American S. S. *Sapinero:*

Gale began on the 23d, wind WSW. Lowest barometer 29.22 inches at 10:30 p. m. on the 23d, wind SW., 10, in latitude 36° 30′ N., longitude 47° 55′ W. End on the 24th, wind NW. Highest force of wind 10, SW.; shifts WSW.–W.

American Schr. *Frank A. Morey:*

Gale began on the 23d, wind SSE. Lowest barometer 29.50 inches at 4 p. m. on the 24th, wind NW., in latitude 40° 50′ N., longitude 73° W. End on the 26th, wind N. Highest force of wind 10; shifts not given.

Dutch S. S. *Leersum:*

Gale began on the 24th, wind SE. Lowest barometer 29.15 inches at 8 p. m. on the 24th, in latitude 47° 20′ N., longitude 38° 10′ W. End on the 25th, wind W. Highest force of wind 11; shifts S.–W.

British S. S. *Idaho:*

Gale began on the 24th, wind S. Lowest barometer 28.96 inches on the 25th, wind W., 10, in latitude 45° 41′ N., longitude 52° 41′ W. End on the 25th, wind W. Highest force of wind 10; steady from W.

American S. S. *F. Q. Barstow:*

Gale began on the 22d, wind NW. Lowest barometer 29.93 inches on the 22d, wind NW., 7, in latitude 22° 30′ N., longitude 94° 10′ W. End on the 24th, wind N. Highest force of wind 9, N.; shifts NW.–N.

On the 26th and 27th, while there were no well developed depressions over the ocean, a number of sporadic reports were received from vessels that encountered winds of gale force.

The observer on board the British S. S. *Paul Paix* reports as follows:

From November 25 to December 6 between meridian 36° W., and Bermuda a series of moderate gales in quick succession, causing high confused seas, and irregular changes of wind, was experienced, accompanied by severe squalls. Barometer fluctuating between 29.58 and 30.22 inches.

On the 28th there was a well-developed disturbance central about 5° east of Charleston, S. C., that moved slowly northeastward, increasing in extent; on the 29th the center was near Sydney, N. S., while the storm area extended as far south as the 30th parallel.

On the 28th a second area of low pressure of less intensity and extent was central near latitude 47° N., longitude 35° W. This also apparently moved northeastward during the next two days, although it was impossible to locate its track accurately on account of lack of observations. Storm logs and reports referring to both of these disturbances follow:

American S. S. *Chester Sun:*

Gale began on the 27th, wind W. Lowest barometer 29.45 inches at 6:30 a. m. on the 28th, wind W., in latitude 31° 52′ N., longitude 75° 03′ W. End on the 29th, wind NNE. Highest force of wind 10; shifts about 10 points.

American S. S. *Maracaibo:*

7 p. m. on the 27th, in latitude 33° 20′ N., longitude 73° 10′ W., barometer 29.70 inches, wind NW., 7; weather, cloudy.

7 a. m. on the 28th, in latitude 31° 50′ N., longitude 71° 20′ W., barometer 29.62 inches, wind SSW., 10; weather, raining.

7 p. m. on the 28th, in latitude 31° 40′ N., longitude 71° 10′ W., barometer 29.56 inches, wind WSW., 11; weather, raining.

7 a. m. on the 29th, in latitude 30° 10′ N., longitude 70° 45′ W., barometer 29.98 inches, wind NNW., 7; weather, cloudy. Lowest barometer 29.48 inches at 4 p. m. on the 28th.

French S. S. *Roma:*

Gale began on the 28th, wind S. Lowest barometer 29.32 inches at 11 a. m. on the 29th, wind S., in latitude 38° 48′ N., longitude 58° 30′ W. End on the 29th, wind WNW. Highest force of wind 10, S; shifts S.–NNW.

German S. S. *Bayern:*

Gale began on the 28th, wind SSE. Lowest barometer 29.55 inches at 5 p. m. on the 30th, wind S., 10, in latitude 47° 21′ N., longitude 38° 35′ W. End on the 20th, wind W. Highest force of wind 10, S.; shifts S.–W.

Norwegian S. S. *Foldenfjord:*

Gale began on the 29th, wind SE. Lowest barometer 29.13 inches at 1:30 p. m. on the 30th, wind S., 10, in latitude 42° 18′ N., longitude 55° 56′ W. End on the 30th, wind NW. Highest force of wind 11; shifts S.–W.

NORTH PACIFIC OCEAN.

By WILLIS E. HURD.

The weather over the North Pacific Ocean during November, 1922, indicates the usual increase of storm activity natural to the advancement of the season over the northern area. The comparatively few reports at hand would indicate a quite persistent area of high pressure over the China coast and some storm activity to the eastward and over Japan, especially on the 1st to 4th, 7th to 11th, 18th to 24th, and 24th to 27th. At least three of the four more active storms occurring during these periods were of tropical origin, but they seem to have developed no material energy until well into higher latitudes.

The first of these storms apparently originated near Guam about October 28. Its center was east of Japan on November 1, and on the 2d and 3d was causing gales to the eastward of the Kurils. The Canadian S. S. *Canadian Inventor*, bound from Moji to Victoria, was involved in this storm on the 2d, 3d, and early morning of the 4th, between latitudes 43° 50′ and 44° 50′ N., longitudes 156° 55′ and 160° E. Though the highest wind force she experienced was only 9, yet on the 2d her barometer showed a pressure, corrected, of 28.87 inches.

The cyclone of the 7th-11th apparently formed over the Asiatic continent, early disturbing the weather in the neighborhood of Japan, thence moving northeastward and merging with the Aleutian LOW in Bering Sea on the 11th.

On the 18th a depression was observed to the southward of the Bonin Islands. On the 19th it was over Japan, and during the four or five following days moved northeastward, developing considerable energy. The American S. S. *West Kader* reported a force of 11 from the W., pressure 29.25, on the 23d in 42° 06′ N., 150° 26′E.

The fourth storm of the Far East began as a tropical depression on or about the 24th, and strongly affected Japan on the 26th. On this and the following day several vessels reported strong westerly gales between Honshu and the 160th meridian of east longitude.

Along the northern steamship routes gales were of frequent occurrence throughout the month, and very few vessels accomplished a passage without encountering rough weather. On a voyage from Yokohama toward Victoria the British S. S. *Tyndareus* was in high seas from the 3d, in about 50° N., 165° W., until the 7th, in about 49½° N., 135° W. Until the 6th the observed gales in this area, force 7 to 11, were mostly from NW. to SW., with the center of activity fluctuating from the Aleutians to the Gulf of Alaska. During the 6th, however, the cyclone spread southward from the Gulf, giving lowered pressures along the coast from Sitka to San Francisco and southerly to easterly gales over much of the same region. The Japanese S. S. *Arabia Maru* reported a gale from the SE., force 11, near latitude 49° N., longitude 128° W., on the 3d.

About the 16th of the month a disturbance appeared near 35° N., 160° E. Near here on the 17th the British S. S. *Shabonee* encountered a southeasterly gale, force 11, with lowest corrected pressure, 29.66 inches. On the same date the American S. S. *Algonquin*, Capt. J. C.

Harding, bound toward San Francisco, encountered hurricane winds several hundred miles to the northeastward of the *Shabonee's* position. The observer noted:

The 17th November, 1 p. m. (G. M. T.), latitude 43° 12′ N., longitude 175° 15′ E. Strong east breeze, cloudy, threatening, barometer 29.90 (uncorrected). 4 p. m., SE. gale, wind force 8, barometer 29.43. 8 p. m., SE. storm, wind 11, barometer 28.98. 9 p. m., hurricane wind SE. 12, mountainous and dangerous sea, hove to full speed ahead. 9.30 p. m., wind hauled to SSE., 12, barometer 28.82. 10 p. m., wind hauled to south, sea very rough, barometer rising slowly to 28.84. 11 p. m., wind hauled to SSW., barometer 28.86. 11.30 p. m., wind hauled to SW. by S., barometer 28.86. 12 a. m., 18th, wind hauled to SW., barometer rising slowly. 1.30 a. m., wind gradually hauling to westward, turned ship around before wind, which put ship almost on her daily track. 4 a. m., wind moderating to a strong gale, with the sea very rough.

Many other vessels reported gales over the northern routes on the 17th and from then until the 24th. Among them the Japanese S. S. *Mandasan Maru*, Yokohama toward San Francisco, reported an easterly gale, force 10, in 45° 55′ N., 179° 17′ E., lowest pressure (uncorrected) 28.87 inches, on the 18th. On the 21st the same vessel noted a northwesterly gale, force 11, pressure 29.42 inches, in 46° 02′ N., 169° 38′ W. The condition causing these gales was very widespread, the entire northern and eastern portion of the ocean being occupied by low pressure having two centers of considerable energy, one over the Aleutians, the other south of the Gulf of Alaska.

North Pacific atmospheric pressure during November was characterized by a procession of LOWS, or a fluctuation of low pressure, across the Aleutian area, and a considerable breaking by cyclonic storms or depressions into the usual belt of high pressure in middle latitudes. Several cyclones from the western part of the ocean seem to have merged with the Aleutian LOW. In addition, a considerable depression moved northward from the vicinity of Midway Island on the 26th and was definitely aligned with an Aleutian disturbance in Bering Sea on the 27th. Two low-pressure areas which apparently originated to the eastward or northeastward of the Hawaiian Islands on the 11th and 20th, respectively, also worked their way into the northern semipermanent cyclone. These depressions exhibited comparatively little violence. They were well observed, since they lay on the San Francisco-Honolulu route. The first persisted east of Hawaii until about the 16th; the second merged on the 21st with the great cyclone which spread southward from the Gulf of Alaska and later retreated to the Aleutian area. After the 26th the North Pacific HIGH dominated the weather of the eastern part of the ocean until the end of the month.

Pressure at Dutch Harbor was somewhat above the normal for the month, the average, based on afternoon observations, being 29.64 inches, as compared with a normal of 29.59. The change from the preceding month was +0.17 inch. The highest reading was 30.26 inches, on the 5th, and the lowest, 28.54 inches, on the 3d. At Midway Island pressure was prevailingly below normal, the average for the month being 30.03 inches, as compared with a normal of 30.11. From the 21st to the end of the month the average daily departure was −0.14 inch. The highest reading was 30.34, on the 10th, the lowest, 29.84, during a northwest gale on the 26th. At Honolulu the departure was very small, as usual, being approximately −0.01 inch. The extremes here were 30.13 inches, recorded on the 25th, and 29.82, on the 11th.

Reports received indicate a marked decrease in the percentage of fog over the North Pacific as compared with October. Only a few vessels specifically mention fog and that on scattered dates along the American coast and elsewhere east of the 180th meridian. The report of the Japanese S. S. *Meiyo Maru*, Capt. J. Satow, Callao toward Honolulu, contains the following statement:

From Chilean coast to near Equator experienced thick weather, misty or foggy, on every morning from about 4 to 8.

On the 17th this vessel reported the unusual condition of fog in latitude 0° 27′ N., longitude 103° 59′ W.

SIX TYPHOONS IN THE FAR EAST DURING NOVEMBER, 1922.

By Rev. JOSÉ CORONAS, S. J.

[Weather Bureau, Manilla, P. I., Dec. 2, 1922]

Five typhoons have been shown on our weather maps during the last month of November, although none of them was of any importance for the Philippines. The last typhoon of October which had appeared to the SSE. of Guam on the 28th and 29th near 146° longitude E. and 9° or 10° latitude N. moved NNE. to the E. of Guam; and while its center could be situated at 6 a. m. of October 30 in about 150° longitude E. and 15° latitude N., another atmospheric disturbance made its appearance to the WNW. of Guam in 140° longitude E. and 16° latitude N., moving NNE. first and then NE. On November 1 this first depression or typhoon of November was still noticed to the SE. of the Bonins, when another typhoon developed between Japan and the Bonins not far from 142° or 143° longitude E. and 31° latitude N. It moved northeastward and caused a considerable falling of the barometer and a gale from SSE. and SSW. on board the S. S. *Taiyo Maru* during the night of November 1 to 2, the approximate position of the steamer being at the time of the barometric minimum (29.30 inches) 149° 30′ longitude E. and 35° 04′ latitude N.

It was also on November 1 that a shallow depression was shown by the observations of Yap in about 138° longitude E. and 6° latitude N. It traversed the southern part of the Philippines on November 4 in the form of a low-pressure area of no importance, but once in the China Sea it developed into a real typhoon, and as such it crossed the southernmost part of Indo-China in the evening and night of November 6.

The fourth typhoon of the month was formed on November 9 to the SSW. of Guam near 142° longitude E. and 9° latitude N. It moved NW. between Guam and Yap on November 9 to 10 and inclined northward on November 12 in about 137° longitude E. and 14° latitude N. It is impossible, with the data at hand, to follow the typhoon after the 13th or to decide whether it filled up or not on that day. Before receiving the daily weather maps of Tokio, it was thought that the falling of the barometer and winds observed in the Bonins on the 16th might be attributed to the recurving northeastward of this typhoon. Yet the Tokio maps are not in favor of this supposition, but rather of a new atmospheric disturbance which developed in the neighborhood of the northern Loochoo Islands on the 15th and moved eastward to the north of the Bonins.

The last depression or typhoon appeared on the 11th and 12th about 200 miles east of the Visayan Islands, moving NNW. It remained almost stationary on the 13th east of southern Luzon and continued moving NNW. or N. on the 14th to 16th. We could not follow the disturbance any more after the 16th; it may be that it filled up on that day E. of the Bashi Channel or of southern Formosa.