

## NORTH PACIFIC OCEAN, DECEMBER 1937

By WILLIS E. HURD

*Atmospheric pressure.*—Numerous deep cyclones were charted over northern and central waters of the North Pacific during December 1937. From the 4th to the 16th, and on a few later days, pressures below 29 inches were read on ships at various times along the entire stretch of the northern routes. At Midway Island, on the 11th, the barometer fell to 29.04, and on the 10th and 11th still lower readings were made on shipboard nearby.

The average pressures in the Aleutian region were higher than the normal of the month, but the excess in the average for December of this year was due to the high readings of the 20th to 23d, with a maximum of 31 inches or higher at St. Paul and Kodiak on the 21st. As an example of the excessive pressure fluctuations of the month in high latitudes, the instance of Kodiak, with the lowest reading of 28.53 on the 18th and the highest reading of 31.00, on the 21st, may be cited.

In consequence of the greatly extended sphere of cyclonic activity, the regions of average high pressure were abnormally restricted into two small areas, one lying off the coast of California and the other extending from the east coast of China seaward across the Nansei and Ogasawara Islands.

The extreme pressure readings recorded were 31.10, at St. Paul on the 21st, and 28.37, on the steamship *President Jackson*, near 50° N., 140° W., on the 10th.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean, December 1937, at selected stations

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Point Barrow.....	30.32	+0.29	31.06	8, 9	29.50	19
Dutch Harbor.....	29.59	+0.03	30.92	21	28.54	18
St. Paul.....	29.79	+0.21	31.10	21	28.92	18
Kodiak.....	29.64	+0.08	31.00	21	28.58	14
Juneau.....	29.88	+0.09	30.78	21	29.19	14
Tatoosh Island.....	29.97	+0.01	30.67	20	28.94	10
San Francisco.....	30.07	-0.05	30.35	28	29.62	9
Mazatlan.....	29.92	-0.01	29.98	{ 20-22, 24 }	29.82	15
Honolulu.....	29.96	-0.05	30.19	14	29.70	
Midway Island.....	29.96	-0.05	30.24	26	29.04	1
Guam.....	29.84	-0.03	29.92	14, 15	29.77	6, 22, 25
Manila.....	29.84	-0.02	29.94	14	29.68	
Hong Kong.....	30.03	-0.06	30.14	5	29.92	9, 23
Naha.....	30.07	+0.09	30.18	4, 5, 12	29.89	31
Titijima.....	30.02	+0.02	30.21	16	29.83	25

NOTE.—Data based on 1 daily observation only, except those for Juneau, Tatoosh Island, San Francisco, and Honolulu, which are based on 2 observations. Departures are computed from best available normals related to time of observation.

*Extratropical cyclones and gales.*—An unusual number of deep cyclones, some of great extent and duration, occurred on the North Pacific during December. While the maximum wind reported did not exceed force 11 in any of these disturbances, gales were of practically daily occurrence on the ocean outside the tropics, and the month may well be considered a stormy one. Heavy weather conditions resulting from extratropical disturbances penetrated into low latitudes on several days, and winds of whole gale force occurred on the 10th accompanied by low pressures in two localities south of the thirtieth parallel.

The earliest storm of importance in the month was centered near the southeast coast of Honshu late on the

2d and early on the 3d. At or near Yokohama on the 3d, according to the report of the Japanese motorship *Tatsuta Maru*, the barometer fell to 29.33, with a fresh west gale. To the eastward on the 3d the American steamer *President McKinley* encountered a west-southwest gale of force 10, barometer down to 29.12. In Yokohama harbor on the 4th this ship reported a whole westerly gale. The storm field spread during the 3d and 4th, and some fresh to strong gales connected with it were experienced as far to the eastward as 170° E., between 30° and 35° N.

By the 4th several deep centers lay over northern waters and were followed by similar conditions until the 18th, after which there was an abatement in the general depth and severity of the storms, following the sudden appearance of a powerful anticyclone over northern waters.

On the 4th to 6th the American steamer *President Jackson*, Yokohama to Victoria, passed through a storm area south of the Aleutians, with barometer depressed to 28.66 inches on the 5th near 49° N., 179° W., and attended by intermittent gales which reached their greatest intensity, force 11, early on the 6th.

On December 10 a storm, with little known antecedent history, appeared central in the near vicinity of Midway Island, with pressures on two ships, one closely north of the island and the other to the eastward, reading 28.94, both accompanied by whole gales. At Midway, on the early morning of the 11th, the extraordinarily low reading for the station of 29.04 inches was recorded. At 4 a. m. of the 11th the Norwegian motorship *Corneville*, after experiencing gales for several hours northeast of Midway, ran into a north gale of force 11, barometer 28.57, in 36°24' N., 169°18' W. The storm thereafter, with rapidly decreasing energy and increasing speed, moved northward and lay over the eastern Aleutians on the 12th and 13th.

On December 8, while most of the eastern half of the ocean was a scene of unsettled weather and low barometer, a storm center, with lowest pressure about 28.70, appeared near 40° N., 160°-165° W. It moved northeastward, during its passage coalescing with another center from the Aleutians, and on the 10th was central near 50° N., 140° W., where the steamer *President Jackson*, shortly after encountering a second force 11 gale of the month, had a barometer of 28.37 inches. During the 9th and 10th, while strong southerly winds occurred along the upper coast of the United States, the gale area of the great disturbance, as shown by vessel reports, extended as far south, at least, as the twenty-eighth parallel, and from about longitude 155° W. eastward almost to the Washington and Oregon coasts. Near 36° N., 144° W., pressure was 29.70 on the 9th, attended by strong gales, while as far south in latitude as 29° N., 145° W., the American steamer *Makawao* had a barometer depressed to 29.33 inches, with strong to whole westerly gales. By the 11th the storm had moved northward and its gale field had retreated from the California-Hawaiian routes.

From the 12th to 18th scattered gales of force 8-9 occurred on various parts of the ocean, and may best be located by reference to the table of gales.

On the 19th and 20th a storm passed up the east Japanese coast and entered the Sea of Okhotsk. During these days strong to whole gales swept the western waters of the northern steamship routes, while central pressures fell to approximately 29 inches.

From the 23d to 28th stormy weather prevailed in coastal Washington and neighboring waters. A small

depression southwest of Vancouver Island on the 23d and 24th resulted in disturbed conditions prior to its passage inland over British Columbia. The British steamer *Aorangi*, outward bound from Victoria, encountered fresh westerly gales late on the 23d, increasing to force 9 early on the 24th. The ship's lowest pressure, 29.40, was read on the 23d near  $46\frac{1}{2}^{\circ}$  N.,  $129^{\circ}$  W.

Closely following upon the heels of this low, a further disturbance pressed in upon the Washington coast from the westward. From the 27th to 29th strong winds to gales were experienced in connection with it to the eastward of  $150^{\circ}$  W., and to the northward of the fortieth parallel. On the morning of the 28th the storm center was near  $52^{\circ}$  N.,  $140^{\circ}$  W., with lowest observed pressure 28.62; and at p. m. observation the center had moved eastward to about  $132^{\circ}$  W., with barometer about 28.70. Early on the morning of the 28th the American steamship *Coloradan*, bound up the coast to Portland, after steaming in southerly gales since the previous noon, experienced a south gale of force 11 in  $46^{\circ}54'$  N.,  $125^{\circ}24'$  W. Gales of decreasing force continued until the ship entered the Columbia River. The storm center after the 28th moved toward the Gulf of Alaska, but continued to cause gales on the 29th far to the southward along the eastern extremity of the northern steamer route.

The following wind velocities, speed in miles per hour with the corresponding direction, were recorded for 5-minute periods at the Weather Bureau Station at North Head, Wash., during the 24th to 28th: 24th, 50 west; 25th, 61 south; 26th, 54 southwest; 27th, 64 south; 28th, 70 south.

*Typhoon in the Far East.*—One typhoon occurred in the Far East this month. An account of it, prepared by the Reverend Bernard F. Doucette, S. J., of the Philippine Weather Bureau, is subjoined.

*Gales on and near the Gulf of Tehuantepec.*—Strong northerly winds of the Tehuantepecer type occurred as follows: Of force 7 on the 4th, 11th, 12th, and 27th; and of force 8 on the 2d, 3d, 6th, and 20th. The U. S. S. *Neches*, Coco Solo to San Pedro, in addition to the Tehuantepecer of the 6th, experienced a northeast Papagayo of force 7 off the Costa Rican coast on the 4th.

*Fog.*—Fog was infrequent this month on the North Pacific. It was reported on 5 days along the middle section of the northern routes; on 5 days several hours out from the coast of the United States; and on 1 day near the mouth of the Columbia River. Off the coast of southern and Lower California it occurred on 3 days, and northwest of the Revillagigedo Islands on 1 day.

#### TYPHOON OVER THE FAR EAST, DECEMBER 1937

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*Typhoon, December 2-14, 1937.*—A low pressure area appeared over the Western Caroline Islands on November 30, but a definite center did not form until December 2, when a depression was central about 200 miles east-south-east of Yap. It moved rather rapidly in a northwesterly direction, inclining somewhat to the west-northwest as it approached the one hundred and thirty-fifth meridian. On December 3 it changed to the west-southwest, intensifying as it proceeded. The next morning found it about 300 miles east of Surigao Strait, from which position it moved west by north, crossing southern Samar Island

between Borongan and Guiuan. On December 5 it moved across the Visayan Islands, crossing the southern part of Masbate Island and passing close to and north of Panay Island. At 6 a. m. December 6 its center was located between Tablas and Mindoro Islands. It now began an irregular course, moving slowly and weakening. First there was an inclination to the south for about 20 miles, then during the forenoon of December 7 a shift to the east, bringing the center to the northwestern part of Panay Island, and finally a change to the southwest, which carried the disturbance to the northern part of the Sulu Sea (December 8). These facts briefly indicate its irregular course. Now, as a weak low pressure area it moved along a west-northwest course into and across the China Sea, where it intensified into a typhoon. The steamship *President Polk*, en route from Manila to Singapore, came under its influence after it again became a typhoon, central near latitude  $12^{\circ}$  N., longitude  $115^{\circ}$  E. The typhoon now continued along a west-northwest course for a short period, moving in a northerly direction December 13 and disappearing over the region of the Paracel Islands and Reefs, December 14.

This storm followed a course over the Visayan Islands similar to the typhoon of November 15-23, 1937. However, only four deaths resulted from this typhoon according to the newspaper reports, two from Masbate and two from Mindoro being the only casualties coming to the notice of the public.

On December 11 and 12 an increase in the strength of the northeast monsoon current caused the intensification of the low pressure area over the China Sea as mentioned above. The steamship *President Polk* reported on December 12, 2 p. m. Manila time, 749.7 mm (29.516 in.) with south-southeast winds force 8, at latitude  $12.20^{\circ}$  N., longitude  $115.30^{\circ}$  E.

Over the Visayan Islands the significant barometric minima are listed as follows: Borongan had 737.22 mm (29.025 in.) at 4 p. m. December 4; Guiuan, 1 hour before, had a minimum value of 745.79 mm (29.362 in.); Tacloban's minimum value occurred at 7:30 p. m. of the same day, and was 744.70 mm (29.319 in.); December 5 at 3 p. m. 747.7 mm (29.437 in.) was recorded at Masbate; December 6, at 4:25 a. m., Odiongan had a value of 745.34 mm (29.344 in.), and Cuyo, 2 days later, reported 748.65 mm (29.474 in.) as the minimum (December 8, 10 a. m.). The strongest winds reported were west winds, force 11, at Tacloban. During the course of the storm over the Visayan Islands, after crossing Samar, the strongest winds reported were force 7.

#### SEA-SURFACE TEMPERATURE SUMMARY FOR A PORTION OF THE NORTH ATLANTIC OCEAN NEAR TO AND EAST OF THE VIRGINIA-NORTH CAROLINA CAPES

By GILES SLOCUM

The area embraced in this summary comprises eleven  $1^{\circ}$  squares, namely:

- From  $35^{\circ}$  N. to  $36^{\circ}$  N.,  $69^{\circ}$  W. to  $74^{\circ}$  W.
- From  $36^{\circ}$  N. to  $37^{\circ}$  N.,  $69^{\circ}$  W. to  $73^{\circ}$  W.
- From  $37^{\circ}$  N. to  $38^{\circ}$  N.,  $69^{\circ}$  W. to  $71^{\circ}$  W.

This area includes a portion of the axis of the Gulf Stream, but lies south and east of its shoreward portions, thus excluding nearly all of the area alternately occupied by the Gulf Stream and by the cold waters of the con-