

From the 27th to 30th heavy weather was reported over to middle and eastern sections of the steamer lanes. Storm logs:

American S. S. *Ala*:

Gale began on the 27th, wind WSW. Lowest barometer 29.18 inches at 10:30 a. m. on the 28th, wind W, 10, in latitude 52° 39' N., longitude 35° 34' W. End on October 1, wind N. Highest force of wind 10, W. by S. to WNW. Shifts; WSW-WNW.

Danish S. S. *Oscar II*:

Gale began on the 29th, wind S. Lowest barometer 29.35 inches at 8 p. m. on the 29th, wind SSW, 7, in latitude 57° 58' N., longitude 14° 35' W. End on the 30th, wind SSW. Highest force of wind 9, steady SSW.

NORTH PACIFIC OCEAN.

By WILLIS E. HURD.

The early receipt of the very complete typhoon report for the REVIEW from Rev. José Coronas, S. J., of the Manila Observatory, renders it unnecessary to remark in detail in this résumé upon the weather in the Far East for September. Father Coronas notes the behavior of an August-September typhoon, and records the movements of four others whose histories are wholly contained within the latter month. The Weather Bureau has received reports from vessels slightly involved in all these storms. In the first, on September 11, the Japanese S. S. *Taiyo Maru*, Captain Nagana, Observer Kamada, Yokohama to Hongkong, encountered winds from the NW., force 8, in latitude 25° 49' N., longitude 121° 20' E., lowest corrected pressure, 29.27 inches. The observer notes:

At 4 a. m. wind N. by W., force 7, ugly, threatening weather; barometer showed 29.46, corrected. Then we avoided the typhoon, putting engine slow down, and taking ship's course on north.

This storm, which prevailed over the lower Loochoos on the 10th, is reported to have been one of the severest ever experienced there. On Miyako Island alone about 2,000 houses were destroyed.

The influence of the second typhoon, that of the 11th to 21st, was felt by the British S. S. *Talhybuis* on the 19th and 20th, in latitudes 22° to 23° N., longitudes 115° to 117° E.; highest wind force ENE., 8, on the 20th.

The third typhoon, which formed on the 13th to 14th over the Marianas, is mentioned by Father Coronas as having been last seen on the 21st in about 35° N., 144° E., but reports which have since become available would indicate that it continued eastward and into still higher latitudes. The American S. S. *West Iran* had a gale, force 7, on the 22d, in 39° 10' N., 157° E., with shifts from S. to WNW., lowest pressure, 29.43. It seems unquestionable that this vessel was affected by that cyclone, and still further reports indicate as fully that the typhoon, now become an extratropical storm of much reduced intensity, moved still farther northward until on the 25th it was over the upper reaches of Bering Sea.

The Dutch S. S. *van Overstraten*, Hongkong to Amoy, fell under the influence of the fourth typhoon, that of the 25th to 29th. The storm moved to the eastward and northward of the vessel's positions on the 28th and 29th. The steamship therefore remained in the left-hand semicircle and experienced little beyond northeasterly to northwesterly gales and rough seas up to the time the storm entered the China coast near 26° N.

Tropical storms were not confined to the Far East during September, however, for two violent cyclones were reported from the hurricane region off the west coast

of Mexico. The first was observed on September 1 by the American S. S. *West Catanace*, Capt. A. W. M. Knip, Balboa to San Pedro. Strong easterly and southeasterly gales to hurricane winds were encountered by this vessel from 4 a. m. until noon, between 17° 06' N., 102° 50' W., and 17° 16' N., 103° 04' W. Said Captain Knip:

Tried at 4 a. m. to bring wind on 4 points starboard bow, but ship refused to haul up in wind, and decided to keep running. In fact, thought to have success, as barometer started to rise between 4 and 5 a. m. After 5 barometer steady, sea increasing. After 6 barometer dropped, and before 6 a. m. a heavy sea struck starboard side, doing some damage. Tried again to bring ship up in wind, but in vain. At 7 a. m. barometer had dropped again. Took opportunity from lull in wind to bring ship up in the sea, but could not bring her further than NE 6 N. Decided to keep that course. Barometer dropping fast between 7 and 8. Ship laying fine and shipping very little water. Sea heavy, but not dangerous. After 8 a. m. barometer rising fast, wind hauling and sometimes moderating. Between 8 and 9 clearing in SW. Between 8 and 10 weather moderating and wind hauling after heavy rain squalls, and sky clearing at times, but about 11 a. m. wind increasing to 12 accompanied by terrific rains. After 11:30 weather moderating fast.

NOTE.—At 7:30 a. m. antennæ parted and could not be repaired on account of the storm. Repaired the same during the afternoon and at 6 p. m. sent out advisory to all ships in vicinity, asking also for their weather report, but didn't get any reply, although wireless operator heard advisory repeated by several steamers.

This storm was apparently moving in a course parallel with the coast. It is unfortunate that no other information concerning it is at hand.

On September 9-10 the American S. S. *Bessemer City*, Capt. John Murphy; observer, Second Officer David Polowe, Honolulu to New York, passed through the "eye" of a cyclone in 16° 12' N., 113° 44' W. The vessel experienced gale winds, beginning from NNE., 7, from 4 a. m. of the 9th until noon of the 10th, and hurricane winds from 11 a. m. to 11 p. m. of the 9th, except from about 3:30 p. m. to nearly 5 p. m., during which time calms to light airs accompanied the passage through the storm center. The "eye" was estimated to be from 15 to 18 miles in diameter. This size, coupled with the fact that the *Bessemer City* and the disturbance were moving in opposite directions and the vessel so long involved, suggests a hurricane of extraordinary dimensions, larger probably than any other of this locality of which there is trustworthy information.¹

Of the subsequent movement of the storm, no further data are available. Mr. Polowe suggests that:

The place of disappearance of the confused seas gives us our probable true point of origin of the cyclone (and) makes the parabolic nature of the track at once apparent. This point lies in latitude 16° N. and longitude 113° W. Since the eastern limit of the trade winds is soon reached, the disturbance probably recurred at 20° N., then traveled N. or NNE. and most likely was dissipated against the rocky and mountainous coasts of Lower California.

The pressure alignments over the eastern part of the ocean for September, 1922, showed a persistent low-pressure area over the Gulf of California or adjacent territory, with the North Pacific high-pressure area occupying the major portion of the central region from the 180th meridian to the California coast. This anti-cyclone was broken only from the 20th to the 26th, when it was pushed westward and southward and cut into two centers by a powerful disturbance central over the Gulf of Alaska.

The Aleutian Low lay to the southward of Alaska from the 1st to the 3d of the month. It disappeared on the 4th, and on the 5th low pressure covered the islands

¹ Numerous instances like those here mentioned are at hand of extremely valuable though incomplete data concerning the cyclones of west Mexican waters. The Weather Bureau is especially desirous of obtaining all available information about these storms so that their histories may be established, if possible, and is taking opportunity at this time to call the attention of seamen to its needs.

to the westward, where it showed some intensity until the 8th, then weakening until the 11th, when it became negligible. On the 14th the Gulf of Alaska was again the center of an area of low pressure which fluctuated in movement and intensity until the 21st, when it spread to the southward with greatly increased energy. On the 22d to 24th its influence was such that it dominated most of the eastern half of the region previously occupied by the anticyclone, causing strong westerly and northwesterly gales. Several trans-Pacific steamships crossed this storm area. Among them the British S. S. *Empress of Asia* reported the lowest observed corrected pressure reading, 28.90 inches, at 7 p. m. of the 23d, in 50° 05' N., 140° 29' W. On the 26th the storm weakened and began moving inland.

About this time the Aleutian Low proper redeveloped west of Alaska, apparently consequent upon the entrance into Bering Sea of the typhoon of the 13th to 25th, previously mentioned, and thence to the end of the month it fluctuated across the whole Alaskan region.

On the 30th west-southwesterly gales were observed near 45° 25' N., 164° E. It was the reported beginning of a storm which, early in October, produced violent if not hurricane winds to the eastward.

Considering the eastern portion of the ocean, as represented by the island stations of Dutch Harbor, Midway Island, and Honolulu, pressure during September was above the normal. The excess at the first-named station, based on p. m. observations, was 0.21 inch. The highest pressure was 30.46 inches, recorded on the 17th, the lowest, 29.04 inches, on the 7th. At Midway Island the plus departure was 0.03 inch. The highest pressure here, 30.16 inches, occurred on the 18th, the lowest, 29.82, on the 29th. At Honolulu the plus departure was approximately 0.02 inch. The highest pressure, 30.10, occurred on the 26th, the lowest, 29.89, on the 12th.

Fog was observed by a large percentage of the vessels traversing the northern sailing routes. It was well distributed throughout the month in both eastern and western waters, and some observers reported it for several consecutive days covering many degrees of longitude.

FOUR SEVERE TYPHOONS IN THE FAR EAST DURING SEPTEMBER, 1922.

By Rev. JOSÉ CORONAS, S. J.

(Weather Bureau, Manila, P. I.)

There were four severe typhoons in the Far East during this month. All formed in the Pacific. Two went to China after striking Meiacosima and Formosa, respectively; another traversed the Babuyanes Islands and northern Luzon in the Philippines; and the last remained in the Pacific, recurving northeastward to the southwest and west of the Bonins.

The Meiacosima and China typhoon.—This typhoon was shown in our weather maps of September 7 to 9 over the Pacific between the Ladrone Islands and the Philippines, about 500 or 600 miles to the east of northern Luzon. At 6 a. m. of the 10th, it could be easily situated northeast of Luzon, between 127° and 128° longitude E., 20° and 21° latitude N., moving northwest. The center passed over the Meiacosima group of islands during the night of September 10 to 11, the barometer of Ishigakihima station having fallen to 740.4 mm. (29.15 inches), at 1 a. m. of the 11th, and the wind from WSW., having reached its maximum velocity of 30 meters per second (67 miles per hour), at 10 p. m. of the 10th. The typhoon inclined to WNW. after traversing Meia-

cosima and entered China during the night of the 11th-12th, passing over Wenchow where it caused great destruction and terrible losses, especially in the river. The typhoon, once in China, recurved northeastward to the west of Shanghai during the night of the 12th and early morning of the 13th. It reached the Shantung Promontory on the morning of the 14th, and northern Korea at about noon of the same day; but it seems that on that day, at least in the afternoon, it was only a depression of no great importance.

The Babuyanes and Locos typhoon.—We do not hesitate to call this one of the most remarkable typhoons observed in the Philippines in many years, particularly as to its abnormal track. It formed over the Pacific, on the 11th to 12th, to the west of the Ladrone Islands, between 15° and 16° latitude N. and near 139° longitude E. It moved first W. by N., then NW. by W., until 6 a. m. of the 16th, when near the Balintang Channel it recurved to WSW., to SW., and even to SSW., following the last-named direction very near the western coast of Luzon from Laoag to Bolinao. At about the latitude of Bolinao the typhoon moved for a few hours to SW. until in about 16° latitude, between 118° and 119° longitude it recurved back to NW., thus tracing a track very similar to a typhoon barographic record. A good number of steamers experienced the violence of the storm in the China Sea, among them the *Loong Sang*, the *Susana II*, and the *Tango Maru*, all the captains having been much surprised at its remarkably abnormal track.

Following are some of the barometric minima observed in Luzon during the typhoon:

	Longitude.	Latitude.	Barometer.
	° /	° /	Mm.
Aparri.....	121 38	18 22	734.55 (28.92) at midnight, 16th.
Cape Bojeador.....	120 36	18 31	728.40 (28.68) at 6:40 a. m., 17th.
Laog.....	120 35	18 12	732.40 (28.84) at 7 a. m., 17th.
Vigan.....	120 23	17 34	737 (29.02) at 2 p. m., 17th.
San Fernando Union.....	120 19	16 37	739.73 (29.12) at 6:15 a. m., 18th.
Bolinao.....	119 53	16 24	735.41 (28.95) at 6 a. m., 18th.
Iba.....	119 58	15 20	745.18 (29.34) at 4 a. m., 18th.

The barometric minima of the *Loong Sang*, *Susana II*, and *Tango Maru* were:

	Longitude.	Latitude.	Barometer.
	° /	° /	Mm.
Loong Sang.....	118 32	16 46	735.06 (28.94) at 1 a. m., 19th.
Susana II.....	117 30	18 33	738.64 (29.08) at 4 p. m., 19th.
Tango Maru.....	116 11	20 39	747.76 (29.44) at 4 a. m., 20th.

It has been reported that in Fuga Island (Babuyanes Islands) the barometric minimum was as low as 695 or 696 mm. (27.36 or 27.40), that there was one hour of vortical calm observed, and that only one house was left standing after the typhoon.

Following is the position of the typhoon for 6 a. m. and 2 p. m. of the 16th to 20th:

	Latitude.	Longitude.
	° /	° /
16th—6 a. m.....	19 35	124 15
2 p. m.....	19 25	123
17th—6 a. m.....	18 35	120 45
2 p. m.....	17 45	120
18th—6 a. m.....	16 35	119 25
2 p. m.....	16	118 45
19th—6 a. m.....	17 15	117 15
2 p. m.....	18	116 40
20th—6 a. m.....	18 45	115 10
2 p. m.....	19 05	114 05