

OCEAN GALES AND STORMS, SEPTEMBER 1939—Continued

Vessel	Voyage		Position at time of lowest barometer		Gale began September	Time of lowest barometer, September	Gale ended September	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
NORTH PACIFIC OCEAN—Continued													
Makawell, Am. S. S.	Hilo, T. H.	San Francisco	22 34 N.	151 13 W.	3	4p, 3	4	1,015.9	ENE	E, 9	ENE	E, 9	ENE-ESE.
Potter, Am. M. S.	Los Angeles	Balboa	16 59 N.	101 47 W.	5	3a, 0	6	1,008.5	ESE	E, 8	ESE	E, 8	
San Gabriel, Am. S. S.	do	do	17 59 N.	103 20 W.	6	5p, 6	7	1,005.4	E	E, 8	SE	E, 9	
Charles H. Cramp, Am. S. S.	do	do	13 55 N.	95 00 W.	7	5p, 7	7	1,004.4	NE	SE, 8	SSE	SE, 9	E-SSE.
Potter, Am. M. S.	do	do	13 58 N.	95 24 W.	7	9p, 7	7	1,004.1	ENE	SE, 9	S	SE, 9	E-SE.
Panaman, Am. S. S.	do	do	19 18 N.	106 11 W.	7	6a, 7	8	1,001.4	NE	E, 12	E	E, 12	NE-E.
Kainalu, Am. S. S.	do	do	18 32 N.	107 15 W.	7	11a, 7	8	995.6	N	WNW, 12	S	WNW, 12	N-SW.
Vega, U. S. N.	San Diego	do	14 12 N.	93 55 W.	7	6p, 7	8	1,008.8	S	S, 7	S	S, 7	
Horace Luckenbach, Am. S. S.	Balboa	Los Angeles	20 59 N.	107 51 W.	7	11p, 7	8	989.2	ESE	E, 12	SSE	E, 12	E-SSE.
West Cactus, Am. S. S.	do	do	21 53 N.	109 53 W.	7	5a, 8	8	986.1	N	NW, 12	SW	NW, 12	NE-NW-SW.
Point Judith, Am. S. S.	do	do	21 21 N.	108 50 W.	7	2a, 8	8	948.2	ENE	Var. 4	SW	NNE, 12	NNE-WSW.
Losmar, Am. S. S.	Los Angeles	Balboa	22 40 N.	110 10 W.	8	1p, 8	8	953.3	NE	—, 12	—	—, 12	
Horace Luckenbach, Am. S. S.	Balboa	Los Angeles	23 48 N.	111 55 W.	8	9p, 8	9	986.1	S	SE, 12	SE	SE, 12	ESE-SE.
Minnesota, Am. S. S.	do	do	23 50 N.	111 55 W.	7	10p, 8	9	982.4	ESE	SE, 12	S	SE, 12	ESE-S.
J. L. Luckenbach, Am. S. S.	Los Angeles	Balboa	24 00 N.	112 30 W.	8	—a, 9	9	—	—	—	—	Shifting, 11.	
San Gabriel, Am. S. S.	do	do	15 45 N.	97 49 W.	8	2a, 9	9	1,010.5	E	E, 9	SE	E, 9	E-ESE.
Maul, Am. S. S.	do	do	25 24 N.	113 35 W.	9	Noon, 9	9	1,003.1	NNE	SE, 8	SE	SE, 8	NNE-SE.
Hamakua, Am. S. S.	do	do	27 00 N.	114 36 W.	9	4p, 9	10	1,006.8	ESE	ESE, 2	E	ESE, 8	
Texas, Am. S. S.	do	Yokohama	46 00 N.	176 52 E.	8	2a, 10	11	993.9	NE	SSW, 9	NW	SSW, 10	SSW-WSW.
Guide, U. S. C. & G. S.	Dutch Harbor near.	Unimak Island.	55 06 N.	164 42 W.	10	10a, 11	11	1,017.3	S	S, 8	S	SE, 8	S-SSW-SE.
Discoverer, U. S. C. & G. S.	On survey work near.	Aleutian Islands.	54 30 N.	162 36 W.	14	Noon, 14.	15	1,012.5	NW	NW, 7	NW	NW, 10	W-NW.
Vermont, Am. S. S.	Los Angeles	Balboa	22 57 N.	118 18 W.	13	4a, 14	14	1,007.5	NW	WSW, 8	SW	W, 8	WNW-SW.
Henry S. Grove, Am. S. S.	do	do	13 37 N.	94 24 W.	14	8a, 15	15	1,008.1	SE	NE, 6	ESE	NE, 7	NE-E.
Hamakua, Am. S. S.	do	do	14 14 N.	94 29 W.	15	4p, 16	17	1,006.8	NE	ESE, 7	E	E, 7	ENE-SE.
City of Los Angeles, Am. S. S.	do	do	15 08 N.	96 33 W.	17	1p, 17	17	1,007.1	ESE	ENE, —	SE	ESE, 7	
Manoeran, Du. M. S.	San Francisco	do	17 25 N.	106 20 W.	18	4p, 19	20	1,007.2	NW	ESE, 5	W	E, 7	ENE-ESE.
Besholt, Nor. M. S.	Los Angeles	do	18 00 N.	113 36 W.	20	11p, 20	21	983.9	NE	NNW, 9	S	NNW, 10	NE-NW.
Canton, Swed. M. S.	Manila	San Francisco	41 08 N.	149 35 W.	20	7a, 20	20	980.5	SW	E, 10	SW	SE, 11	SW-E-SE.
Kansai Maru, Jap. M. S.	Yokohama	Los Angeles	46 43 N.	166 09 W.	22	6a, 23	23	977.3	NW	SSE, 7	SSW	N, 8	SE-SSW.
Chirikof, Am. S. S.	Chignik, Alaska.	San Francisco	55 32 N.	156 18 W.	23	6p, 23	23	993.2	ENE	E, 7	E	E, 9	E-SE.
Discoverer, U. S. C. & G. S.	On survey work near.	Aleutian Islands.	54 44 N.	162 56 W.	23	4p, 23	23	987.5	ENE	E, 8	E	E, 11	E-SE.
Leonard Wood, U. S. A. T.	Balboa	San Francisco	31 48 N.	118 48 W.	24	4p, 24	24	1,001.4	—	S, 8	—	S, 8	
San Clemente Maru, Jap. M. S.	Los Angeles	Yokohama	38 45 N.	145 00 E.	23	2a, 24	24	984.1	ENE	NE, 6	NW	NW, 8	ENE-NNW.
Bengal Maru, Jap. S. S.	do	Balboa	32 55 N.	117 45 W.	24	5a, 25	25	993.2	SSE	SE, 9	SW	SE, 9	SE-SSW.
Akiura Maru, Jap. M. S.	Kamchatka	Los Angeles	50 44 N.	160 00 E.	24	4p, 25	26	930.2	ENE	NNE, 8	NNW	NNE, 8	ENE-N.
Sawokla, Am. S. S.	Maslinoc, P. I.	do	42 40 N.	172 25 E.	25	Mdt, 25	26	999.3	SSW	SW, 7	WNW	W, 8	SSW-WSW.
Sanyo Maru, Jap. M. S.	Yokohama	San Francisco	45 33 N.	167 17 E.	24	Mdt, 25	26	991.9	SSE	WSW, 8	NW	WNW, 9	WSW-WNW.
Kiyo Maru, Jap. M. S.	Nagasaki	Los Angeles	46 29 N.	177 43 W.	26	5p, 25	27	997.8	W	SW, 6	WNW	W, 8	S-WSW.
Guide, U. S. C. & G. S.	Dutch Harbor	Seattle	54 54 N.	163 24 W.	26	2p, 27	27	982.7	SE	S, 2	SE	SE, 9	SSE-SW.
Azuma Maru, Jap. M. S.	Yokohama	San Francisco	47 12 N.	173 06 W.	27	Noon, 26	27	1,007.2	—	NW, 8	WNW	NW, 8	
Discoverer, U. S. C. & G. S.	On survey work near.	Aleutian Islands.	54 30 N.	162 18 W.	26	2a, 28	27	988.2	SE	SW, 4	SE	SE, 10	

1 August.
 2 Barometer uncorrected.
 3 Position approximate.

NORTH PACIFIC OCEAN, SEPTEMBER 1939

By WILLIS E. HURD

Atmospheric pressure.—On the average, a long, shallow low, pressure 1,008.0 to 1,010.3 millibars (29.77 to 29.83 inches), extended from the Gulf of Alaska across Aleutian waters and the southeastern part of the Bering Sea. The lowest daily pressure of the month at any of the island stations in this region was 979 millibars (28.91 inches), at Kodiak, on the 6th; the highest pressure was 1,032 millibars (30.48 inches), at St. Paul Island, in the Bering Sea, on the 15th. Throughout the Aleutian region the average barometer was higher than the normal, that at St. Paul, 1,010.3 millibars, being 4.2 millibars (0.12 inch) above. In middle latitudes, on the eastern half of the ocean, high pressure was strongly developed from the 1st to the 17th, but was thereafter broken by intruding lows. Here the average pressure was near normal. In the southwestern Tropics, following the extraordinarily depressed conditions of August, pressure had risen, and was for the most part above normal in September.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean, September 1939, at selected stations

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Millibars	Millibars	Millibars		Millibars	
Point Barrow	1,010.2	-2.3	1,023	22	995	16
Dutch Harbor	1,008.8	+1.0	1,029	15	981	27
St. Paul	1,010.3	+4.2	1,032	15	987	26
Kodiak	1,008.0	+1.9	1,023	10	979	6
Juneau	1,013.5	+0.3	1,030	23	990	15
Tatoosh Island	1,017.7	+0.8	1,026	18	1,006	12
San Francisco	1,013.9	0.0	1,022	14	1,005	25
Mazatlan	1,010.2	+0.4	1,013	3, 4, 24	1,006	27
Honolulu	1,014.8	-1.1	1,018	3	1,011	28
Midway Island	1,016.9	+0.6	1,023	4	1,009	11
Guam	1,009.4	-0.8	1,012	2, 6	1,004	18
Manila	1,009.3	+1.2	1,013	6	1,006	16
Hong Kong	1,009.1	+1.0	1,013	30	1,003	1
Naha	1,010.5	+2.7	1,016	24-25, 30	1,006	8
Titijima	1,011.7	+0.5	1,016	14-15, 25-26	1,006	10
Petropavlovsk ¹	—	—	1,020	18	999	24

¹ For 16 days.

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.—The centers of most extratropical cyclones of the month moved in high latitudes, crossing the Aleutians or the Bering Sea from west to east, but affecting the weather far to the southward along the upper main traveled routes. A few cyclones of importance, however, formed in middle latitudes. While storminess had increased considerably, since the preceding month, it was severe only locally, according to reports received; near 46° N., 177° E., on the 9th, force 10; to the near southward of the Alaska Peninsula and the eastern Aleutians on the 14th, 23d, and 26th, force 10–11; and near 41° N., 150° W., on the 20th, force 11.

Prior to the 15th the only winds reported as high as force 8, aside from the stronger winds mentioned as of the 9th and 14th, occurred close to the center of the high pressure area near 41° N., 139° W., on the 1st; off the coast of northern California on the 2d; and near the tip of the Alaska Peninsula on the 2d and 11th.

During the 15th and 16th a low traversed the Gulf of Alaska and the adjacent waters of the ocean, causing northerly winds of force 7–8 in the gulf on the 15th.

A depression left the northern California coast on September 25–26 and, after an unusual southwestward course to about 32° N., 135° W., went northward and dissipated on the 28th. The strongest wind noted in connection with the disturbance was of force 7, near 40° N., 129° W.

From the 17th to 23d an extensive cyclone lay over midocean. It moved slowly in an east-to-northeast direction until the 22d, then with much increased rapidity northward toward the Alaskan coast. The cyclone attained considerable intensity on the 20th, as shown by the report of the Swedish motorship *Canton*, San Francisco toward Manila. This ship encountered a gale of force 11 at local noon, in 41°08' N., 149°35' W., and had a low barometer reading of 980.5 millibars (28.96 inches) 5 hours earlier. The Japanese motorship *Kansai Maru* reported a lower barometer, 977.3 millibars (28.86 inches), near 47° N., 166° W., on the 23d, but this ship met only winds of force 7–8. At noon of the 23d the United States Coast and Geodetic Survey Ship *Discoverer* encountered a force-11 gale from the east, barometer 987.5 millibars (29.16 inches), near 55° N., 163° W.

On the 24th a further cyclone lay near northern Japan. In its eastward course, it crossed the western Aleutians on the 25th–26th. The center skirted the islands to the northward and entered southwestern Alaska from the Bering Sea on the 29th. Stormy weather was reported by several ships along the northern routes during its course from the 24th to 27th. The earliest gale reported was of force 8, met by the Japanese motorship *San Clemente Maru*, barometer 984.1 millibars (29.06 inches), not far from the east coast of Honshu Island. The succeeding gale reported, also of force 8, occurred on the 25th, southeast of Kamchatka. On the 26th westerly gales of force 8 to 9 occurred within the area 42°–47° N., 172° E.–177° W., and a southeast gale of force 11, barometer 980 millibars (28.94 inches) was reported by radio from a ship in a position southwest of Dutch Harbor. Late on the 26th the United States Coast and Geodetic Survey ships *Guide* and *Discoverer* encountered southeast gales of force 9 and 10, respectively, to the eastward of Dutch Harbor. On the 27th the storm had lessened in energy, and the highest winds reported for the day were of force 8, south of the central Aleutians.

Cyclones and gales of the Tropics.—In tropical waters of the North Pacific there was much less storm activity in

the southwestern part of the ocean, and much more in the southeastern, than in the preceding month. An account of the typhoons and depressions over the Far East for September 1939, prepared by the Rev. Bernard F. Doucette, S. J., Weather Bureau, Manila, P. I., is subjoined.

Reports from two ships to the east of the Hawaiian Islands on September 3 indicate the existence of a disturbed condition in the afternoon. The American steamer *Anniston City* had a north wind of force 7 in 21°12' N., 150°12' W., at 2 p. m., and the American steamer *Makaweli* encountered an east gale of force 9, in 22°34' N., 151°13' W. at 4 p. m. The lowest barometer reported by both vessels was 1,015.9 millibars (30 inches).

In Mexican waters three cyclones passed up the coast in a general northwesterly direction. Two were of hurricane or near hurricane intensity, one being particularly violent over and in the vicinity of the mouth of the Gulf of California, and the other being of unique economic importance to southern California, besides being the first tropical storm of this severity to have affected this coast within our years of record. These storms will be made the subject of a special article to appear in a later issue of the REVIEW, and will therefore receive only brief treatment in the present report.

The first, that of September 5–12, had its origin to the southward of Acapulco and its dissipation over the upper part of Lower California. It was of great severity on the 7th to 9th, with hurricane winds reported by several ships from positions south of Cape Corrientes and thence for some distance northward up the southern west coast of Lower California. The American steamer *Point Judith*, during the early morning hours of the 8th, passed through the hurricane center, near 21° N., 109° W., with light variable winds, and a barometer reading of 948.2 millibars (28 inches), the lowest point on the aneroid's scale. Hurricane winds were experienced by this ship before and after passage of the center.

The second cyclone, that of the 5th to 14th, originated near 9° N., 88° W., or at some distance off the coast of southern Costa Rica, and dissipated over the southern headlands of Lower California. The highest wind reported for this cyclone was of force 9, experienced by the American vessels *Potter* and *Charles H. Cramp* on the 7th, near 14° N., 95° W., and by the steamer *San Gabriel* on the 9th, near 16° N., 98° W. The lowest barometer reported was 1004.1 millibars (29.65 inches), read on the motorship *Potter* on the 7th.

The third cyclone, that of the 14th to 25th, originated near 10° N., 91° W., moved in a west-northwesterly direction, and after describing a wide curve to the southward and westward of the Revillagigedo Islands, went north then northeast and its center entered southern California near Los Angeles early on the 25th. A number of ships reported moderate gales (force 7) from the 15th to 19th, but the highest wind velocity and lowest barometer yet reported by a ship were contained in a radio message received from the American steamer *Ewa*, Balboa toward Honolulu, on the 22d. This ship was close to the storm center at 7 a. m. (E. S. T.) of that date, near 21° N., 116° W., where she encountered a southeast gale of force 11, barometer 971 millibars (28.67 inches). As the storm neared the southern California coast during the late afternoon on the 24th and early morning of the 25th, ships in coastal vicinities reported southeasterly gales of force 8 to 9.

The severity of the storm along the coast is indicated by a loss of 45 lives at sea, and a property damage approximating \$2,000,000, mostly to shipping, shore structures, power and communication lines, and to crops. Unprecedented September rains accompanied the storm along the southern California coast.

Fog.—Fog occurrence in September changed but little from that of the preceding month over the eastern part of the northern routes, but lessened materially over the western part. The most frequent open ocean fogs occurred between about latitudes 45° and 50° N., longitudes 150° to 175° W., with about 7 to 10 days with fog reported in each included 5° square. East of 155° W., fog occurred on 1 to 4 days between the 50th parallel and the Gulf of Alaska. Along the immediate American coast, 14 days were reported with fog off Washington; 7 off Oregon; 11 off California; and 3 off Lower California.

TYPHOONS AND DEPRESSIONS OVER THE FAR EAST, SEPTEMBER 1939

By BERNARD F. DOUCETTE, S. J.

[Weather Bureau, Manila, P. I.]

Depression, September 12-16, 1939.—A depression, apparently of minor importance, formed about 300 miles south of Guam, moved northwest, then west-northwest and disappeared about 600 miles east-northeast of San Bernardino Strait.

Typhoon, September 17-19, 1939.—This disturbance formed over the China Sea somewhere southeast of the Paracel Reefs and seems to have moved in a northwesterly direction toward the southwestern part of Tong King Gulf. It probably was weak in the beginning of its progress and intensified as it approached the continent. Because of the war situation, there were no ship's observations available and its approach to the coast of Indochina, with typhoon intensity, was known only from a special typhoon warning broadcasted from Phulien. It entered Indochina about 150 miles northwest of Tourane.

Typhoon, September 18-24, 1939.—Forming as a depression about 250 miles west of Guam, this storm moved west-northwest and northwest to the ocean regions about 600 miles east of Aparri, reaching this position on the morning of September 21, already intensified to typhoon strength. It recurved to the northeast during the forenoon hours of the same day and continued along this

course to the regions east of northern Japan, after moving almost parallel and quite close to the coast line of that country. No trace of the typhoon could be found on September 25.

The upper winds at Guam were from the southwest quadrant beginning September 16, weak at first, and then increasing to values over 50 kilometers per hour (the highest being 64 kilometers per hour, at the morning ascent of September 19). This current began to weaken after September 20. During these days when the depression was forming, southern Phillipine stations and Menado, Celebes Island, had winds from the northwest and northeast quadrants mostly, with southwest winds only at isolated levels. The velocities hardly ever reached 40 kilometers per hour and were below 20 kilometers per hour most of the time. At the same time strong southwest and west winds were reported from Thailand, due to the China Sea typhoon of September 17 to 19, mentioned above. The distribution of upper winds, as outlined above, indicates that the air in the southwestern sector of this typhoon (in the Pacific) was attracted toward the center of the disturbance rather than forced toward the center from remote regions.

Typhoon, September 27-October 1, 1939.—Pressure was relatively low over the China Sea after September 26, with some indications of circulation. No definite center appeared, however, until September 29, when it seemed certain that there was a depression or typhoon central near Maccles Field Reefs. This disturbance moved west-northwest, intensified, and entered the continent close to and south of Tourane on September 30. Only slight traces of the typhoon could be found on the weather maps of October 1.

The Paracel Island station reported pressure of 750 mm. (999.9 mb.) at 2 p. m. September 29 (Manila time) with east-northeast winds, force 5. Tourane, the afternoon of the following day, had north-northwest winds, force 9, with pressure at 751.8 mm. (1,002.3 mb.).

During the formation and course of this typhoon, Hong Kong had upper winds from the east quadrant, with velocities as high as 85 kilometers per hour (the morning ascent of September 30). Thailand stations had southwest quadrant winds predominating, with velocities often above 50 kilometers per hour, the maximum value being 110 kilometers per hour (from Bandon, morning ascent of September 30).