

MONTHLY WEATHER REVIEW

ALFRED J. HENRY, Editor.

VOL. 50 No. 4.
W. B. No. 772.

APRIL, 1922.

CLOSED JUNE 3, 1922
ISSUED JUNE 24, 1922

DISCONTINUANCE OF CHART I—HYDROGRAPH OF SEVERAL PRINCIPAL RIVERS.

Beginning with this issue, the above-named chart will be permanently discontinued and the serial numbers of the remaining charts regularly published will each be advanced one number; thus the previous No. II will now be No. I, etc.

The information carried by this chart is published in tabular form, annually, in the volume Daily River Stages. Considerable inquiry shows that the purpose of the chart thus discontinued will be equally well served by the data of Daily River Stages.—EDITOR.

FORMATION AND MOVEMENT OF WEST INDIAN HURRICANES.

By EDWARD H. BOWIE, Meteorologist.

[Weather Bureau, Washington, D. C., May 3, 1922.]

SYNOPSIS.

The physical features of the hurricane are fairly well understood. The explanation of the process of formation of the hurricane remains in more or less dispute, there being two hypotheses that attempt to satisfactorily explain its origin. There are reasons for believing that countercurrents, having their origin in differences in temperature over large geographic areas, initiate the conditions that give rise to the system of gyrating winds; that the condensation of water vapor supplies the energy necessary to maintain them through considerable periods of time. The movement of the hurricane is generally attributed to the general drift of the air in the region of the hurricane. The daily synoptic weather charts and the observations of the free-air directions and speeds of the winds in regions contiguous to hurricanes appear to indicate that hurricanes are carried forward on the border of the major wind system (the northeast trade) of the tropics, and that as this wind system changes its direction the course followed by the hurricane is changed to correspond thereto.

The hurricane.—To the cyclone of the West Indies has been given the name *hurricane*, a vast system of gyrating aerial currents, surrounding a central small or relatively small and more or less circular region of calms known as the eye of the cyclone. The movement of the winds around this center is counterclockwise, with varying degrees of inclination and at speeds proportional to the steepness of the baric gradient. The physical features of the hurricane are fairly well understood. According to Bigelow and other writers, the approach of a hurricane is usually indicated, when the observer is in a position to make such observations, by a long swell on the ocean, propagated to great distances and forewarning the observer by two or three days in rare instances. A rise in the barometer at times occurs before the gradual fall sets in, which fall becomes very pronounced on the near approach of the center; fine wisps of cirrus clouds are first seen, which surround the center to a distance of 200 miles or more; the air is calm and sultry and the usual afternoon thundershowers are suppressed; this is gradually supplanted by a gentle breeze, and later the wind increases to a gale, the clouds become matted, the sea rough, rain falls, and the winds become gusty and dangerous as the vortex core comes on. Here is the indescribable tempest, dealing destruction, impressing the imagination with its wild exhibition of the forces of

nature; the torrents of rain, the cooler air by reason of the falling rain, all the elements in an uproar, indicate the close approach of the center. In the midst of this turmoil there is a sudden pause, the winds almost cease, the sky clears, the waves, however, rage in great turbulence. This is the eye of the storm, the core of the vortex, and it is, perhaps, 20 miles or less in diameter, or one-thirtieth the diameter of the whole cyclone. The respite is brief and is soon followed by the abrupt renewal of the violent wind and rain, but now coming from the opposite direction, and the cyclone passes off with the several features following each other in the reverse order.

Region of first appearance.—The hurricane belt of the North Atlantic Ocean extends entirely across the ocean in low latitudes, but in so far as we are concerned it may be described and defined as that area extending from longitude 56° west to 95° west and from latitude 10° to approximately latitude 25°, or roughly the Caribbean Sea, the Gulf of Mexico, and the waters adjacent to the West Indian Islands. There are, of course, instances where hurricanes have entered this area from the eastward, but during a period of 35 years 90 per cent of the hurricanes of these waters according to Fassig, have had their origin within and not without this area. There is a well-marked belt of maximum frequency through the northern half of the Caribbean Sea, extending almost due west from the Windward Islands to Yucatan. During the greater part of the year this region and the water areas to the north and east are under the influence of the more or less permanent area of high barometer of higher latitudes, and the northeast trade flows entirely over it, but occasionally the northeast trade withdraws from this region and there is left a region of very slight baric gradient, more or less homogeneous temperature distribution in the horizontal, and feeble winds. It is during such times that hurricanes are likely to be found in these waters. Some years pass without hurricane formations; other years are notable for their frequency.

The formation of hurricanes.—We do not know all the facts which would permit an authoritative and unquestioned explanation of the origin of a hurricane. That