

veloped into a severe disturbance which moved rapidly eastward, as on the morning of the 18th the center was near latitude 50°, longitude 40°. A large number of special reports were received from vessels regarding this storm which was of a most unusual nature in many respects. Some of the storm logs and reports are as follows:

Nieuw Amsterdam, Dutch S. S.:

Gale began on the 17th. Lowest barometer 28.56 inches at noon on the 17th. Position, latitude 43° 18' N., longitude, 55° 18' W. End of gale on the 17th. Highest force of wind, 12; shifts ENE.-NNW.

At 12:05 p. m. on the 17th, wind reached hurricane force, holding for half an hour, barometer rising, and within 10 minutes there was an extraordinary high sea and swell. Diminishing wind and swell in the evening; rain showers and lightning in the southwest.

Osawatomie, American S. S.:

Gale began 17th. Lowest barometer 28.35 inches at 2:35 p. m. on the 17th. Position, latitude 43° 43' N., longitude 53° 40' W. End of gale 11 a. m. on the 18th. Highest force 11; shifts SW.-W.-WNW.-NW.

At noon on the 17th, barometer read 28.58 inches; the weather was foggy with wind south, force 4. At 1 p. m. A. T. S. wind became west, force 6, for about 20 minutes; barometer rapidly falling all the time. The wind then shifted back to SW., 6, until 2:35 p. m., when it became WNW., 12, lasting for about an hour, the barometer rising rapidly in the meanwhile. At 9 a. m. on the 18th wind was SW. and began hauling toward the NW.; similar to that of the 17th but of slightly less violence and did not last so long; barometer then began to rise slowly. Sky covered with cirrus veil. Position, Greenwich Mean Noon December 18, latitude 43° 05' N., longitude 56° 04' W.

Mongolian Prince, British S. S.:

At noon December 17, wind WSW., 3, barometer 29.67 inches, position, latitude 47° 24', longitude 38° 20' W. 3 p. m., S. 3; 29.63 inches. 5 p. m. SSE., 4; 29.59 inches; 9 p. m.; SW., 9; 29.17 inches, terrific squalls. Midnight, SW., 12; 29.25 inches; hurricane. December 18, 3 a. m. W., 12, 29.31 inches; 8 a. m. W. by N., 12; 29.53 inches. Noon, W. by N., 9; 29.62 inches; 19th, 1 a. m. NW. squally, heavy rain, weather moderating.

On the 17th strong westerly gales were encountered off Hatteras, and on the 16th and 17th one vessel reported similar conditions in the Gulf of Mexico. Storm logs are as follows:

Hartford, American S. S.:

Gale began on the 15th. Lowest barometer 30.07 inches at noon on the 17th; position, latitude 30° 11' N., longitude, 88° W. Gale continued until ship entered Mobile Bay on the 17th. Highest force of wind, 8; no shifts given.

W. M. Burton, American S. S.:

Gale began on the 17th. Lowest barometer 29.54 inches at 10:30 a. m. on the 17th; position, latitude 34° 58' N., longitude 73° 29' W. End of gale on the 18th. Highest force of wind 12; shifts not given.

On the 20th a moderate disturbance was central near latitude 50, longitude 22, that developed into one of considerable force 24 hours later, when the center was near the north coast of Ireland. Storm logs follow:

Scythian, British S. S.:

Gale began on the 20th. Lowest barometer 28.93 inches at 11 p. m. on the 21st; position, latitude 50° 24' N., longitude 19° W. End of gale on the 22d. Highest force of wind, 10; shifts, SW.-W.-NW.

Eglantier, Belgian S. S.:

Gale began on the 21st. Lowest barometer 29.19 inches on the 21st; position, latitude 49° 43' N., longitude 7° 29' W. End of gale on the 23d. Highest force of wind, 10; shifts S.-WSW.-W.

On the 22d and 23d unusually heavy weather prevailed in the region between the Azores and the Bermudas, the storm area extending as far south as the 30th parallel. Storm logs:

Oranian, British S. S.:

Gale began on the 23d. Lowest barometer 29.40 inches at 1 a. m. on the 23d; position, latitude 36° 30' N., longitude, 32° 10' W. End of gale on the 28th. Highest force of wind, 9. Wind varying between WNW. and WSW. Very heavy squalls during the period between the 22d and 28th. Barometer in these squalls ranging from 29.42 inches to 29.67 inches.

From December 23 to the end of the month the Azores HIGH was replaced by a persistent LOW, the barometer reading at Horta, Azores, ranging from 29.16 inches on the 25th to 29.84 inches on the 29th. This reversal of the normal pressure distribution was responsible for the unusual and unsettled conditions prevailing over the greater part of the ocean during this period.

On the 24th strong southerly gales were encountered in the regions between the Bermudas and the 50th parallel, as shown by the following storm logs:

Jalapa, American S. S.:

Gale began at 4 p. m. on the 23d. Lowest barometer, 29.49 inches at 4 p. m. on the 24th. Position, latitude 37° 20' N., longitude 16° 35' W. End of gale at noon on the 28th. Highest force of wind, 10; shifts W. by S.-SW.

Kaysecka, American S. S.:

Gale began on the 23d. Lowest barometer 28.95 inches at 5 a. m. on the 25th. Position, latitude 47° 10' N., longitude 12° 30' W. End of gale on the 28th. Highest force of wind, 10; steady from SW.

Charts XI, XII, and XIII show the conditions on the 25th, 26th, and 27th, respectively. Storm logs follow:

Grampian Range, British S. S.:

Gale began on the 25th. Lowest barometer, 28.81 inches at noon on the 27th. Position, latitude 46° 51' N., longitude 35° 15' W. End of gale on the 27th. Highest force of wind, 9; steady from NNW.

Inca, British S. S.:

Gale began on the 25th. Lowest barometer, 29.98 inches on the 25th. Position, latitude 38° 42' N., longitude 63° 25' W. Highest force of wind, 8; steady from NNW.

Edgewood, American S. S.:

A severe gale was encountered on the night of the 27th, and early morning of the 28th, with a heavy cross sea, SW. and NW. It was necessary for the vessel to heave-to. Lowest barometer, 29.57 inches at 10 p. m. on the 27th. Position, latitude 36° 42' N., longitude 70° 30' W. Highest force of wind, 10; shifts SW.-NW.

On the 28th and 29th heavy weather was the rule over the greater portion of the steamer lanes, with a well developed Low central near midocean. Storm logs:

Stanmore, British S. S.:

Gale began on the 28th. Lowest barometer, 28.60 inches at 1 p. m. on the 29th. Position, latitude 46° 22' N., longitude 40° 06' W. End of gale on the 30th. Highest force of wind, 12; shifts SW.-W.-S.

Gaasterland, Dutch S. S.:

Gale began on the 29th. Lowest barometer, 28.56 inches at 9:10 p. m. on the 29th. Position, latitude 47° 40' N. longitude 33° 40' W. End of gale on the 31st. Highest force of wind, 10; shifts S.-W.

This disturbance remained nearly stationary during the remainder of the month, and reached its greatest intensity on the 30th, as shown by Chart XIV for that date. Storm log:

Eglantier, Belgian S. S.:

Gale began on the 29th. Lowest barometer, 29.58 inches at noon on the 30th. Position, latitude 38° 02' N., longitude 26° 05' W. End of gale on the 31st. Highest force of wind, 9; steady from SW.

NORTH PACIFIC OCEAN.

By F. G. TINGLEY.

Over the northern part of the North Pacific Ocean, especially in the Gulf of Alaska, December was a stormy month. Reports from almost all vessels on the northern steamer routes contain references to gales and rough seas. Over the southern part of the ocean; except for a brief period at the beginning of the last decade, fine weather was general.

The most noteworthy feature of the weather of the month was the low pressure and accompanying storm conditions in the vicinity of Midway Island during the last decade. On the 22d an unusually low barometer reading of 29.36 inches was recorded at Midway Island. The lowest on record at Midway Island appears to be 29.28 inches, made on January 28, 1917,

The American aux. sch. *Flaurence Ward* which plies between Honolulu and neighboring islands was just to the eastward of Midway Island during the period when this depression reached its greatest intensity.

According to the report of Capt. Geo. H. Piltz of that vessel conditions became threatening on the 22d. At 4 p. m. on that date the wind was SE., 4, barometer 29.62 inches and falling steadily. At 6:30 p. m. the wind went to S. and at 8 p. m. to SSW., where it remained throughout the entire time of the gale, lasting until midnight of the 24th. The barometer continued to fall until midnight of the 23d when it stood at 29.12 inches, remaining at that point until 4 a. m. of the 24th. The wind increased steadily in force and reached its greatest intensity, force 11, between 8 a. m. and noon of the 24th, or just after the pressure had begun to rise. At the commencement of the storm there was terrific lightning and heavy rain and the weather remained squally until the force of the gale began to abate.

The respective Greenwich Mean Noon positions of the *Flaurence Ward* on the dates mentioned were as follows: 23d, latitude 27° 40' N., longitude 167° 30' W.; 23d, latitude 27° 42' N., longitude 166° 23' W.; 24th, latitude 27° 55' N., longitude 163° 51' W.

This depression occasioned a kona, or southwest, storm at Honolulu from the 22d to the 25th. During this period the wind reached a maximum velocity of 36 miles an hour from the west and an extreme velocity of 42 miles. The rainfall for the same period was 6.21 inches, of which 4.83 inches fell in 24 hours. The total rainfall for the month at Honolulu was 8.72 inches, or considerably more than twice the average amount. The mean temperature was 1.3° above the normal.

Between the 22d and the end of the month pressure was generally low over the northeastern part of the ocean with the center of greatest depression over the Gulf of Alaska. East of the 180th meridian high pressure was confined to the region between the Hawaiian Islands and the American coast.

Vessels on the northern steamer routes during the last decade experienced stormy weather not only as a result of the depression referred to but also on account of one which appeared to be central to the east of Japan on the 28th.

The American S. S. *Mobile City*, Capt. C. H. Longbottom, Shanghai for Seattle (Dec. 22-Jan. 8), experienced strong winds and gales during the entire voyage. On December 30-31, so states Mr. C. Kennedy, the observer, when nearing the 180th meridian, the *Mobile City* encountered a gale of hurricane force accompanied by terrific seas on account of which it was necessary to put about and run before the gale. As it appeared from conditions that the depression was traveling in a northeasterly direction a course was laid to the southward as soon as conditions permitted and the vessel soon ran into fine weather. The lowest barometer observed was 28.69 inches at 4 a. m. of the 31st, when in latitude 48° 35' N., longitude 178° E.

The Japanese S. S. *Africa Maru*, Capt. H. Yamamoto, Yokohama for Victoria (Dec. 17-30) appears to have been near the center of the depression in the Gulf of Alaska near the close of the month. At 2 a. m. on the 27th, when in latitude 50° 48' N., longitude 147° 22' W., the barometer fell to 28.39 inches, accompanied by a whole gale from WSW. and a tremendous sea.

In Asiatic waters several vessels experienced about the 7th heavy weather as a result of depressions on the front of an anticyclone of great magnitude which developed over eastern Siberia.

Storm logs are as follows:

West Ira, American S. S., Capt. C. F. Cross, Yokohama, (Dec. 1), for San Francisco:

Gale began on 8th; lowest barometer 30.03 inches at 8 p. m. of 9th in latitude 39° N., longitude 144° E.; highest force of wind, 9 NW. End of gale, 11th; shifts of wind, WNW., NW.

West Niger, American S. S., Capt. R. L. Holt, Hongkong (Dec. 1), for San Francisco:

Gale began on 7th; lowest barometer 29.54 inches at 4 p. m. of 7th in latitude 31° 30' N., longitude 137° 50' E.; highest force of wind, 10, NW.; end of gale on 8th. Shifts of wind NE., E., WSW., NW., W., NW.

West Cadron, American S. S., Capt. F. E. Anderson, Shanghai (Dec. 2), for San Francisco:

Gale began on 7th; lowest barometer, 29.35 inches at 8 p. m. of 7th in latitude 35° 35' N., longitude 142° 35' E.; highest force of wind 9, NE.; end of gale on 8th; shifts of wind NE. to NNE.

The closing days of the month saw renewed storm activity on the Asiatic side resulting from a depression which appears to have developed to the east of Japan about the 27th, moving thence northeastward toward the Aleutians. The British S. S. *Empress of Russia*, the Japanese S. S. *Alabama Maru* and *Korea Maru*, and the American S. S. *Mobile City* were all more or less involved in this storm from the 27th to the 31st. The experience of the last-named vessel has already been described.

On the 16th, as a result of the southeastward movement over the western United States and Mexico of an anticyclone of great magnitude fresh to strong easterly winds, reaching gale force at times, were experienced off the west coast of Central America.

The American S. S. *Stanley*, Capt. B. I. Joyce, Panama (Dec. 11) for Honolulu, experienced a gale which began on the 15th and continued until the 17th, the wind throughout being NE. and reaching a force of 10. The lowest barometer was 29.81 inches at 11 p. m. of the 15th in latitude 12° 03' N., longitude 95° 52' W.

In connection with the low barometer in the North Pacific Ocean during the last decade of the month attention is invited to the low pressure in the North Atlantic during the same period, which is referred to in the review of the weather for that ocean. The departure from normal pressure at Midway Island from the 21st to 31st, inclusive, was -0.31 inch and at Horta for the same period -0.57 inch.

TYPHOON IN THE WESTERN CAROLINES.

On the morning of December 17, a very severe typhoon swept the Western Carolines, causing great destruction on the Island of Yap. A cablegram to this effect was received by Manila Observatory on the 19th, in which our Filipino observer at Yap stated that the barometric minimum as registered by the barograph was as low as 712.47 mm. (28.05 inches), that hurricane winds blew there from northeast veering to south-southeast, and that the majority of our instruments were destroyed.

The above information was confirmed later by the following cablegram from Tokyo, dated December 20, which appeared in the Manila newspapers on December 22: "A very severe storm has destroyed the majority of the buildings on the Island of Yap. The gale prevailing there on December 16 developed a hurricane strength on the morning of the 17th, unroofing several public structures, including the barracks, Government offices, the native school, the telegraph office, the hotel, and several stores, and severely damaging practically every house."

The typhoon appeared about 300 or 250 miles to the east of the Philippines on December 20, threatening for a while to cross the central part of the archipelago. But fortunately it almost stopped moving on the 21st and finally filled up on the 23d, thus disappearing all danger for the Philippines.—Rev. José Coronas, S. J., *Philippine Weather Bureau*.