OCEAN GALES AND STORMS, DECEMBER 1938—Continued

Vessel	Voyage		Position at time of lowest barometer		Gale began December	Time of lowest barometer December	Gale ended December	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									
			° ′	° ′				*Inches*					
Toorak, Br. S. S.	Los Angeles	Onagawa	33 51 N.	159 19 E.	14	11p, 14	14	29.40	S.	SW, 10	W.	SW, 10	SW-W.
Tuyama Maru, Jap. S. S.	Yokohama	San Francisco	41 23 N.	171 00 W.	14	Mdt, 14	15	[2]29.30	S.	S, 10	W.	SSW, 10	S-W.
Zuiyo Maru, Jap. S. S.	Yura	Los Angeles	[1]41 49 N.	155 46 E.	14	4a, 16	16	29.56	NW.	W, 7	NW.	W, 9	W-NW.
Dickenson, Am. S. S.	Fanning Island	Honolulu	5 10 N.	159 17 W.	15	4a, 15	18	29.74	NE.	E, 2	NE.	NE, 8	None.
Silvermaple, Br. M. S.	Manila	Portland, Oreg.	41 00 N.	167 00 W.	14	6a, 15	15	29.39	SSW.	SSW, 9	WNW.	SSW, 9	S-W.
Kongo Maru, Jap. M. S.	Yokohama	Los Angeles	46 00 N.	174 39 E.	15	Noon, 15	15	28.64	WNW.	WNW, 7	W.	W, 8	WSW-WNW.
Silvermaple, Br. M. S.	Manila	Portland, Oreg.	44 48 N.	152 18 W.	16	2p, 17	17	29.84	S.	S, 9	WNW.	S, 9	SSE-SSW.
Pres. Cleveland, Am. S. S.	San Francisco	Honolulu	[1]36 33 N.	127 04 W.	18	2a, 18	18	29.78	N.	NE, 7	N.	N, 8	NE-N.
Ewa, Am. S. S.	Honolulu	Los Angeles	31 06 N.	131 30 W.	18	3p, 18	20	29.98	NNW.	NNW, 9	NNW.	NNW, 9	
Nagara, Maru, Jap. M. S.	Yokohama	do	46 12 N.	178 18 W.	18	Noon, 18	19	29.71	SW.	WSW, 7	SW.	W, 8	SW-WSW.
Zuiyo Maru, Jap. S. S.	Yura	do	42 26 N.	170 08 E.	18	5p, 18	19	29.25	WSW.	SE, 5	W.	WSW, 9	SE-WSW.
Arimasan Maru, Jap. M. S.	Yokohama	San Francisco	43 19 N.	160 53 E.	18	Mdt, 18	19	29.27	ESE.	SW, 9	NW.	W, 9	ESE-SW-W.
Empress of Japan, Br. S. S.	Honolulu	Yokohama	31 02 N.	151 48 E.	22	10p, 22	23	29.68	S.	WSW, 9	NW.	WSW, 9	S-NW.
Olympia Maru, Jap. M. S.	Dairen	Los Angeles	39 53 N.	174 20 E.	22	5p, 23	24	[2]29.38	ENE.	SSW, 10	W.	S, 10	SSE-WSW.
Hikawa Maru, Jap. M. S.	Yokohama	Vancouver	[1]46 45 N.	167 16 E.	23	6p, 23	25	28.03	ESE.	SE, 8	W.	W, 9	SE-SW.
Empress of Japan, Br. S. S.	Honolulu	Yokohama	[1]34 43 N.	140 16 E.	23	5a, 24	24	29.34	SE.	SW, 6	SW.	SSE, 9	SE-SW.
Pres. Coolidge, Am. S. S.	Yokohama	Honolulu	34 53 N.	142 56 E.	24	Noon, 24	25	29.40	SW.	SW, 9	NW.	WSW, 9	SW-WSW.
Tyndareus, Br. S. S.	do	Victoria, B. C.	46 48 N.	168 06 E.	29	11p, 29	30	29.36	W.	W, 7		W, 8	
San Marcos, Am. S. S.	Balboa	San Diego	15 17 N.	93 12 W.	30	Noon, 30	30	29.88	WNW.	NW, 3	NNW.	NW, 8	NW-WNW.
Maunalei, Am. S. S.	Honolulu	San Francisco	26 18 N.	149 18 W.	31	2p, 30	31	29.93	WNW.	W, 3	WNW.	WNW, 8	
Mauna Ala, Am. S. S.	Seattle	Honolulu	48 06 N.	125 12 W.	31	Mdt, 31	[4]1	29.31	SSE.	SSE, 10	SW.	SSE, 10	SSE-SE-S.

[1] Position approximate. [2] Barometer uncorrected. [4] January.

NORTH PACIFIC OCEAN, DECEMBER 1938

By WILLIS E. HURD

Atmospheric pressure.—Pressures were almost continuously low in the Aleutian region in December 1938, except on the 23d to 25th, when a high-pressure area moved eastward across the islands, giving barometer readings above 30 inches, first at Dutch Harbor, then at Kodiak. At Dutch Harbor and St. Paul the average pressures were 29.21 and 29.27, respectively, or in both instances more than 0.3 inch below the normals of the month. The average pressure rose sharply southward toward Midway Island, where the mean reading of the month, 30.20 inches, was 0.19 inch above the normal. Barometer readings at this station were as continuously high as they were low at the Aleutian stations.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean, December 1938, at selected stations*

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Point Barrow	29.88	−0.15	30.74	25	28.98	17
Dutch Harbor	29.21	−.35	30.10	23	28.10	15
St. Paul	29.27	−.31	30.18	23	28.48	12
Kodiak	29.39	−.17	30.28	25	28.74	16
Juneau	29.80	+.01	30.56	25	29.17	31
Tatoosh Island	30.08	+.12	30.46	11	29.08	2
San Francisco	30.11	−.01	30.47	2	29.71	15
Mazatlan	29.94	+.01	30.00	10	29.88	9, 26
Honolulu	30.02	+.01	30.17	17	29.79	28
Midway Island	30.20	+.19	30.45	6	30.09	1, 3, 4
Guam	29.85	−.02	30.09	11	29.77	4, 26
Manila	29.82	−.04	29.92	31	29.65	7
Hong Kong						
Naha	30.10	+.12	30.27	30	29.71	20
Titijima	30.06	+.06	30.24	31	29.77	21
Petropavlosk	29.39	−.23	30.09	5	28.70	28

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.

On the average, pressures exceeded 30 inches along the coast of the United States and thence westward to southwestward to beyond Midway Island. Average pressures were also high to the eastward of the China coast, including the Nansei and Ogasawara Islands, 30.10 to 30.06 inches.

Pressures below 29 inches occurred in higher latitudes of the Pacific, as shown on our charts, on 16 days in December, thus attesting to the depth of the several cyclones. The lowest corrected pressure reported by a ship was 28.03, read on the Japanese motorship *Hikawa Maru*, near 47° N., 167° E., on the 23d. Nearly as low pressures occurred among the Aleutians on the 11th and 15th.

Extratropical cyclones and gales.—For the North Pacific as a whole, December was the stormiest month to date of the present winter—much stormier than November, and having more sustained storminess than October, although October had a considerably greater number of local gales of intensity higher than force 10. In December, as indicated by ships' reports now at hand, gales were experienced of force as high as 11 on only 2 days, the 6th and the 10th, to the eastward of the Kuril Islands. However, stormy regions were of great width, as well as depth, on several days, and winds of whole gale force (10) were of frequent occurrence, particularly over that part of the ocean lying west of longitude 170° W., and north of latitude 30°.

Between about longitudes 130° and 160° W., gales were few and scattered, being thus far reported on only 7 days, and for the most part not exceeding force 8. The comparative freedom from severely stormy weather in this part of the ocean was largely due to the considerable prevalence there of anticyclones.

Between longitude 130° W. and the coast of the United States gales were of greater importance. On the 2d westerly winds of force 9 occurred along the Washington and Oregon coasts. The maximum wind velocity of the month at Tatoosh Island was at the rate of 67 miles an hour from the southwest, registered on the 2d at the Weather Bureau office. On the 31st, during the prevalence of a cyclone in extreme northeastern waters, the American Steamship *Mauna Ala*, while off Cape Flattery, had a southeasterly gale of force 10. Off central and southern California, gales of force 8 were experienced by ships

on the 13th, 14th, and 18th, in connection with a cyclone that developed to the northeastward of the Hawaiian Islands on the 11th and, slowly moving eastward, entered the California coast on the 19th.

The greater part of the strong extratropical cyclonic activity of the month occurred in connection with low pressure systems east of Japan and those peculiar to the Aleutian LOW. Many of these were of enormous extent and on several days caused fresh to strong and even whole gales as far southward as the 30th parallel, as well as over considerable areas in higher latitudes in both west and east, but principally in east, longitudes. An inspection of the accompanying table, *Ocean Gales and Storms*, will indicate the intensity and distribution of the stormy conditions encountered by North Pacific ships.

On the 1st to 3d of the month fresh gales were experienced within the area 30° to 50° N., 145° to 160° W., and fresh to whole gales along the central and western parts of the northern steamer routes. On the Japanese motorship *San Clemente Maru* pressure fell to 28.42, with a northwest wind of force 9, in the vicinity of 44° N., 164° E., on the 2d. Near midnight of the 1st, in about 49° N., 179° W., the British steamship *Anglo-Peruvian* had a north-northeast gale of force 10, lowest barometer 28.70. This ship had a rough passage thence westward toward Yokohama, since on the 6th, near 45° N., 165° E., she encountered a northeast gale of force 11, and on the 10th, near 42° N., 157° E., she met a wind of similar force, from the northwest, barometer 28.74.

December 10 and 11 were particularly stormy days over considerable regions in east longitudes—of force 10 to 11 in northern waters, and of force 8 to 9 between the 30th and 40th parallels. On the central Aleutians pressure was very low, with a minimum of 28.10 reported on the 11th.

On the 14th to 16th widespread gales, some rising to force 10, were reported within the region between 160° W. and 155° E. The strongest gales of the period occurred on the 14th near 34° N., 159° E., and 41° N., 171° W.

On the 23d a storm developed over Japan and moved rapidly northeastward, on the 24th causing strong gales outside of the port of Yokohama. On the 23d a storm central near 47° N., 167° E., where the pressure was reported as 28.03 inches, caused strong gales in the vicinity, and strong to whole gales (forces 9–10) as far eastward as 170° W.

There was a considerable general abatement in storminess during the last week in December.

Typhoons and depressions over the Far East.—One typhoon of hurricane strength, that of December 3–10, occurred in tropical waters of the Far East and was destructive in the central Philippines on the 8th. An account of this storm and of three depressions, prepared by the Rev. Bernard F. Doucette, S. J., Weather Bureau, Manila, P. I., is subjoined.

Tehuantepecers.—The following northerly gales in the Gulf of Tehuantepec, due to strong anticyclones pressing southward into the Gulf of Mexico, were reported: Of force 8 on the 7th, 9th, 10th, 28th, and 30th.

Intensified trade wind.—The American S. S. *Dickenson*, Fanning Island toward Honolulu, reported a northeast gale of force 8 in latitude 5°10′ N., longitude 159°17′ W.

Fog.—Fog occurred on three or four scattered dates on the open North Pacific in west longitudes during December, but it was mostly confined, so far as reports indicate, to United States coastal waters. There were 2 days with fog off the Washington and Oregon coasts; 8 days with fog off the California coast; and 3, off Lower California. Fog was reported on December 31 a short distance southwest of Costa Rica.

TYPHOONS AND DEPRESSIONS OVER THE FAR EAST, DECEMBER 1938

BERNARD F. DOUCETTE, S. J.

[Weather Bureau, Manila, P. I.]

Depression, December 1–5, 1938.—A depression, apparently of minor importance, formed over the western Caroline Islands, moved west, then west-northwest, finally inclining to the west-southwest as the center moved across the Visayan Islands to the Sulu Sea where it disappeared.

Typhoon, December 3–10, 1938.—This storm appeared about 300 miles south of Guam on December 3, apparently well developed, after it had formed over the regions adjacent to the eastern Caroline Islands. On December 4 there was no doubt that the storm was of typhoon intensity and was moving in a west-northwesterly direction; it later inclined to the west, thus approaching northern Samar. As it came near San Bernardino Strait, it again took a course to the west-northwest, passing a short distance north of Laoang during the late evening hours of December 7. The typhoon crossed the Archipelago December 8, passing about 100 miles south of Manila, moving west-northwest, at approximately 2 p. m. The center moved across the northern part of Mindoro Island into the China Sea, where it weakened as it rapidly progressed toward Indochina. On December 10, it entered the continent, where it quickly disappeared, apparently of weak intensity.

Over the Philippines, this was the worst typhoon of the year. On December 14, the final total of deaths was published, the number being 305. The greatest havoc occurred over northern Samar and the extreme southern portions of Luzon. The lowest barometric readings occurred at Legaspi, Sorsogon, and Laoang. At Laoang, Samar Province, 723.84 mm. (28.50 in.) was recorded December 7, at 9:30 p. m. Sorsogon, Sorsogon Province, had its minimum of 726.90 mm. (28.82 in.) at 2 a. m. December 8. Legaspi, Albay Province, reported a value of 732.71 mm. (28.85 in.) as its minimum, at 2:20 a. m. December 8. The storm center passed very close to and south of Sorsogon. Winds of force 12 were experienced at these three stations as well as at a few neighboring cities. Later on in the day, Boac, Marinduque Province, had a minimum reading of 740.76 mm. (29.16 in.) when the center was within 50 miles south of the station (10 a. m. December 8) indicating that the storm was weakening. The steamship *Admiral Halstead* was anchored in Sorsogon Bay while the typhoon approached and passed over the locality. Two radiograms were sent to the observatory, the messages reading as follows: "15:45 G. M. T. Dec. 7, lat. 12°56′ long. 123°55′ 11:30 p. m.; wind north-by-west force 10; barometer 29.20; steady heavy rain". "December 8, 1 a. m., at Sorsogon Bay, wind north-northeast, force 12, barometer 28.50, 2 a. m., wind light southeast; barometer commenced rising." The steamship *Baron Stranraer* sent the following message during the forenoon hours of December 8: "Dec. 8, lat. 13°00′ N., long. 122°20′ E., typhoon, severe center, passed over vessel 7 a. m. local time; lowest barometer 28.50; present weather: wind south, 11, decreasing; barometer 29, rising; severe squall."

As the series of extra observations ordered as the typhoon approached the archipelago arrived at the observatory, it seemed that a secondary disturbance of consider-