

OCEAN GALES AND STORMS, OCTOBER 1938—Continued

Vessel	Voyage		Position at time of lowest barometer		Gale began— October—	Time of lowest barometer, October—	Gale ended— October—	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													
Leme, Ital, M. S.	Los Angeles	Balboa	13 18 N.	89 30 W.	17	6a, 18	17	29.88		ESE, 3		NNE, 8	
Toa Maru, Jap. M. S.	Kobe	San Francisco	42 36 N.	163 50 W.	17	2p, 18	18	29.09	W	W, 9	WNW	W, 9	
Kunikawa Maru, Jap. M. S.	Yokohama	do	45 57 N.	171 53 E.	17	Mdt, 17	20	28.30	ESE	SW, 11	N	NW, 12	ESE-SW-W.
Cingalese Prince, Br. M. S.	San Francisco	Manila	20 39 N.	139 16 E.	18	4p, 19	20	29.61	S	S, 7	WSW	S, 7	None.
Empress of Canada, Br. S. S.	Yokohama	Honolulu	34 49 N.	140 58 E.	21	11a, 21	21	28.60	N	S, 12	NW	S, 12	SSE-SW.
Kunikawa Maru, Jap. M. S.	do	San Francisco	45 00 N.	143 34 W.	21	8a, 22	23	28.16	ENE	SSE, 10	WSW	WSW, 12	ESE-SSE-W.
Toyo Maru, Jap. M. S.	Sasebo	Los Angeles	43 03 N.	174 42 W.	21	6a, 22	23	28.81	SW	W, 9	WNW	W, 9	SW-W.
Dagmar Salen, Swed. M. S.	Manila	do	39 33 N.	174 57 W.	22	6a, 22	22	29.32	W	W, 8	SW	W, 8	W-WSW.
Nozima Maru, Jap. M. S.	Balboa	do	17 24 N.	102 11 W.	22	8a, 22	22	29.64	SE	SW, 9	WSW	NW, 10	SW-NW.
Asuka Maru, Jap. M. S.	do	do	17 44 N.	102 25 W.	22	8a, 22	22	29.31	SSE	NNW, 9	W	NW, 11	S-NW-W.
San Diego Maru, Jap. S. S.	Yokohama	San Francisco	42 09 N.	164 30 W.	22	2p, 22	23	29.00	WSW	W, 8	WNW	W, 10	WSW-NW.
Swiftsure Bank Light-ship, U. S. Lighthouse Service.	On station off Tatoosh Island, Wash.		48 30 N.	125 00 W.	26	6a, 26	26	29.57	SE	SE, 8	SSE	SE, 8	None.
Dagmar Salen, Swed. M. S.	Manila	Los Angeles	38 34 N.	140 38 W.	26	Noon, 27	27	29.29	S	WSW, 7	W	SSW, 11	SSW-W.
Amagisan Maru, Jap. M. S.	Yokohama	do	41 32 N.	150 22 W.	25	6p, 26	28	28.94	SW	SW, 7	WNW	NW, 10	SW-W.
Susan V. Luckenbach, Am. S. S.	San Francisco	Balboa	12 33 N.	90 24 W.	29	6a, 30	29	29.77		Calm	NNW	NNW, 7	
Nitro, U. S. Navy	do	Bremerton	41 56 N.	124 46 W.	30	6a, 30	30	29.76	SE	S, 6	SE	SE, 8	SE-S-NNW.

NORTH PACIFIC OCEAN, OCTOBER 1938

By WILLIS E. HURD

Atmospheric pressure.—Pressure conditions over the North Pacific Ocean during October 1938 were typically those of winter, with a strong Aleutian LOW and a well developed central Pacific HIGH. The lowest average pressure, among the Alaskan Islands, was 29.33 inches, at Kodiak. This was 0.26 inch below the normal of the month. Abnormally low pressures occurred throughout the Aleutian region, with minus departures decreasing in value southward along the American coast to -0.01 inch at San Francisco. The lowest pressure reported at a northern island station was 28.30 inches, at Kodiak, on the 23d. The lowest barometer reported by a ship was 28.07 inches, read on the British steamer *Empress of Russia*, in latitude 51°51' N., longitude 161°44' W., on the 5th.

The North Pacific anticyclone was centered in the vicinity of Midway Island. The average pressure at Midway was 30.15 inches, which is 0.12 inch above the normal of October.

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

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	<i>Inches</i>	<i>Inch</i>	<i>Inches</i>		<i>Inches</i>	
Point Barrow	29.71	-0.22	30.16	31	29.22	18
Dutch Harbor	29.41	-.24	30.12	12	28.74	16
St. Paul	29.48	-.15	30.18	31	29.10	15
Kodiak	29.33	-.26	30.14	1	28.30	23
Juneau	29.74	-.13	30.22	15	28.87	26
Tatoosh Island	29.97	-.04	30.32	16	29.43	31
San Francisco	30.00	-.01	30.19	3	29.82	14
Mazatlan	29.87	+.03	29.98	2	29.76	22
Honolulu	30.01	+.01	30.14	24	29.87	18
Midway Island	30.15	+.12	30.30	24	29.86	31
Guam	29.82	-.02	29.89	25, 26	29.41	11
Manila	29.80	.00	29.92	25	29.62	4, 5
Hong Kong	30.05	+.01	30.22	13	29.84	6, 7
Naha	29.91	+.01	30.09	25	29.71	19
Titijima	29.92	+.01	30.09	1, 25, 29	29.51	16
Petropavlosk	29.76	-----	30.18	25, 30	29.09	15

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 observations.

Extratropical cyclones and gales.—While a few cyclones entered middle and northern waters of the North Pacific from Asia during October, the greater number originated and developed over the ocean itself, with centers to the northward of the 40th parallel. Many of these centers were of great depth, with barometer readings below 29 inches on at least 10 days. The deepest developments occurred largely to the eastward of the 180th meridian, and it was in this region that stormy weather was most frequent if not the severest.

The first heavy weather experienced was that of the first few days of October in connection with the deepest storm of the month. This disturbance appeared on the 1st over the central Aleutians. Its center followed an erratic path on the 2d to 4th, then took a decided east to northeast course and entered Alaska north of Kodiak on the 7th. On the 4th to 6th its central pressures were well below 29 inches, and on the 4th and 5th it caused southerly gales of force 11 in the vicinity of 47° to 52° N., 162° W., encountered by the steamships *Michigan* and *Empress of Russia*, as shown in the table of gales.

Another storm at this time lay over the western part of the northern steamer routes and resulted in gales of force 9 to 10 within the approximate area 40° to 50° N., 160° to 175° E., on the 5th and 6th.

From the 7th to 14th scattered gales occurred daily on northern waters, but none was reported that exceeded 8 or 9 in force.

On the 15th and 16th another deep cyclone was central to the southward of the Alaska Peninsula, accompanied by force-10 gales. The lowest barometer, read on the British motorship *Silverguava* in 51° N., 155° W., was 28.21.

On October 17 and 18th an intense cyclone lay over northern waters at and to the immediate westward of the 180th meridian. While only two gale reports of this storm are at hand, yet both show winds of hurricane force, with lowest pressures of about 28.80 inches. The report from the Japanese steamer *San Diego Maru* gives the principal gale encounter near 42° N., 164° E., on the 17th. That from the Japanese motorship *Kunikawa Maru*, Yokohama toward San Francisco, shows that the vessel experienced

gale winds from about 6 p. m. of the 17th until the early morning of the 20th. The ship's lowest pressure, at midnight of the 17th-18th, occurred near 46° N., 171° E. The wind was then southwest, force 11. During the forenoon of the 18th the wind at ship was most of the time of force 11, but for several hours in the afternoon was of hurricane velocity. It very slowly decreased over most of the period thereafter until the 20th, when the ship was near 47° N., 162° W., with the wind still of fresh to strong gale force.

The *Kunikawa Maru* had scarcely escaped this violent storm area than she ran into another of equal wind intensity, but much lower pressure, her minimum barometer being 28.16, in 45° N., 143°34' W., on the 22d. From early morning until late that night she encountered violent gales, mostly of force 11 to 12 from easterly to westerly directions, thereafter rapidly moderating as the storm moved toward the Gulf of Alaska from the eastern part of the northern steamer routes.

In east longitudes, so far as present reports indicate, stormy weather of extratropical type had ceased by the 20th, but in west longitudes it continued until late in the month. The last severe storm was that of the 26th-27th which overspread northeastern waters and caused scattered gales over a considerable area from the Washington coast southwestward. The strongest gale reported was of force 11 from south-southwest, barometer 29.29, encountered by the Swedish motorship *Dagmar Salen*, in 38°34' N., 140°38' W., late on the 26th. Ten degrees to the westward on the following morning the Japanese motorship *Amagisan Maru* had a force-10 gale, barometer 28.94. At the entrance to the Strait of Juan de Fuca on the 26th the Swiftsure Bank Lightship reported a southeaster of force 8. This was one of three strong southeasters reported during the month off the coast of the United States. The first was reported in a special letter to the Weather Bureau by the second officer on the American-Hawaiian steamer *Columbian*. This south-bound vessel, after passing St. George's Reef on the 3d, ran into a small depression in which a southeast wind of force 9 was encountered. The third coast gale, of force 8, occurred off the lower coast of Oregon on the 30th.

Tropical cyclones—typhoons.—Elsewhere in this REVIEW appears a report by the Rev. Bernard F. Doucette, S. J., of the Weather Bureau at Manila, P. I., on the Far Eastern typhoons and depressions of October 1938. There remains little to be added except in connection with the typhoon which struck southern Japan on the 21st with considerable loss to life and property. On that day the British steamer *Empress of Canada*, while 50 to 75 miles southeast of Yokohama, ran into the north gales of the typhoon at 4 a. m., then into south winds of hurricane force toward 11 a. m., lowest barometer 28.60. The storm appears to have disintegrated rapidly thereafter, as no trace of it was to be seen on the following day.

Tropical disturbances of the southeastern Pacific.—Two tropical cyclones, of apparently brief existence, occurred in southeastern waters. The earlier was reported only by the American steamer *Ensley City*, Honolulu to Balboa, on the 9th. The ship was under the influence of the disturbance for 11 hours, with changing winds which reached their highest velocity, force 8 from west-northwest, at 4 p. m., lowest barometer 29.43.

The second cyclone was severely encountered by two north-bound Japanese ships, the *Nozima Maru* and the *Asuka Maru*, close off the Mexican coast between Manzanillo and Acapulco, on the 22d. In both instances the advance winds of the storm were experienced from southeasterly directions, quickly changing and rising to highest

velocity from the northwest shortly after 8 a. m. On the *Nozima Maru* the heaviest wind was of force 10, lowest barometer 29.64 in and near 17°24' N., 102°11' W. On the *Asuka Maru* the wind attained force 11, lowest barometer 29.31, in 17°44' N., 102°25' W. Both ships were out of the gale before noon.

Fog.—On the open Pacific remote from land, fog was reported on only 3 days. Along the American coast ships reported fog as follows: Off Washington on 3 days; off Oregon on 2 days; off California on 10 days; off Lower California on 1 day.

TYPHOONS AND DEPRESSIONS OVER THE FAR EAST OCTOBER 1938

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Typhoon, September 28 to October 4, 1938.—A low pressure area formed about 400 miles east-northeast of San Bernardino Strait and intensified into a typhoon after moving along a west-northwesterly course. It inclined to the west-by-north and entered Luzon during the afternoon and evening hours of September 30, passing a short distance south of Tuguegarao, Cagayan Province. It was not very strong at this part of the course, but in the China Sea, it rapidly acquired energy as it continued along a west-by-north course. On October 2 and 3, it was almost stationary about 90 miles east of Hainan Island, until the afternoon hours (October 3) when it proceeded a short distance to the northeast. A change to the west-northwest carried the storm into the continent where it disappeared over the regions north of Hainan Island. After the storm center passed the Philippines, no reports of serious damage were received.

On September 30, when the center crossed northern Luzon, surface winds from stations affected by the storm were not stronger than force 3, and the pressure values varied between 748 mm and 750 mm (29.449 and 29.528 inches). This was due to the mountainous nature of the region, which also caused the winds to be very irregular, so that hardly any indication of circulation was apparent.

When this typhoon formed, the typhoon of September 16-29, 1938, was disappearing over the Formosa Channel and consequently a southwesterly current had been flowing over the Archipelago. A front appeared, extending east to west across the China Sea and northern Luzon, Aparri reporting northeast and east quadrant winds, while Manila and southern stations remained in the southwesterly current. Velocities at Aparri were between 30 and 45 k. p. h. as the typhoon passed about 60 miles south of the station, altitudes of 2,100 and 3,500 m being attained. The strength of the southwest winds increased from values between 20 and 40 k. p. h. to about 60 k. p. h. (at Cebu, September 30) as the storm crossed Luzon, afterwards decreasing. On October 1 and the following days, when the typhoon was moving across the China Sea, the upper winds over northern Indo China were from the northwest, north, and northeast with velocities as high as 60 k. p. h. Over southern Indo China was the extension of the front over Luzon, which separated these northerly winds from the southwesterly current flowing over Saigon and the stations of Siam, where velocities as high as 90 k. p. h. were reported before October 5, afterwards decreasing.

Typhoon, September 30 to October 9, 1938.—This typhoon appeared about 200 miles south-southwest of Guam, apparently well developed, moving along a west-northwesterly course, and gradually inclining to the west-by-north as it moved. In 3 days it was about 600 miles east