MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE. Assistant Editor: FRANK OWEN STETSON.

VOL. XXXII. SEPTEMBER, 1904. No. 9

INTRODUCTION.

The MONTHLY WEATHER REVIEW for September, 1904, is based on data from about 3300 stations, classified as follows:

Weather Bureau stations, regular, telegraph, and mail, 167; West Indian Service, cable and mail, 4; River and Flood Service, regular 43, special river and rainfall, 190, special rainfall only, 56; voluntary observers, domestic and foreign, 2565; total Weather Bureau Service, 3025; Canadian Meteorological Service, by telegraph and mail, 20, by mail only, 13; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Meteorological Service, 75; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25; The New Panama Canal Company, 5; Central Meteorological Observatory of Mexico, 20 station summaries, also printed daily bulletins and charts, based on simultaneous observations at about 40 stations; Mexican Federal Telegraph Service, printed daily charts, based on about 30 stations.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. R. C. Lydecker, Territorial Meteorologist, Honolulu, Hawaii; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander H. M. Hodges, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; Rev. José Algué, S. J., Director, Philippine Weather Service; and H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Señor Enrique A. Del Monte, Director of the Meteorological Service of the Republic of Cuba.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or $10^h\ 30^m$ west of Greenwich. The Costa Rican standard meridian is that of San José, $5^h\ 36^m$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

Low barometric pressure prevailed over the North Atlantic in the vicinity of the British Isles during the first half of the month and at its close, and from the 19th to the 23d the barometer was low on the coasts of Spain and Portugal, and high over west-central continental Europe and the British Isles. In the vicinity of the Azores high pressure prevailed and the barometric changes were not marked.

Several disturbances of moderate strength passed from the American Continent over the ocean in high latitudes, and during the 14th and 15th a disturbance that first assumed marked intensity in the subtropical region north of the West Indies moved with extraordinary speed from the south Atlantic to the New England coast, and passed thence over Newfoundland, attended along the Atlantic seaboard by exceptionally heavy rain and strong gales, which attained hurricane force at points along the middle and south Atlantic coasts. Although the approach of this storm was announced by timely advices and warnings that prompted precautionary measures, a number of lives were lost, much damage was caused to seaside property, and many causualities to shipping occurred along the Atlantic coast of the United States. The maximum wind velocity reported in connection with this storm was 100 miles an hour from the northwest at Delaware Breakwater at 2:50 a. m. of the 15th, and the rainfall exceeded 5 inches at points in the Middle Atlantic States.

The storms of the Great Lakes were of moderate intensity, and no disturbance appeared in the Gulf of Mexico. On the Pacific coast the storm period had not begun, and extreme wind velocities were not experienced.

The first important frost-producing cool wave advanced from the Northwest to the middle Mississippi Valley during the 13th, 14th, and 15th, and from the 20th to the 22d a cool wave advanced from the Northwest to the Middle Atlantic States, attended by heavy frost and the lowest temperature on record for the season in the Middle Atlantic States, a reading of 36° being noted at Washington, D. C., on the morning of the 22d. Timely warnings were issued in connection with the damaging frosts of the month.

A remarkable warm wave visited California from the 6th to the 9th, and on the 7th and 8th, the maximum temperature reached 100° at San Francisco, and 100° to 108° in the central valleys of California.

During the closing days of September, destructive floods occurred in southern Colorado, New Mexico, and Oklahoma. At Trinidad, Colo., the losses were very great, and in parts of New Mexico the floods were the most extensive and destructive in the history of the Territory.

NEW ENGLAND FORECAST DISTRICT.

The chief and about the only unusual feature of the weather of the month was the general and destructive storm of the 14–15th. The storm came on very rapidly during the afternoon of the 14th, and prevailed with great fury through the night and the morning of the 15th. Heavy gales prevailed north to Eastport and from Highland Light, Mass., to Block

Island, R. I., the winds attained hurricane force, strewing Vineyard Sound, Nantucket, Cape Cod, and the Maine coast with many wrecks. Beach property along the coast in some places suffered much damage, and there was considerable loss of life. The press of the city places the loss by damage from the wind and rain, for New England, at $1,000,000. The rainfall was very heavy, except in some of the southeastern sections of the district, the amounts reaching several inches, and the downpour caused much damage by floods and washouts to fields and roads. Remarkable and unusual phenomena attended the storm at points on the Massachusetts coast. At Woods Hole, during the early hours of the gale, the tide rose several feet above the mean high-water mark. This was followed by a drop which was as unusual as the rise, the tide dropping 7 feet in fifty minutes, and to a point 5 feet below the average. Storm warnings were ordered and bulletins issued well in advance of the storm, and doubtless resulted in the saving of many lives and much property.

The frosts, and in some sections, freezing weather on the 22d and 23d were unusually severe and early for the season. They were duly anticipated and announced in the forecasts.—*J. W. Smith, District Forecaster.*

NORTH-CENTRAL FORECAST DISTRICT.

Storm warnings were ordered up on the evening of September 1, and the morning of the 2d, for a storm that advanced northeastward from the southern Rocky Mountain region to the Lakes. High velocities were reported at many stations, but the storm lost force by the night of the 2d. Warnings were ordered on Lakes Michigan and Huron on the morning of September 20, in advance of high northerly winds which prevailed over those lakes. They were again hoisted on the eastern half of Lake Superior on the morning of September 30. The stations at Marquette and Sault Ste. Marie reported unusually high winds, the velocity attaining 56 miles per hour from the northwest at the latter station.

Frost warnings were issued several times during the month. The high pressure area which appeared in the British Northwest on the morning of the 10th advanced southeastward, and by the morning of the 12th had caused light to heavy frosts over the entire district. Another such condition, but more severe, appeared in the extreme northwest on the morning of the 12th and followed about the same course as its predecessor, and by the 15th had caused frosts over the entire district. Another high area, accompanied by frost, moved across the northern tier of States during the 20th and 21st. On account of the lateness of the corn crop, these warnings and the ensuing frosts affected in a great degree the price of corn, as it was supposed that great injury would result. However, except from a speculative point of view, these warnings were not important, because no protection from frost conditions can be afforded the growing crop. Warnings of these frosts were sent to the cranberry growers of Wisconsin, and it gave them opportunity to flood the marshes and prevent damage to the berries.—*H. J. Cox, Professor and District Forecaster.*

WEST GULF FORECAST DISTRICT.

The early part of the month was showery, and moderate temperatures prevailed. The close of the month was marked by unseasonably high temperatures, and the maximum, 94° on the 30th, broke all previous records for the last decade in September. The month was free from disturbances, and no special warnings were issued.—*I. M. Cline, District Forecaster.*

ROCKY MOUNTAIN FORECAST DISTRICT.

Apart from the heavy rainfall in New Mexico and southeastern Colorado, and the absence of destructive frosts in the principal horticultural and agricultural districts, the month was devoid of unusual conditions. Such frosts as were noted occurred in the high districts, and were well covered by the forecasts.—*F. H. Brandenburg, District Forecaster.*

SOUTH PACIFIC FORECAST DISTRICT.

A warm wave passed over California from the 6th to the 9th; it was very intense in the San Francisco Bay section on the 7th and 8th, when the previous maximum temperature recorded at San Francisco, of 100° was exceeded. In the interior valleys on these dates, the maxima ranged from 100° to 108°. Little or no damage resulted from the heat.

A well-defined storm covered the district from the 22d to the 25th, causing rain and numerous thunderstorms throughout California and Nevada. The rain was abnormally heavy in northern California, and on the northern coast of southern California. At San Francisco, where the record began in 1850, the greatest previous amount for September was 1.06 inches, against 5.07 this year. A remarkable feature of the storm was the great number of thunderstorms accompanying it. Much damage was caused in San Francisco by the water flooding basements and stopping street car traffic in the lower portions of the city. Great loss was caused to drying fruit, hay, grain, and beans in the fields, and to table and wine grapes. Ample warnings of the storm were given and generally heeded, but the rains were so heavy that protection in many cases was impossible.

Southeast storm warnings were displayed from San Francisco to Eureka at 11 a. m. on the 22d, and advisory messages sent to all southern ports. These warnings were continued on the 23d and 24th. No high winds occurred at either San Francisco or Eureka during this period, but the warnings were verified at Point Reyes and Southeast Farallon, and vessels coming into port during and since the storm reported very rough weather outside.—*G. H. Willson, District Forecaster.*

NORTH PACIFIC FORECAST DISTRICT.

The month of September was unusually dry up to the 21st, when a disturbance of moderate energy moved southward along the coast to California, causing general rain throughout the district, and moderately high southeasterly winds along the Washington coast. Southeast storm warnings were displayed at the mouth of the Columbia River, and along the Strait of Fuca, from Port Townsend westward to Cape Flattery, on the afternoon of the 21st. The rains, while generally insufficient to effectually break the long continued drought, put out the forest fires, cleared the atmosphere of smoke, and slightly revived vegetation.

Light frost, for which warnings were issued, occurred east of the Cascade Mountains on several mornings. West of the Cascades no frost of consequence occurred.—*A. B. Wollaber, District Forecaster.*

RIVERS AND FLOODS.

The Mississippi, Missouri, and Ohio rivers were considerably lower during this month than in the corresponding month of the year 1903, and more nearly approached the normal low-water conditions that are to be expected at the beginning of the autumn season. Navigation proceeded as usual on the Mississippi River, and was not seriously interrupted on the Ohio. The Tennessee River continued to fall steadily throughout the month, and readings below zero were reported at many stations; navigation had already been suspended on the upper river, and very little was possible below.

The rivers of the Atlantic system were quiet as a rule; the heavy rains of the middle of the month caused a sharp swell in all districts, but the stages reached were quite moderate except in the Roanoke and Cape Fear rivers, where danger-line stages were exceeded. At Fayetteville, N. C., the Cape Fear River rose more than 46 feet from the 14th to the 17th; warnings for this flood were issued on the 15th. Reports of the mountain floods in the Southwest have not yet been received, and they will appear at a later date. Warnings were issued on the 17th for the flood in the Rio Grande, the only