island on 29th October, 1933. The year 1933 will, therefore, be recognized as a phenomenal year for the development and progress of weather disturbances in these waters.

THE HURRICANE OF SUNDAY, 29TH OCTOBER, 1933.

4. During the early days of the month, from the 1st to the 2nd, a weather disturbance organized somewhat to the south of Jamaica, and moved on a track around to the westward of Negril Point, causing a heavy rainfall all over the Island, from the 1st to the 4th giving an aggregate mean total of about 10 inches for the four days. After the 4th October there was no indication of any other disturbed weather conditions presented near Jamaica, until the 28th which will now be reviewed by the aid of all data at command.

5. From the daily observations made at Kingston, during the five days, from the 23rd to the 27th Oct. there was a persistently steady low barometric pressure prevailing, which ranged from 0.06 inch to 0.08 inch below the October normal. This circumstance merely denoted that there was a large area of low pressure, with no tendency to disappear or otherwise to "fill up." At no time was the barometer so low as even a tenth of an inch below the normal, consequently there was no indication apparent of a disturbance developing in the vicinity, during these days. It was not until 9 p.m. of Friday 27th the pressure fell to 0.09 inch below the normal. The barometer continued to gradually fall, when in the forenoon of 28th it was 0.12 inch below. It was then evident that a weather disturbance was coursing not far from Jamaica, for the forenoon observation made at Negril Point Light House shewed 0.03 inch gradient above that of Kingston, at the same hour Morant Point reported the existence of easterly gales with somewhat heavy seas, pointing to a disturbance approaching to the south-east of Jamaica. At 11.45 a.m. on 28th it became necessary to circulate a general warning around by all the Island Telegraph Offices, advising caution for the next 36 hours. Also at 3.45 p.m., same day a second warning was issued, confirming the necessity for continued caution.

6. There was then conclusive evidence that a weather disturbance was certainly in the vicinity, to the SE of Jamaica, probably moving in a WNW direction, with increasing intensity, for as this storm proceeded on its course, it was reported that a vessel at 6 p.m. on the 28th when about 100 miles to the south of Kingston, encountered in the open sea wind of hurricane force.

7. This hurricane continued north-westerly on its track towards the near south-west coast of Jamaica. The Kingston barometer continued to fall until at 3 a.m. on Sunday 29th it read 29.60 ins., or equivalent to 0.27 inch below the normal. At that instant the centre of the hurricane was estimated to be about 60 or 70 miles to the south-west of Kingston, in the open sea. The barometric pressure then rose rapidly from 3 a.m. to 3.30 a.m., showing that the centre was advancing further to the westward, and away from Kingston. The local wind up to midnight of the 28th did not exceed 9 miles per hour from east, owing possibly to the topography of the country near Kingston, and Kingston being not so exposed as at Morant Point. The wind subsequently increased to 28 miles per hour, south-east, at 3 a.m. on Sunday 29th and then gradually decreased to 21 miles per hour SSW at 7 a.m. the 29th, veering to the south-west after that hour.

8. From all the data of observations kindly supplied by the local proprietors of estates and others stationed in the parishes of St. Elizabeth, Westmoreland, Hanover, St. James and other localities, the evidence seems to conclude that the track of this hurricane, which was located at some point, probably about 120 miles distant to the SE of Jamaica, on the 28th must have moved in a WNW and NW direction, coursing out at sea, some little distance from Milk River, Alligator Pond, Pedro Bay, (very near) Black River, (about 5 miles distant from the town), from the south coast, eventually passing to the south of Sav.-la-Mar and curving around Sav.-la-Mar between noon and 1 p.m. on the 29th at a point between Sav.-la-Mar and Retreat Estate, Westmoreland. The centre then acquired a rather unusual acute turn around the west of Sav.-la-Mar before finally crossing country through Westmoreland and Hanover with egress to seaward (to north) near to the mouth of the Great River, between the parishes of Hanover and St. James, at about 6 p.m. on Sunday the 29th. When passing north-eastwardly to seaward it is estimated to have been, at about 7 p.m., approximately 5 miles to the north-west of Montego Bay.

THE CHARACTER OF THE HURRICANE AND ITS EFFECT ON WEATHER CONDITIONS.

9. Overwhelming evidence supplied established the fact that this storm gained hurricane force, of from 80 to 100 miles per hour, at many places, in its progress, either at sea, along the near southern coast regions of Southern Manchester, St. Elizabeth, and Westmoreland or, when it traversed the country from a point to the immediate west of Sav.-la-Mar, coursing in a north-easterly direction to the eastern border line of Hanover, near to the mouth of the Great River.

10. At sea, the vessel already mentioned on its voyage from South America when about 100 miles to the south of Kingston, on the 28th at 6 p.m., reported the storm as of hurricane force. In the early morning hours of Sunday, 29th October, when the centre of storm had continued near to the Ports of Milk River, Alligator Pond, Pedro Bay and Black River, the experience at certain places definitely classified it as one of hurricane force, or very near to that scale of wind, notwithstanding that the centre of the storm kept many miles to seaward, until it coursed towards the land at the point of ingress between the west of Sav.-la-Mar and to the east of Retreat Estate in Westmoreland. This hurricane force appears to have been maintained during its further progress across the Island with probably some diminution in wind intensity. The loss of life and damaging effects rendered to property were more marked in St. Elizabeth and Westmoreland than in the parishes of Hanover and St. James.

11. The consequent precipitation at the time was gauged as follows: In the eastern parishes the mean rainfall was heavier on the 28th than on the 29th October, recording over 5 inches on the 28th, and about 3 inches on the 29th giving a total for the two days of approximately 8 ins. In the western parishes the reverse condition obtained, for there was less rainfall on the 28th than on the 29th. The 28th gave a mean of about 1½ inch, whereas on the 29th the mean amount gauged was about 5½ ins. It will, therefore, be seen that to westward the rainfall of 29th was about four times as great as on the 28th. In the eastern section it will be gathered, that as the position of the storm centre was to the south of Morant Point on the 28th and the rainfall would be inevitably greater than on the 29th. When the centre had moved to the westward of the Island the reverse was experienced, and more rain was gauged on the 29th instead. There was, however, a total rainfall of about 7 ins. for the western section, as compared with 8 ins. falling in the eastern section on these 2 days.

12. It is also worthy of note that although the storm centre was over 100 miles distant to the south of the eastern parishes, on the 28th and still further on the 29th the mean rainfall for the 28th and 29th was over 8 ins. as compared with that of the western parishes which shewed a mean total of 7 ins., demonstrating that upon occasions the outer area of a revolving storm system may be capable of releasing greater precipitation than the area near to the vortex.

13. It is typical of the October storms in the Caribbean to confine their development and progress in their paths, to a region definitely to the westward, in these waters, and quite unlike the character of the August tracks originating to eastward. Only a small percentage, of the October weather disturbances, really generate to the eastward of Jamaica. By reference to the records it will be found that prior to 1932, for 30 years, only one October storm passed to the south of this Island, in a WNW course (in 1916). Since the year 1932 there seems a tendency to organize in this region, near SE of Jamaica.

14. The hurricane of October, 1933 in sweeping around the town of Sav.-la-Mar changed its direction of movement with a sharp curve, almost at right angles. Such an occurrence is not exceptional, for attention may be drawn to the hurricane of 15th October, 1910 which crossed over the western end of Cuba, at Finar del Rio, and looped in a small diameter track, then, returned to intersect its original track, before it continued on a course to the northwest of Cuba.

15. Along the track of this recent hurricane the distance travelled from the time when the vessel encountered it to the far south of Kingston, at 6 p.m. on Saturday, 28th, to 12 noon on 29th October, when it reached Sav.-la-Mar, a distance of 150 miles was covered in 18 hours. This gives an average velocity of movement in its track as far as Sav.-la-Mar, of about 8 miles per hour, but it apparently occupied about 2 hours to curve around Sav.-la-Mar at a much decreased velocity. From this town to the mouth of the Great River gives a distance of 20 miles, consequently, as the storm passed to the north coast at about 6 p.m. on the 29th the time taken would be 4 hours, giving a reduced velocity rate of 5 miles per hour when traversing Westmoreland and Hanover.

16. From the reports circulated defining the areas which suffered property destruction, wrought by this storm, it can to some extent, be estimated that wind of hurricane force was experienced at least, within a radius of 15 to 20 miles from the centre, and wind of high gale force beyond that distance to probably 30 miles inland, particularly along the St. Elizabeth and Westmoreland southern parts. The force of the wind nearer to the centre of storm may have attained a velocity of 100, or more, miles per hour along some parts of the track. This, of course, applies to the right hand, or dangerous, sector. Places on the left hand sector of storm track would be subject to a less force of wind, as instanced at Negril Point—although the centre was located at about 16 or 18 miles away to eastward, the wind as recorded at the Light House did not exceed about 50 miles per hour, and classed as of gale force. This storm, therefore, would not fall within the class of the Tornado type having a small and very destructive centre. Sav-la-Mar, although located near to the centre did not, apparently, suffer greater damage than Black River. The range of destruction entitles the hurricane to be regarded as one of large diameter.

17. Mention must be made here of the receipt of Tables and Reports of valuable observations undertaken by residents in the vicinity of the storm track, including places particularly in the parishes of St. Elizabeth, Westmoreland, Hanover and St. James. These voluntary contributions embrace methodical barometer readings, notes of wind direction and velocity, etc., that render material aid for the determination of the most likely course taken by this destructive hurricane across the western parishes.

18. Each of these reports will be briefly referred to, in order to shew in what manner the deductions have been made, so as to arrive at the line of track, as well as to demonstrate whether the many changes of wind direction and barometric pressure from hour to hour, be in accordance with the theory concerning revolving storms in the northern hemisphere.

19. For the purpose of better elucidation it is considered, perhaps, advisable to first deal with that portion of the storm course, adjacent to the seaboard, until it enters land to the west of Sav-la-Mar, and it will be denoted as the southern section. The remainder, across country to the northside, as the northern section as follows.—

THE SOUTHERN SECTION.

20. In dealing with the reports, from the several voluntary observers, in this section, they will occur in the order from east to west, so far as their meridians are concerned, and as nearly as possible following the line of direction of movement of the hurricane, as given below, and the respective tables studied.

21. An interesting account, from near the Great Pedro Bluff, St. Elizabeth, is presented by Mr. W. H. Coke, Solicitor of Mandeville, who happened at the time to have been in the locality, at Calabash Bay, on the 28th and 29th October. This place is situated near to the coast line, and the storm centre not far away. There was wind of hurricane force from the north, changing to north-east at about 5 a.m. to 7 a.m. on the 29th. This would indicate that the centre would have a bearing about south-east, and at 7 a.m. the centre apparently approached dangerously near to the coast, for there was calm noted lasting for 15 minutes, to 7.30 a.m. At 8 a.m. the centre moving north-westward was possibly about due west, for at that moment the southerly wind, at Calabash Bay, would indicate that direction. These observations are convincing.

22. At Munro College, Mr. John Thompson reports from a point about 5 miles inland, that a maximum velocity of wind, of hurricane force was noted from the east at 6.30 a.m. on 29th. At that moment the centre would have been almost due south of Munro. Later on to 10 a.m. the wind kept blowing from due south, when the centre would have advanced to the westward, in the vicinity of Black River. This may be accepted as being in conformity with principle of a revolving storm.

23. Near to Black River, at a point about 6 miles to the northward of that town, Mr. Septimus Nash took notes of instrumental observations, as well as of the wind directions, at frequent intervals, from 5 p.m. on 28th throughout the 29th and to the early morning of the 30th October. These shew definitely that the storm centre was nearest to Black River at about 8.30 a.m. on the 29th when he noted his barometer lowest (corrected to diurnal var.) as 29.21 ins., being about one inch below normal. The wind was then blowing more or less from the east and changing to ESE by 10 a.m. on the 29th, with hurricane force. Following this, when the centre was estimated as being almost due west of Mr. Nash's residence, it was approaching Sav-la-Mar, therefore, his wind direction as being from the south, established the fact very well that the line of track should be as shewn on the map, herewith. And furthermore when the centre was near to the mouth of the Great River, at a point nearly north-west, about 30 miles distant, the wind at Black River changed its direction to south south-west, and finally south-west the following morning of the 30th. This is very satisfactory. There were showers of rain for about five hours at Black River.

24. At Sav-la-Mar, the Revd. Canon H. W. Cope, at the Rectory, also exhibited a deal of interest in noting his barometer readings as well as the wind direction, from 8 p.m. on 28th to 5.10 p.m. on the 29th October. An easterly wind was experienced which would place the storm centre nearly due south of that town, just a little before noon. There was lowest barometric pressure from about 11.40 a.m. to about 2.55 p.m. when the eastern side of the Sav-la-Mar Church and Church Hall sustained damages from an easterly wind of hurricane force. The centre appears to have been retarded in moving around the westward of Sav-la-Mar in an acute curve, as usually occurs in such instances. The lag of a storm in such movement would also create a confused wind direction. As the centre proceeded to advance towards Hanover the barometric pressure gradually increased, when from 3 p.m. to 10 p.m. the 29th the pressure rose from 29.04 inches to 29.43 ins., or about 0.40 inch. The prolonged period of calm, from 2.45 p.m., suggests that the storm centre must have moved very slowly, and not far from the town, maintaining a calm from 2.45 to 3.15 p.m., representing a duration of 30 minutes. The greatest fall of the barometer appears to have been 0.70 inch at about 2.55 p.m. on the 29th from the evening previous. The rainfall at Sav-la-Mar for the 28th and 29th gave a total of 6.25 ins.

25. Now, Retreat Estate, which is situated midway between Negril Point and Sav-la-Mar, reports lowest barometer at 1.30 p.m. on the 29th with wind of such force as to be able to blow to the ground the Works' steel chimney from north to south, causing material damage. The wind as blowing from the north at that moment certainly determines the centre of storm as towards the east of Retreat Estate. And, as has been already shewn, the hurricane must have been passing then to the westward of Sav-la-Mar, and conclusively leading to the belief that the centre traversed country between Sav-la-Mar and Retreat, possibly somewhere nearer to Retreat. There was heavy rain at Retreat, and a total fall of 4.75 ins. was gauged on the 29th.

26. Negril Point Light House is the extreme western point on this section to deal with. Mr. Brownhill, the Superintendent, reports the lowest barometer reading as 29.279 ins. at 1 p.m. on the 29th. The wind was then at its maximum velocity of high gale force of 48 miles per hour, from the north-east at 2 p.m. changing immediately after that to north at 3 p.m. This clearly shews the storm centre as being at a point with a bearing eastward of the Light House. The rainfall on 29th gauged 5.85 ins. There was a moderate sea at the time, with no sea swell.

27. From the foregoing analysis it renders it quite evident that the storm must have pursued a fairly straight track, from a position, where it was first located on 28th at about 120 miles to the south-east of Kingston, then, at 6 p.m. the 28th it passed about 100 miles to south of Kingston, developing heavy seas off the Palisades, continuing to move in a north-westerly direction until arriving at the south of Sav.-la-Mar at about noon on the 29th.

28. Attention may be directed to the fact that it is known to sailors and others that at the centre of a tropical cyclone the calm region rarely exceeds 10 to 20 miles in diameter. Therefore, the deductions made by Mr. Coke, when the hurricane centre was adjacent to Calabash Bay, at about 7.15 a.m. on Sunday when it was then about 3 miles distant off the coast, appears to have been fairly well estimated by him, we can regard the diameter of the "calm centre" as, say, 10 miles and the mean rate of progress of the storm, along its track, 8 miles per hour. When we consider this diameter of 10 miles of calm to pass over any given point, it would occupy an interval of 75 minutes. Consequently, as Mr. Coke observed, an interval of calm 7.15 to 7.30 a.m. or 15 minutes, it will be therefore seen that during these 15 minutes, only 2 miles of this calm diameter (which forms a chord to the circle) passed Calabash Bay. A period of 15 minutes represents one-fifth of 75 minutes. The versed sine of this small chord of 2 miles would be merely, about, one-fifth of a mile and therefore, negligible. The distance of the centre from the coast, upon this basis, can reasonably be taken as about four and four-fifths miles, nearly equal to the radius of 5 miles.

29. By supposing as an alternative the calm centre to have been 20 miles, instead of 10 in diameter the distance of the centre, away to sea, would be nearly ten miles. It can then be admitted that at a very extreme allowance the centre could not even have been more than 10 miles away when passing near Calabash Bay.

30. That the centre of this hurricane pursued a track along a straight line, away from the coast, direct from a region far south of Kingston to a point of ingress to the near west of the town of Sav.-la-Mar remains indisputable; and at no time did the centre traverse through this country, such as Southern St. Elizabeth, although winds of hurricane force were experienced at a moderate distance from the track.

31. The remainder of the course of the hurricane through Westmoreland and Hanover will now be discussed.

THE NORTHERN SECTION.

32. With the northern section, in dealing with the several tables and data supplied appertaining to places situated either upon the line of the track, or in close proximity to it, the order of sequence will be somewhat different to that of the southern. They will occur, more or less, in the order as follows: 1, Sadlers Hall; 2, Round Hill; 3, Torrie; 4, Kempshot; 5, Rose Mount; and 5, Dromilly.

33. The storm centre appears, after leaving Sav.-la-Mar, to have moved along a line adjacent to Grange Hill and Petersfield, in Westmoreland. The church as well as other buildings and cultivation sustained damage, at Grange Hill. At Petersfield many houses were blown down and cultivation suffered.

34. Mr. E. P. Haughton James, of Sadlers Hall, Hanover, which is situated about 8 miles to the south of the mouth of the Great River, reports as having experienced north-easterly and easterly winds from about 3.30 p.m. to 5 p.m. on the 29th October. The barometer indicated 0.70 inch below the normal, the last tenth of an inch gained very rapidly, and torrential rains were falling at the time. The wind then shifted around to south-east and then south-west, still blowing hurricane force. This shews that the centre had passed to the westward of Sadlers Hall, probably about three or four miles distant. With a SW wind at 5 p.m. it would indicate the centre was advancing to the north coast of Hanover. All appeared to be over about 8 p.m. No calm was noted, except at about 2 p.m. This place must have been just outside the boundary of the calm area.

35. Round Hill, Hanover, which is situated a short distance to the west-north-west of the mouth of the Great River, and about $5\frac{1}{4}$ miles to the south-west of Montego Bay, recorded some important observations. The centre of storm, apparently passed a little to the eastward of this property. Major G. B. Pease observed the threatening weather conditions prevailing throughout, at the time on the 29th October. At 4.30 p.m. the greatest wind velocity occurred, and the lowest barometer reading then shewed 29.01 ins. At one time there was a severe blowing from westward, and trees had fallen. Then, later on trees fell in the opposite direction, shewing the proximity of the storm centre in relation to Round Hill.

36. When the hurricane was about to the south, moving in the region of Black River at about 8 a.m. 29th, there was a stiff easterly wind at Round Hill. A lull of wind occurred just before dark on 29th but the duration is not given. There is, however, much to shew that as the wind blew from the eastern direction before noon, and then later in the afternoon from the westward, establishes conclusive proof that the centre must have coursed nearby to the east of Round Hill, shortly after sunset.

37. Mr. J. G. M. Robertson, of "Torrie," St. James, situated about one mile to the east of Great River, supplied an exhaustive report, giving readings of his barometer and wind direction at frequent intervals, from Saturday 28th, Sunday 29th and to the 30th at 11 a.m. The lowest barometer at Torrie is shewn as 29.22 ins. at 5.15 p.m. 29th October. As the wind blew from the east at about noon the 28th the storm centre at that hour would have been near to Sav.-la-Mar. The centre evidently passed very nearly over his residence, for there was a lull, of light stifling winds, lasting 85 minutes, between 5.05 and 6.30 p.m. This long duration is accounted for by the slower movement of the storm as it travelled from Sav.-la-Mar to the Great River, a distance of 20 miles in 4 hours, giving a rate of 5 miles per hour, as compared with 8 miles per hour when moving off the south coast of the Island. By taking the diameter of the calm centre as still 10 miles it would have required 2 hours of lull if the actual centre had passed over Torrie. The centre is therefore estimated to have passed between Round Hill and Torrie towards the mouth of the Great River. At 8.30 p.m. on the 29th October high wind from the west was noted. The centre was then out at sea to the northward or north-eastward.

38. Mr. Edward Foster, F.S.I., of Rose Mount, St. James, also has contributed a very detailed account of observations taken by him at his residence about $1\frac{1}{2}$ miles to the eastward of Montego Bay. His notes of barometer readings, wind directions and other occurrences, go towards confirming the conclusion arrived at that the storm centre at the time of egress, or, when moving to seaward, near to 6 p.m. on the 29th inevitably passed over very near to the mouth of the Great River, between Hanover and St. James. The lowest barometer reading at Rose Mount was 29.11 ins. at 5.45 p.m., with a fierce wind from the south, changing to south-west at that time, clearly leading to the conclusion that the centre passed to the immediate west of Montego Bay, continuing in a north-easterly course.

39. Mrs. C. M. Stillwagon, of Kempshot, St. James, has presented a very elucidating report of her observations, covering a period commencing from 7 a.m. on the 29th October to 6 p.m. the 30th October. Although this place is situated about 8 miles to the south-east of Montego Bay, and 10 miles to the east-south-east of the mouth of the Great River (and about 1,770 feet above the sea) wind of hurricane force at 80 miles per hour, was experienced there. But being farther away from the centre of the storm than Rose Mount, the fall of the barometer at Kempshot below the normal was 0.42 inch, at 5.55 p.m., whereas at Rose Mount (much nearer) the barometer read at that hour on 29th 0.70 inch below normal of the 28th. This interesting series of observations of wind directions, if carefully studied, will shew clearly in what manner the successive changes of bearing of the storm centre conform with the hourly variation of wind direction with remarkable precision. Taking a few examples, it will be seen that when an easterly wind was noted at Kempshot at 7 a.m. on the 29th the centre of the storm, then, was a short distance to the east of Black River (35 miles away from Kempshot), and when there was an east-south-easterly wind noted at noon the storm was then coursing around to the westward of Sav-la-Mar. And, finally, at the time of 5.55 p.m. when the centre of storm was located near to the mouth of the Great River, Kempshot had southerly winds. These all shew ample concordance, in the support of the theory of a cyclone, or revolving storm, and also present additional evidence so as to confirm establishment of the line of the track of this 29th October hurricane, as delineated upon the small map attached to this report.

40. At Dromilly, about 12 miles to the ESE of Montego Bay, and 700 feet above sea level, Mr. E. P. Burgess writes that he estimated the force of wind on Sunday 29th as blowing 70 miles per hour, in gusts, when his barometer read 29.40 ins., or 0.48 inch below his normal. The wind changed from easterly to south-easterly on Sunday night. There was no lightning noticed.

TERMINATION TRACK OF THE HURRICANE.

41. This hurricane of October, 1933, after traversing western Jamaica moved in a north-easterly course, seaward, to a point situated about 30 miles to the west of the city of Santiago-de-Cuba, on 31st October; then changing for a north-westerly direction, across Cuba, to a point a short distance to the west of the town of Nuevitas, north coast of Cuba, on 1st November. Taking, again, a somewhat sinuous course, on the sea across the great Bahama Bank, until it arrived near to the south of Andros Island of the Bahamas, on the 4th November.

42. The intensity of this storm after crossing western Jamaica diminished somewhat, for in traversing Cuba, overland, along a track of about 200 miles, so far as Nuevitas, the wind became moderate, but with heavy precipitation. After egress from Cuba it gradually regained strength, until it reached the Andros Island, Bahamas, on 4th November.

THUNDERSTORMS.

43. There was an almost general absence of reports of thunderstorms occurring along, or in the neighbourhood, of the track of the hurricane. At Duncans, in Trelawny, however, there is a report of lightning observed on 28th October; the day preceding the storm of the 29th October.

44. It may be added that twenty-one years previously, during the hurricane of November 1912, to the westward of Jamaica, thunderstorms were observed at Negril Point on 17th at 10 p.m. and at Kempshot Observatory on 18th at 6 p.m. There was also, at Kingston, a record of a thunderstorm to eastward on 16th November between 4 a.m. and 6 p.m.

45. Thunderstorms are, apparently, somewhat characteristic of a tropical cyclonic system. They are generally coincident with such visitations, as a disturbance becomes well developed.

RAINFALL.

46. Although the monthly Jamaica Weather Reports have published accounts of the phenomenal rainfalls occurring from June to November, 1933, it may be appropriate to repeat the mean totals for the Island, along with their averages, for these six months, as follows:

1933.	Rainfall.	Average 60-year.	1933.	Rainfall.	Average 60-year.
	Ins.	Ins.		Ins.	Ins.
June	13.76	6.60	September	11.91	7.94
July	11.44	4.76	October	28.43	10.14
August	14.49	6.93	November	14.13	8.29

47. The aggregate Island precipitation for the six months gives 91.16 ins., and the 60-year average 44.66 ins., shewing an excess of 49.50 ins., above the average. The total mean rainfall from January to May, 1933 (5 months), gives only 13.84 ins. or 10 inches of deficiency of the normal.

48. Compared with the year 1912, when a hurricane, also struck western part of Jamaica, in November of that year, the aggregate Island rainfall from June to November was 54.33 ins., or 40 ins. less than in the year 1933, but 10 ins. above the aggregate average. And November, 1912 gauged a mean rainfall of 26.74 ins.

49. As there may be some vagueness arising in regard to the relative intensities of the hurricane of November, 1912, with that of 1933—both devastating the western end of the Island—it would appear that the hurricane of 1912 recorded a greater magnitude, if the greatest fall of barometric pressure be accepted as a guiding factor. In the year 1912 the Negril Point barometer indicated a very low reading of 28.487 ins., on 18th November at 6 a.m., which is equivalent to nearly half an inch lower than the lowest reading taken anywhere along the track of the 1933 storm. In the Weather Report No. 411, of the 1912 hurricane the late Mr. Maxwell Hall sketched the course of this hurricane as lying nearest to Negril Point as ten miles. It will therefore be seen that although the centre passed some 10 miles distant from Negril Point, the pressure of barometer was fully half an inch lower than places situated almost central, and in the vortex, of the 1933 hurricane.

HURRICANE DAMAGES.

50. The storm centre in its track at sea, along the southern coast of St. Elizabeth and Westmoreland, so far as Sav.-la-Mar, appears to have attained greater hurricane intensity than along the remainder of its movement, from Sav.-la-Mar, towards the northern coast of Hanover. The rate of progress along its track in the first portion is estimated at 8.4 miles per hour, and after passing to the west of Sav.-la-Mar it decreased in speed to about 5 miles per hour. The regions lying between 10 to 15 miles distant from the storm track, suffered severely. Buildings such as the St. Mary's Church and Rectory (St. Elizabeth) were badly damaged, and a large percentage of small habitations of the peasantry, at Southfield, were swept away and thousands rendered homeless for a time. Cultivations, also, met severe losses. From Sav.-la-Mar to the north coast, the damages sustained by buildings were somewhat less. The Sav.-la-Mar Church and Church Hall, as well as St. Paul's Rectory, Little London, suffered. Several other buildings in Black River and Sav.-la-Mar were shattered.

In the parish of Hanover quite an appreciable amount of destruction to property occurred in the districts of Chigwell and Hopewell. Inundated areas, arising from heavy rainfall, added, otherwise, to the havoc occasioned by wind.

Banana losses were reported as 100 per cent. near to the storm centre, and diminishing to about 10 per cent. in far off properties, such as are situated in the parish of St. Mary, 70 miles distant to eastward. Large trees were uprooted in the vicinity of the hurricane's track.

There were six deaths reported in the Southfield District of St. Elizabeth, and three seamen lost their lives by the sinking of a small vessel named "A.H.S.," near to the town of Black River. The coastal stamer "Arno" of the Royal Mail Co., met with some disablement at Bogue Island, near to Montego Bay, owing to winds of gale force.

An exhaustive report of the details of all the damages sustained, along with accounts of the early steps taken to afford relief to sufferers, will no doubt be published in due course.

Kingston,

December 14th, 1933.

J. F. BRENNAN,
Government Meteorologist.

The individual reports and tabulated sets of observations supplied from the several localities in the region of the storm area—comprising Pedro Bay, Munro College, Black River, Sav.-la-Mar, Retreat Estate, Negril Point, Sadlers Hall, Round Hill, "Torrie," Rose Mount, and Kempshot to westward Jamaica, as well as those of Morant Point and Kingston to eastward—are appended.

At the end of this report is given a small map of the Island, shewing the hurricane track, as derived from the many observations contributed for different localities.

Pedro Bay, St. Elizabeth:—Mr. W. H. Coke, Solicitor, Mandeville—

The following are from some notes made by Mr. Coke whilst he was at a place known as Calabash Bay, situated about three miles to the west of Great Pedro Bluff, on the coast:

"The hurricane hit Pedro at 5 a.m. 29th October. The wind which for the first half hour, was rather gusty, settled down by 5.30 a.m. blew steadily from due north and continued so, gradually veering to the NE, and at 7 a.m. from east. It continued from this quarter until 7.15 a.m. when it suddenly ceased, completely, enabling one to go outside the building with safety. At 7.30 a.m., the wind started again, from practically due south, and continued so until a little after 9 a.m. when it slackened quickly."

"I should estimate the velocity of the wind to have been 100 m.p.h. with gusts at intervals, reaching 120 m.p.h. I estimated at the time, that the exact centre of the hurricane was about 3 miles off shore. My garage was blown down from the north, and motor cars damaged. Cashaw trees were also blown down."

Munro College, St. Elizabeth:—Mr. John Thompson—

The following are extracts from a letter received from Mr. Thompson:

Shortly after midnight of 28th October the wind began to blow.

At 4 a.m. on 29th wind of increased intensity, with heavy rain.

At about 5.30 a.m. it was realized the storm was of hurricane force. Guttering from the chapel was off and corrugated iron roofing loose. Wind about force 9 of the Beaufort Scale.

Direction of wind at 5.30 a.m., east. The maximum velocity at 6.30 a.m. was of hurricane force.

About 6 a.m. to 10 a.m. 29th the wind veered from east to due south.

Shortly after 10 a.m. the storm ceased, but lighter winds were experienced from the south-south-west.

The estimated duration of the storm may be taken as from 2 a.m. to 10 a.m. on 29th.

Centre, apparently, did not pass over Munro College.

From information given it appears that on the coast at Pedro Bay, a distinct lull was experienced for about 20 minutes duration with puffs of wind at reversal of wind direction.

Mr. Ivor of Malvern states that his barometer during the storm fell 0.90 inch.

Probably the place worse hit was at Southfield, where six persons were reported dead.

Excessive rainfall at Munro. Rain-gauge flooded over. At Southfield, 3 miles from Munro, scarcely a house remains.

Black River, six miles to north of—Mr. Septimus Nash.—Barometer about 650 feet above Sea Level.
Barometer normal—29.030 ins.

Date.	Hour.	Barometer.		Wind Direction & Velocity M.P.H.	Remarks.
		Ins.	Corrected for Diur. Var.		
1933.		Ins.	Ins.		
October 28	5.00 p.m.	28.800	28.834	NE 15-20	
" "	9.00 p.m.	.700	.676	NE 20-25	
29	2.00 a.m.	.650	.668	NE 25-30	
" "	4.50 a.m.	.500	.516	NE do.	
" "	6.00 "	.450	.451	NE by E 50 to 60	Accompanied by showers
" "	7.10 "	.400	.382	do.	
" "	7.30 "	.380	.356	do.	do. do.
" "	8.00 "	.320	.288	NE by E 70-80	
" "	8.35 "	.250	.212	do.	do. do.
" "	9.30 "	.280	.233	E 80	
" "	10.00 "	.420	.371	ESE 80	do. do.
" "	10.30 "	.500	.460	SE 70	do. do.
" "	10.40 "	.540	.504	SSE 60-70	do. do.
" "	11.15 "	.550	.524	" 50-60	
" "	Noon	.600	.592	S 15-20	
" "	2.10 p.m.	.540	.577	S 30	
" "	4.00 "	.500	.540	S 30-40	
" "	5.35 "	.550	.579	SSW 10-20	
" "	7.40 "	.560	.549	" 10	
" "	8.20 "	.600	.583	Calm	
" "	9.00 "	.640	.615	do.	
30	4.30 a.m.	.640	.655	SW light	
30	4.30 a.m.	.640	.655	SW light	
" "	7.00 "	28.700	28.684	do.	

Sav-la-Mar, Westmoreland—Revd. Canon H. W. Cope—about 40 feet above sea level Aneroid barometer.

Date.	Hour.	Barometer.		Remarks.
		Aneroid.	Corrected for Diur. Var.	
1933		Ins.	Ins.	
October 28	8.00 p.m.	29.70	29.69	
" 29	7.00 a.m.	.51	.49	
" "	10.00 "	.36	.31	
" "	10.15 "	.34	.30	The wind at 10 a.m. was almost due north, then veered steadily round to almost, if not quite, due east when the calm period came about 2.30 p.m. on 29th—Wind variable.
" "	10.30 "	.27	.22	
" "	10.40 "	.24	.20	
" "	10.50 "	.22	.19	
" "	11.05 "	.26	.23	
" "	11.15 "	.26	.23	
" "	11.40 "	.18	.16	
" "	11.55 "	.14	.13	At 11.40 a.m. needle of Aneroid oscillating about 0.03 inch var.
" "	12.10 p.m.	.20	.19	
" "	12.30 "	.22	.23	
" "	12.40 "	.26	.27	The eastern sides of the Church, and Church Hall damaged.
" "	1.15 "	.25	.27	
" "	1.30 "	.20	.23	
" "	1.50 "	.22	.25	
" "	2.20 "	.15	.19	
" "	2.45 "	.04	.08	} Period of calm.
" "	2.55 "	.04	.08	
" "	3.15 "	.00	.04	
" "	3.30 "	.00	.04	
" "	4.00 "	.28	.32	
" "	4.30 "	.30	.34	
" "	5.10 "	29.40	29.43	

Retreat Estate, Westmoreland, about 8 miles to east of Negril Point—70 ft. above sea level Mr. F. Farquharson:
Reports his lowest barometer as 28.96 ins. at 1.30 p.m. The only winds noticed on 29th October
blew from north and NNW. The Estate chimney of steel, was blown down during the height of the
storm and fell practically, north to south. Wind from no other direction that day—Rainfall on 29th
4.75 ins.

Negril Point Light House—(Western Jamaica)—Mr. J. S. Brownhill;
(Barometer reduced to sea level and corrected for Diurnal Var.)

Date.	Hour.	Barometer.	Wind Direction and Velocity M.P.H.	Clouds.	Remarks.
1933.		Ins.			
October 28	7 a.m.	29.784	NE 3	A. St. 10 SW	
" "	11 a.m.	.791	NE 10	St. 10 E	
" "	3 p.m.	.759	N 14	St. 10 SE	
October 29	7 a.m.	.587	N 10	St. 10 ?	Light rain from 28th
" "	9 a.m.	.490	NE 26	Nim 10 ?	Rainsqualls from NW
" "	10 a.m.	.441	NE 33	do.	Heavy rainsqualls—Some
" "	11 a.m.	.386	NE 48	do.	of the heavy gusts about
" "	Noon	.286	NE 48	do.	50 miles per hour.
" "	1 p.m.	.279	NE 48	do.	
" "	2 p.m.	.305	NE 41	do.	
" "	3 p.m.	.381	N 34-40	do.	
" "	4 p.m.	.428	N 26-34	do.	Light rainsqualls from
" "	5 p.m.	.510	N 27	do.	north
October 30	7 a.m.	29.610	N 28	do.	do. do.
					Rainfall on 29th 5.85 inches.

Mr. Brownhill reports there were no heavy seas. Small habitations of frail type and cultivation suffered.

Sadler's Hall, Hanover—about 10 miles to south of Montego Bay—Mr. E. P. Haughton James:—

Mr. E. P. Haughton James reports:

At Sadler's Hall, Hanover, that the maximum wind velocity was from the NE and E from about 3.30 to 5 p.m. Sunday 29th October, the barometer falling 0.70 inch below normal, the last 0.10 inch very rapidly. Torrential rain falling at the time, the wind then shifted through SE and SW still blowing hurricane force but with less rain. The force of wind appeared to be more severe than last November (1932). All appeared to be over about 8 p.m. on 29th October. No calm was noticed, except around 2 p.m. then centre must have been approaching.

Round Hill, Hanover—Major G. B. Pease: (Extracts from letter received)—

On Saturday 28th at about 10 a.m. rain commenced and continued all day. The barometer was very low.

On Sunday morning, 29th October, there was a stiff breeze about 8 a.m., and then steadily increased. The direction was about east by north 75 degrees.

About mid-day we went out to the seaside, when there was a good gale in progress, and coconut trees were falling, nuts flying about. While we were on the beach the strength of the wind was almost sufficient to lean against.

At one o'clock I had the ventilators over the doors of house blocked up, as the wind was dashing the electric light pendant about. All doors and windows had been previously shut.

Soon after 3 p.m. the storm was really beginning to increase until the height was reached about 4.30 p.m.

The barometer then read 29.01 ins. This place is about 70 feet above sea level. This was the lowest point of reading, and while the storm was raging the needle of the aneroid kept moving about.

Just before it became dark the lull was experienced, and we were able to go out again; this must have been about 7.30 p.m. We were having another severe blowing. This time from either west by south or west by north, 270° or 290°, but as it was dark it was difficult to judge accurately.

This second blow was of much shorter duration, and the worst of the storm was over by 8.30 p.m. It can be confirmed by the fact that some of the trees in the garden fell one way, while some other trees fell in exactly the opposite direction.

I feel sure in assuming that the centre of the storm passed directly over this house.

Torrie, St. James—about one mile to east of the mouth of the Great River—about 180 feet above sea level—Mr. J. G. M. Robertson.

Date.	Hour.	Barometer.	Barometer corrected for Diur. Var.	Wind Direction.	Remarks.
1933.		Ins.	Ins.		
October 28	Midnight	29.67	29.66	SE	
" 29	8.00 a.m.	.65	.62		
" "	9.00 "	.64	.59		
" "	10.00 "	.62	.57		
" "	11.00 "	.58	.55		
" "	Noon	.56	.55		
" "	1.00 p.m.	.55	.57		
" "	2.00 "	.53	.56		
" "	3.00 "	.50	.54	E	
" "	3.45 "	.44	.48		
" "	4.10 "	.38	.42		Highest wind.
" "	4.40 "	.33	.37	E to NE	
" "	5.05 "	.20	.23	NE	
" "	5.15 "	.19	.22	N	Light wind, slowing down—Lull
" "	6.05 "	.23	.25	NW	
" "	6.30 "	.35	.37	NW	
" "	7.00 "	.42	.43		
" "	7.30 "	.44	.44	NW to N	
" "	8.00 "	.47	.46		
" "	8.30 "	.50	.48	W	Highest wind, after lull.
" "	9.00 "	.51	.49		
" "	9.30 "	.54	.51		
" "	Midnight	.60	.59		
" 30	3.00 a.m.	.62	.64		
" "	6.00 "	.64	.64		
" "	8.00 "	.68	.65		
" "	11.00 "	29.70	29.67		

The calm, or lull, had a duration of about 1 hr. 25 mins.

Rose Mount, St. James—about 2 miles to east of Montego Bay—Mr. Edward Foster, F.S.I..

Date.	Hour.	Barometer		Remarks.
		Aneroid.	Corrected for Diur. Var.	
1933.		Ins.	Ins.	
October 28	12.30 p.m.	29.75	29.75	Light wind from NE.
" "	2.30 "	.68	.72	
" "	4.00 "	.66	.70	
" "	Midnight	.63	.62	Gusts of wind from NE
" 29	2.00 a.m.	.59	.61	
" "	4.00 "	.54	.56	
" "	6.00 "	.54	.54	
" "	7.00 "	.52	.50	Heavy Gusts from N.
" "	8.00 "	.52	.49	
" "	9.00 "	.51	.46	
" "	10.00 "	.52	.47	
" "	11.00 "	.50	.47	High wind from NNE.
" "	1.00 p.m.	.48	.50	
" "	2.00 "	.46	.49	
" "	3.00 "	.42	.46	
" "	3.40 "	.38	.42	
" "	4.00 "	.36	.40	
" "	4.30 "	.30	.34	
" "	5.00 "	.24	.27	
" "	5.30 "	.17	.20	
" "	5.45 "	.08	.11	
" "	5.55 "	.10	.12	Wind from South and SW, Fierce.
" "	7.00 "	.20	.21	
" "	8.00 "	.28	.27	
" "	8.30 "	.34	.32	
" "	9.00 "	.35	.33	
" "	10.00 "	.41	.38	
" "	10.30 "	.45	.52	
" "	11.00 "	.46	.44	
" 30	12.30 a.m.	29.46	29.45	

Kempshot, St. James—Mrs. C. M. Stillwagon. 1,773 ft. above M.S.L.—Aneroid average 29.58 ins.

Date.	Hour.	Barometer.		Wind.	Remarks.
		Aneroid.	Corrected for Diur. Var.		
1933. October 29	7.00 a.m.	Ins. 29.48	Ins. 29.46	E	Heavy gusts and squalls from 3 a.m.
" "	9.00 a.m.	.48	.43	E	About 40 M.P.H. and Fog
" "	11.00 a.m.	.48	.45	ESE	10-11 a.m. Heavy rain and high wind, until 2 p.m.
" "	Noon	.48	.47	ESE	Light rain-fog.
" "	3.00 p.m.	.46	.50	ESE	Heavy gusts 50 to 60 p.m. M.P.H.
" "	4.00 p.m.	.42	.46	ESE	Increasing rain and wind
" "	5.00 "	.32	.35	SE	Wind increasing—trees falling
" "	5.30 "	.20	.23	SE	Do. do.
" "	5.35 "	.16	.19	SSE	Wind estimated (from previous experience) from
" "	5.40 "	.15	.18	SSE	70 to 80 M.P.H. Shutters blown off the Observ-
" "	5.45 "	.15	.18	S	atory Dome—Heavy
" "	5.50 "	.14	.16	S	rain and fog.
" "	5.55 "	.14	.16	S	Wind less violent.
" "	6.00 "	.14	.16	S	Heavy gusts—Rain and fog.
" "	6.05 "	.14	.16	S	Do. do. do.
" "	6.10 "	.15	.16	S	
" "	6.15 "	.14	.16	S	
" "	6.20 "	.16	.18	SSW	
" "	6.25 "	.20	.19	SSW	
" "	6.50 "	.21	.22	SW	Wind abating—30 to 40 M.P.H.
" "	6.35 "	.22	.24	"	Lighter rain squalls.
" "	6.40 "	.22	.24	"	
" "	6.45 "	.25	.26	"	Rain ceased.
" "	6.50 "	.26	.27	"	Dense fog and strong gusts.
" "	6.55 "	.27	.28	"	
" "	7.05 "	.28	.29	"	
" "	7.15 "	.30	.31	"	
" "	7.25 "	.32	.32	"	
" "	8.00 "	.34	.33	SW	Squalls began again.
October 29	9.00 p.m.	29.36	29.34	"	Do do.
" 30	6.00 a.m.	29.44	..	W	15 to 20 M.P.H. Rain squalls all day to 2 p.m. when it cleared.

Morant Point Light House—extreme east Jamaica—Mr. Chas. Durrant. Barometer, reduced to Sea-level diur. var. and Isobar.

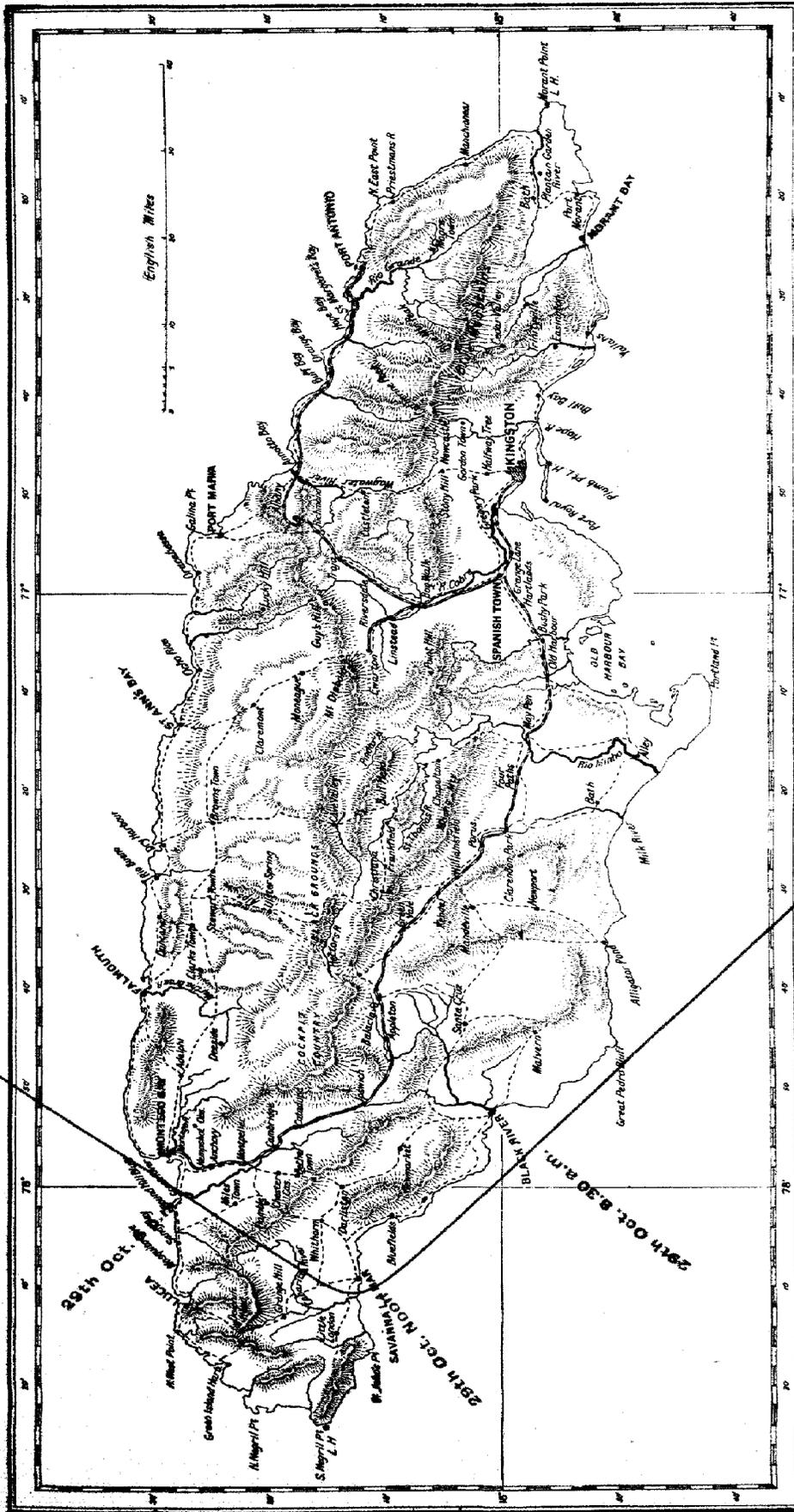
Date.	Hour.	Barometer	Wind direction and velocity, in M.P.H.	State of weather.
1933. October 27	7. a.m.	Ins. 29.792	N 3	Rain
" "	3 p.m.	.807	E 14	Do.
" 28	7 a.m.	.749	NE 22	NE gale and squalls.
" "	11 a.m.	.742	NE 33	NE heavy rain squalls
" "	3 p.m.	.751	NE 26	NE gale and heavy sea.
" 29	7 a.m.	.709	E 41	E gale.
" "	3 p.m.	.697	S 29	E gale
" 30	7 a.m.	.582	S 32	S gale, sky clearing.
" "	3 p.m.	.624	SW 26	Overcast.

Kingston—Disturbance 29th October, 1933—Govt. Meteorologist.—

Date.	Hour.	Barometer. corrected for Diur. Var.	Wind direction and velocity M.P.H.	Clouds.	Remarks.
		Inch.			
October	27	29.794	N 3	10 St. (S)	
"	"	.794	NE 5	10 Nim. E	R Squalls
"	"	.777			
"	28	.750	W 3	10 Nim E	Rain from 1 a.m. Shower.
"	"	.754	SE 6		
"	"	.749	E 3	10 Nim. E	
"	"	.744	N 3	10 Nim. E	Rain all day.
"	"	.720	E 3	..	Rain and heavy sea.
"	"	.695	E 5	..	Do. do.
"	"	.679	SE 11	..	Heavy Sea
"	"	.683	E 9	10 St. E.	Heavy Sea.
"	29	.679	SE 20	10 Nim.	Rain
"	"	.601	SE 28	..	Rain
"	"	.658	SE 28	..	Rain
"	"	.666	SE 25	..	Rain
"	"	.665	SE 23	..	Rain
"	"	.653	SE 23	..	"
"	"	.661	SE 24	..	"
"	"	.664	SE 23	10 Nim. S	"
"	"	.650	SE 23	..	"
"	"	.654	SE 25	10 Nim.	"
"	"	.702	SE 21	10 Nim. (S)	
"	"	.693	SE 22	10 Nim.	Rain
"	"	.679	SE 21	10 Nim.	Rain all day
"	"	.646	SSW 21	10 St. Cu N (Sw)	
"	30	.611	SW 14		
"	"	.633	SW 17	10 Cu N. (SW)	
"	"	.647	SW 11	10 Cu N. (S)	
"	"	29.626	SW 4	10 Cu N. & St. (S)	

Wind velocity from Weather Office corrected to U.S.W.B. Table.

Map of Jamaica indicating in Red line the Track of the Hurricane of the 29th October, 1933.



29th Oct. NOON

29th Oct. NOON

29th Oct. 8.30 a.m.