ADDITIONAL NOTES ON THE HURRICANES OF SEPTEMBER, 1921.

551.515 (729)

There will be found on pages 522 and 523 of the REVIEW descriptions of the tropical hurricanes of September, the latter accompanied by a chart showing portions of the tracks of the two in existence between the 8th and 15th. In addition to the facts that have already been brought out in connection with these storms it is worth noting that the principal hurricane of the month, the one originating southeastward of the Windward Islands probably on the 7th or 8th, formed at a point unusually far south, about due east of the Island of Trinidad. In this respect it was similar to the hurricanes of June 23–27, 1831, and October 6–12, 1892, but these two storms moved on a course somewhat north of west, the former striking the Yucatan Peninsula, the latter the coast of Honduras. Hurricanes that have pursued courses comparable with the one under consideration were those of October 12–18, 1780, known as "The Great Hurricane," September 11–21, 1846, October 1–6, 1889, September 9–19, 1898, and September 8–17, 1908. It is not certain, however, that any of these originated as far to the southward as did the one of the present year or pursued such a long track after leaving tropical waters.

It has been suggested that the storm noted at Iceland on the 22d was in reality this so-called Windward Islands hurricane, which passed to the southeast of Newfoundland on the 17th, but the reports available do not clearly show this to be the case.

The first positive evidence of the existence of this hurricane was contained in a wireless message sent out at 8 a. m. of the 8th from the British S. S. *Dundrennan*, then about 150 miles south of Barbados. This message gave information of great value to many interests, as did several others received from various ships at different times during the progress of the storm. In the beginning the area affected by the hurricane was rather large and damage was caused at both Trinidad and Barbados. After passing the Grenadines, however, the area affected appeared to contract somewhat and to have again increased in size only after the storm reached the higher latitudes in mid-ocean.

Several vessels involved in this hurricane were in the calm center. The first of these was the American S. S. *West Faralon*, which on the 11th, at a point somewhat to the southward of the Mona Passage, was in the center for a period of 55 minutes, from 2.20 p. m. to 3.15 p. m. The lowest barometer reading recorded was 28.38 inches. On the 16th the American S. S. *Oswego* was in the center near latitude 41° N., longitude 53° W. The lowest barometer reading reported by the *Oswego* was 28.46 inches. On the 17th, from 12 to 12:30 a. m., the American S. S. *Capulin* was in the center near latitude 47° N., longitude 45° W. The lowest barometer observed on board this vessel was 28.32 inches. Capt. Henry A. Davis states in his report that "at midnight (16th–17th) the wind fell to a flat calm, sea without a ripple." A half hour later the wind freshened suddenly from NW. by N. and soon was blowing with hurricane force, high seas driving over the vessel.

Many vessels encountered this hurricane during its extended career and considerable damage to shipping resulted. Upward of 80 lives were lost and in the Windward Islands great numbers of people were rendered homeless.

On September 10, while the hurricane referred to was somewhat to the southeastward of the Mona Passage, a second center formed in the region immediately to the eastward of the Bahamas. The British S. S. *Camito*, passing Grand Turk on the morning of the 11th, reported having encountered a hurricane 200 miles to the northward and was thought to have been in the center of it. On the 12th the American S. S. *Capillo* reported by wireless that she was involved in a hurricane to the southeast of Bermuda. This storm, which at first was of small size and fairly rapid movement, increased in size and also in rate of travel after passing Bermuda. It followed a path very similar to that of its successor north of latitude 30° and in mid-ocean was comparable to the latter in intensity. It was last observed on the 15th in latitude 53° N., longitude 35° W.

This secondary hurricane, so-called, was encountered by numerous vessels in the transatlantic steamer lanes and has been confused to some extent with its more important contemporary. It was this hurricane in which the French S. S. *La Savoie* was involved on the 14th–15th, this vessel, according to press dispatches, being forced to run before the wind for 18 hours and sustaining some deck damage. The Italian S. S. *San Pietro* was in the calm center of this hurricane from 5 a. m. to 5.30 a. m. of the 14th, the wind a dead calm but with a tremendous, confused sea. The lowest pressure observed on board the *San Pietro* was 28.90 inches.

Several westward-bound vessels encountered both this storm and the one which followed from two to three days later, thus having the exceptional experience of meeting two distinct hurricanes within the space of a few days.

Many excellent reports dealing with various phases of these storms have reached the Weather Bureau from masters and officers of vessels that were involved. Lack of space prevents giving these reports in detail. A number of storm logs will be found on pages 515–516.—*F. G. T.*

551.515 (265.2)

NORTH PACIFIC OCEAN.

By F. G. TINGLEY.

Pressure conditions during September at the island stations of Dutch Harbor, Midway Island, and Honolulu were not marked by any extremes. At the first-named station there were frequent moderate changes in the barometer during the first and second decades, the average for these periods being close to the normal. During the last decade pressure averaged below normal by approximately 0.16 inch. At Midway Island pressure was slightly above normal, about 0.01 inch for the month, the barometer falling below the normal only on the 16th and 17th and from the 26th to the 30th. At Honolulu pressure averaged above normal by about 0.01 inch.

Unlike the North Atlantic, which was swept by several severe gales during the month, the North Pacific Ocean was relatively quiet during September. Occasional gales, mostly of a moderate character, were experienced by a few reporting vessels during the first and middle parts of the month. Only in the last four days was there any indication of renewed atmospheric activity in this ocean.

From the 1st to the 3d the Japanese S. S. *Horaisan Maru*, Capt. K. Yamaguchi, Observer M. Okhara, Muroran for San Francisco, was involved in a gale in latitude 50° 30′ N., longitude 177° E. to 174° W. The highest force of wind experienced was 8, SE. From the 12th to the 14th, in the same region, the Japanese S. S. *Lyons Maru*, Capt. S. Fujimura, also from Muroran for San Francisco, had a moderate to whole gale with a very high sea. This appears to have been the most important gale of the month in the northern part of the ocean,

with the exception of the one of the 26th to 30th. Several reporting vessels were involved in the latter storm, of which the following may be named:

American S. S. *Granite State*, Capt. H. Wallis, Observer F. H. Spring, Calcutta for San Francisco; U. S. Army transport *Dix*, Capt. C. A. Olsen, Observer O. C. Radford, Manila, via Miike, for Honolulu; U. S. Army transport *Thomas*, Capt. Frank Hall, Observer A. B. Taylor, Manila, via Miike, for Honolulu; Japanese S. S. *Toyooka Maru*, Capt. S. Oya, Observer M. Takahara, Yokohama for Seattle; American S. S. *Nanking*, Capt. T. H. Dobson, Observer A. A. Wahldram, Yokohama for San Francisco. The highest force of wind reported by any of the vessels named was 10, ENE., by the *Dix*. This was on the 29th in latitude 30° 02′ N., longitude 180°. At 1 a. m. of the 29th *Dix* had the lowest barometer reported, 29.39 inches.

On several occasions during the month vessels on coastwise routes north from Panama reported E. to SE. gales. The most important of these seems to have been that of the 25th and 26th. This was encountered by the American S. S. *Hattie Luckenbach*, Capt. Edward J. Boe, Observer Edward E. Krayn, Panama for San Pedro. The storm log is as follows:

Gale began on the 25th; lowest barometer, 29.72 inches, occurred at 4 p. m., same date, in latitude 19° 35′ N., longitude 105° 05′ W.; end of gale on 26th; highest force of wind, 9, SE.; shifts, SE., ESE., SE.; high, irregular sea.

A strong breeze with a rough sea continued on the 27th and 28th, until the vessel reached about latitude 26° N.

THREE TYPHOONS IN THE FAR EAST DURING SEPTEMBER, 1921.

By JOSÉ CORONAS, S. J., Chief Meteorological Division.]

[Weather Bureau, Manila, P. I., October 18, 1921.]

Following is a brief account of the three most important typhoons of this month of September:

The first was a China Sea typhoon, the second was a Formosa typhoon, and the third a Japan typhoon. The second must have passed also over or very close to the Batan Islands in the Philippines; but it is much regretted that owing to lack of communications with those islands no word has been as yet heard from them at the time we are writing these notes (October 17).

China Sea typhoon, September 1 to 4.—This typhoon was formed on the 1st of September in the neighborhood of the Paracels in about 113° longitude E. and 16° latitude N. It moved practically northward and entered China about 150 miles west of Hongkong in the evening of the 3d. No details have been received of any big damage done by this typhoon. The British steamer *Loonsang* experienced a gale from the southeast quadrant on her way from Hongkong to Manila on September 3.

Formosa typhoon, September 14.—This typhoon was noticed on our weather maps as forming on the 7th to 8th about 300 miles west of Yap near 133° longitude E. and 9° latitude N. It took a northwesterly direction and reached the southern part of Formosa during the night of the 13th. The approximate position of the typhoon at 6 a. m. of the 12th and 13th was, respectively, 126° longitude E., 18° latitude N., and 123° 30′ longitude E., 20° latitude N. The typhoon traversed the western part of Formosa and the northern part of Formosa Channel, moving practically north. Then it recurved westward and entered China near Foochow during the night of the 14th to 15th. The barometric minimum recorded in Formosa was that of Taito, 741.00 mm.[1] (29.17 ins.) at 12 midnight of the 13th.

Although it was a well-developed typhoon not much damage was done in Formosa according to a report received from the Director of Taihoku Observatory.

Japan typhoon, September 25.—This typhoon seems to have formed on the 21st to 23d to the northeast of Luzon in about 127° 30′ longitude E. and 20° latitude N. It moved NNE. and crossed Japan during the night of the 25th. Once in the Sea of Japan it recurved northwest toward Manchuria. The approximate position of this typhoon was as follows on the 24th, 25th, and 26th:

September 24, noon, 23° 25′ latitude N., 130° 40′ longitude E. September 25, noon, 29° 05′ latitude N., 134° 20′ longitude E. September 26, 6 a. m., 37° 45′ latitude N., 135° 50′ longitude E.

According to press dispatches published by the Manila papers much damage was done in Japan by the winds, rains, and floods during this typhoon.

SQUALLS IN GULF OF FONSECA.

E. F. McCartin, U. S. N., acting as meteorological observer on board the U. S. S. *Cleveland*, which for some days during September was in the harbor of Amapala, Honduras, has furnished the following note regarding the squalls which occur at that place.

In Amapala, Honduras, the barometer usually drops sharply as temperature increases up to 1 p. m. Violent squalls at sunset are frequent, sometimes reaching a wind force of 9 and lasting from 15 to 30 minutes. They are accompanied by heavy rain and a sharp drop in temperature. These squalls usually develop at the northeastern end of the Gulf of Fonseca and travel to seaward.

THREE SUCCESSIVE TYPHOONS OVER THE PACIFIC BETWEEN THE PHILIPPINES AND JAPAN, AUGUST 1 TO 20, 1921.

By JOSÉ CORONAS, S. J., Chief Meteorological Division.

[Weather Bureau, Manila, P. I., July 30, 1921.]

Very stormy weather prevailed over the Pacific between the Philippines and Japan for no less than 20 successive days, August 1 to 20, owing to three severe typhoons which moved one after another from the Western Carolines or the Ladrone Islands to the China coast between Hongkong and Shanghai.

Once more we could realize in the three cases the great importance of the two daily weather reports we are receiving at present from our advanced stations of Yap and Guam. With these observations at hand, Manila Observatory was able to announce the first typhoon on August 2, four days before it reached Formosa; and the second and third, on August 8 and 10, 6 and 10 days, respectively, before they reached the China coast to the south of Shanghai. For the whole period of 20 days we were able to broadcast typhoon warnings by wireless and cable, following day by day the tracks of the three typhoons.

The Formosa and China typhoon, August 1 to 7.—This typhoon appeared in our weather maps as forming over the Western Carolines to the E. of Yap and SSW. of Guam, on August 1 near 10° latitude N. and 143° longitude E. For about three days the typhoon seems to have moved NW., then it moved almost due W. for over one day, and on the 5th it took again a northwesterly

[1] 739.6 mm. (29.12 ins.) gravity correction applied.