

during the 16th to 19th in connection with a low, which had displayed little strength on the 14th, when near Cuba, but intensified as it advanced northeastward, crossing Newfoundland on the 18th.

A moderately strong disturbance noted from the 4th to 11th in mid-Atlantic, near and to northward of the Tropic of Cancer, is described on p. 428.

A norther of force 8 was experienced to southward of the center of the Gulf of Mexico, by the British motorship *San Alvaro*, during the 14th, while on the 25th and 26th intensified trades were noted by the British motorship *Greystoke Castle*, then about 700 miles northeast of Puerto Rico.

*Fog.*—There was less fog than during November 1936 over practically all areas to east and north of Cape Cod,

including the waters adjacent to Europe; but from Cape Cod southwestward to Texas, chiefly in the vicinity of the coast, there was an increase over November.

From near the coast of southeastern Texas to the northern limit of the middle Atlantic coast the amount of fog during the month was in excess of the average for December; the 5°-square, 35° to 40° N., 70° to 75° W., with 10 days of record, led all other North Atlantic Ocean squares in fog frequency. The period from the 10th to the 18th was especially foggy in this area.

The waters adjacent to New England, the Maritime Provinces, and Newfoundland, also the northeastern part of the ocean, are indicated to have had somewhat less fog than usual for December.

OCEAN GALES AND STORMS, DECEMBER 1936

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									
<b>NORTH ATLANTIC OCEAN</b>													
Burgerdijk, Du. S. S.	Rotterdam	Halifax	50 43 N.	23 20 W.	3	5a, 3	4	29.80	SSW	SSW, 5	WNW	WNW, 9	SSW-WNW.
Exminster, Am. S. S.	Bone	New York	36 25 N.	66 37 W.	3	1p, 3	3	29.90	SSE	SW, 9	W	WSW, 9	SW-W.
American Trader, Am. S. S.	Halifax	London	42 18 N.	59 42 W.	2	6p, 3	3	29.59	ESE	S, 10	W	S, 10	SE-SW.
Tennessee, Dan. S. S.	New York	Oslo	45 20 N.	7 11 W.	3	11p, 3	4	28.76	SW	SW, 10	NW	WNW, 11	SSW-WNW.
Myrtlebank, Br. M. S.	Gibraltar	Halifax	37 12 N.	46 18 W.	6	1p, 6	7	29.66	N	N, 8	N	N, 9	S-NW-N.
Clara, Ital. S. S.	do	New York	32 59 N.	33 58 W.	6	4p, 6	6	29.41	SSE	S, 9	SSW	S, 10	SSE-SSW.
Charles L. D., Fr. M. S.	Buenos Aires	St. John, N. B.	27 20 N.	51 30 W.	6	Mdt, 7	10	29.50	NW	N, 4	NE	NW, 9	NW-NE.
San Blas, Pan. S. S.	Galveston	Santa Marta	11 36 N.	75 00 W.	6	4a, 8	10	29.71	E	NE, 7	E	NE, 7	None.
Antinous, Am. S. S.	Rotterdam	Corner Brook	49 50 N.	35 30 W.	11	4a, 13	13	29.49	WNW	W, 10	NNW	NW, 10	WSW-WNW.
Leerdam, Du. S. S.	Philadelphia	Rotterdam	49 17 N.	21 31 W.	12	4p, 13	13	29.06	SW	SW, 10	NW	SW, 10	SW-NW.
City of Joliet, Am. S. S.	Galveston	Bremen	48 12 N.	24 55 W.	13	4a, 14	14	29.27	WSW	NW, 9	WNW	NNW, 12	W-NNW.
Pres. Harding, Am. S. S.	Southampton	New York	51 00 N.	12 20 W.	13	5a, 14	14	28.52	SSW	SW, 10	NNW	SW, 10	SW-WNW.
Katanga, Belg. S. S.	Banane	Antwerp	47 02 N.	6 44 W.	13	2p, 14	14	29.23	SW	SW, 12	W	SW, 12	SW-NW.
San Alvaro, Br. M. S.	Tampico	New York	23 57 N.	87 56 W.	14	4p, 14	14	29.91	N	N, 6	N	N, 8	None.
Oakman, Am. S. S.	Breuen	New Orleans	52 20 N.	3 00 E.	13	8p, 14	15	29.30	SSW	SSW, 10	WSW	WSW, 11	Steady.
Antinous, Am. S. S.	Rotterdam	Corner Brook	49 00 N.	41 00 W.	14	8p, 14	15	29.10	S	SW, 8	NW	SSW, 10	SSW-WNW.
Veendam, Du. S. S.	New York	Rotterdam	48 59 N.	36 11 W.	14	Mdt, 14	15	29.05	S	S, 8	WNW	SSW, 10	S-NW.
Pres. Harding, Am. S. S.	Southampton	New York	49 41 N.	21 29 W.	15	9a, 15	16	28.99	SW	WSW, 9	W	W, 10	SW-W.
Black Tern, Am. S. S.	Antwerp	Baltimore	49 05 N.	12 09 W.	15	6p, 15	16	29.38	WSW	SW, 10	WNW	SW, 10	SW-W.
City of Hamburg, Am. S. S.	Norfolk	Havre	42 50 N.	48 21 W.	16	2p, 16	17	29.75	WNW	WNW, 8	NW	NW, 10	None.
Topa Topa, Am. S. S.	Tampa	Manchester	48 30 N.	31 00 W.	16	3p, 16	18	28.54	S	W, 8	W	W, 10	S-W.
Veendam, Du. S. S.	New York	Rotterdam	50 20 N.	20 52 W.	16	10p, 16	17	28.78	S	SSW, 11	SW	SSW, 11	SSW-SW.
Scanstates, Am. S. S.	Copenhagen	Wilmingon, Del.	58 38 N.	8 34 W.	17	Noon, 17	18	28.54	W	S, 8	W	W, 9	W-S-SW.
Yselhaven, Du. S. S.	Mobile	Bremen	39 01 N.	63 34 W.	16	2a, 18	19	29.40	SE	WSW, 8	NNW	S, 10	WSW-NNW.
Tampa, Am. S. S.	Gibraltar	New York	39 25 N.	67 13 W.	17	7a, 18	17	29.81	S	NNW, 6	NW	S, 10	None.
Pres. Harding, Am. S. S.	Southampton	do	45 45 N.	42 18 W.	18	6p, 18	18	28.99	SW	SSW, 10	W	SSW, 10	SSW-W.
Champlain, Fr. S. S.	Havre	do	49 53 N.	31 42 W.	18	3a, 19	20	28.80	W	SSW, 10	NW	S, 10	S-SW.
Bremen, Ger. S. S.	New York	Cherbourg	47 27 N.	30 11 W.	18	10a, 19	19	29.27	S	SSW, 11	SW	SSW, 11	None.
Scanstates, Am. S. S.	Copenhagen	Wilmingon, Del.	57 40 N.	21 02 W.	19	Noon, 19	20	28.41	SSE	SW, 9	W	SW, 11	SSE-SW.
Rotterdam, Du. S. S.	Rotterdam	New York	50 28 N.	31 01 W.	18	Noon, 19	20	28.88	WSW	SSW, 10	WNW	W, 11	SSW-NW.
City of Hamburg, Am. S. S.	Norfolk	Havre	48 47 N.	24 50 W.	18	1p, 19	20	29.55	SW	SSW, 10	SSW	SSW, 11	None.
Europa, Ger. S. S.	Cherbourg	New York	48 02 N.	22 22 W.	19	8p, 19	19	29.62	SSW	SSW, 9	W	SSW, 10	None.
R. G. Stewart, Am. S. S.	Port Arthur	do	40 34 N.	74 00 W.	19	8a, 20	20	29.68	E	SSW, 6	SE	S, 9	SE-SSW.
General Gassouin, Fr. M. S.	New York	Antwerp	49 24 N.	15 06 W.	19	11a, 20	20	29.88	SW	SSW, 8	S	SSW, 10	None.
Flour Spar, Am. S. S.	Savannah	Liverpool	39 29 N.	62 15 W.	20	2a, 21	21	29.60	SSE	SW, 9	NW	SSE, 10	SW-NW.
Emile Francqui, Belg. S. S.	Antwerp	New York	46 30 N.	42 10 W.	23	3a, 24	24	29.48	S	S, 9	W	S, 9	S-W.
Greystoke Castle, Br. M. S.	Belawan	do	25 55 N.	58 10 W.	25	10a, 25	26	29.94	NE	NE, 7	NE	NE, 8	E-NNE-NE.
Scanmail, Am. S. S.	Copenhagen	Portland, Me.	50 00 N.	46 40 W.	29	2p, 29	30	28.94	W	SW, 8	NW	NW, 9	SW-NW.
Jean Jadot, Belg. S. S.	Antwerp	New York	50 34 N.	31 58 W.	29	Mdt, 29	31	28.96	SW	SW, 9	NNW	SW, 10	SW-NW.
<b>NORTH PACIFIC OCEAN</b>													
Roseville, Nor. M. S.	Vancouver, B. C.	Singapore	46 30 N.	178 12 E.	1 29	Mdt, 30	1	29.01		WSW, 9		WSW, 9	
Corneville, Nor. M. S.	Hong Kong	Los Angeles	36 00 N.	154 54 E.	3	11p, 3	4	29.61	SSW	SSW, 9	SSW	SSW, 9	SSW-SSW.
Athelcrown, Br. M. S.	Nagasaki	do	37 23 N.	153 28 E.	3	4a, 4	4	29.58	ENE	NE, 8	NE	NE, 8	None.
Michigan, Am. S. S.	Masbate, P. I.	San Francisco	43 32 N.	152 50 W.	5	8a, 5	5	29.77	S	S, 8	W	SW, 10	S-SW.
Steel Age, Am. S. S.	Kahului, T. H.	Balboa	18 47 N.	125 18 W.	4	11a, 8	9	29.86	E	NE, 8	SE	NE, 8	None.
Empress of Russia, Br. S. S.	Yokohama	Victoria, B. C.	48 46 N.	178 53 E.	8	2a, 8	7	28.99	WSW	WSW, 8	SW	WSW, 9	ESE-SSW.
Athelcrown, Br. M. S.	Negasaki	Los Angeles	39 51 N.	177 26 E.	8	8p, 8	9	29.18	SE	SW, 8	W	W, 9	SE-SW-WSW.
Olympia, Am. S. S.	Legaspi, P. I.	do	34 24 N.	154 36 E.	8	6a, 8	8	29.98	WNW	WNW, 8	WNW	WNW, 10	None.
Hoyo Maru, Jap. M. S.	Estero	Yokohama	34 55 N.	165 23 E.	8	1p, 8	8	29.65	W	W, 9	WNW	WNW, 9	W-WNW.
Heian Maru, Jap. M. S.	Yokohama	Vancouver	48 43 N.	176 27 E.	8	4p, 8	8	28.70	WSW	SW, 9	WNW	SW, 9	SW-WNW.
Golden Star, Am. S. S.	do	San Francisco	42 59 N.	167 48 E.	9	5p, 8	9	29.06	WNW	E, 6	W	WNW, 10	ESE-NE-WSW.
Silvermaple, Br. M. S.	Manila	do	47 18 N.	154 24 W.	8	2a, 9	9	29.55	SW	SW, 9	WSW	SW, 9	SW-WSW.
Olympia, Am. S. S.	Legaspi, P. I.	Los Angeles	36 48 N.	161 24 E.	8	11p, 9	10	29.94	W	W, 7	WNW	W, 9	None.
Golden Star, Am. S. S.	Yokohama	San Francisco	43 17 N.	177 30 W.	10	4p, 10	10	29.58	WNW	SW, 7	NNW	NW, 10	SW-NW.
Hoyo Maru, Jap. M. S.	Estero	Yokohama	35 06 N.	147 08 E.	12	3p, 12	12	29.78	SSE	SW, 8	SW	S, 9	S-NW.
Pres. McKinley, Am. S. S.	Yokohama	San Francisco	46 20 N.	149 47 W.	13	Noon, 14	15	29.56	SW	W, 7	NW	W, 10	WSW-WNW.

1 November.  
 2 Position approximate.  
 3 Barometer uncorrected.

OCEAN GALES AND STORMS, DECEMBER, 1936—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									
<b>NORTH PACIFIC OCEAN—Continued</b>													
Chichibu Maru, Jap. M. S.	Honolulu	San Francisco	29 30 N.	145 36 W.	14	2p, 14	15	Inches 30.03	NNE	NNE, 8	NNE	NNE, 8	
Mayflower, Am. M. S.	Fishing grounds	San Diego	13 51 N.	91 15 W.	14	6a, 14	15	29.89	NW	N, 2	N	N, 9	
Henderson, U. S. N.	Balboa	do	11 54 N.	90 18 W.	15	6p, 14	15	29.90	NE	ENE, 2	N	N, 8	ENE-NE.
H. M. Storey, Am. S. S.	do	Los Angeles	13 28 N.	91 03 W.	15	Noon, 14	15	29.79	N	NW, 1	E	N, 9	
Golden Star, Am. S. S.	Yokohama	San Francisco	42 45 N.	147 50 W.	15	6a, 16	16	29.96	W	W, 8	W	W, 9	None.
Olympia, Am. S. S.	Legaspi, P. I.	Los Angeles	41 30 N.	148 47 W.	19	Noon, 19	21	29.61	SSW	SW, 9	SW	SW, 11	S-W.
Texas, Am. S. S.	Yokohama	San Francisco	34 19 N.	139 58 E.	21	Noon, 21	21	29.89	NE	NE, 9	NE	NE, 9	
Heiyo Maru, Jap. M. S.	do	Honolulu	23 06 N.	161 21 W.	24	7p, 24	25	30.14	ENE	ENE, 7	ENE	ENE, 8	
Toorak, Br. S. S.	do	San Francisco	40 24 N.	130 44 W.	25	6a, 27	27	29.51	WNW	NNW, 6	N	NW, 9	None.
Otowan Maru, Jap. M. S.	Tokuyama	Los Angeles	35 59 N.	155 07 E.	26	4p, 27	29	29.06	SE	WSW, 8	NW	SSE, 10	SE-S-W.
Golden Sun, Am. S. S.	Yokohama	San Francisco	40 22 N.	165 33 E.	27	8a, 28	28	28.96	SSE	SW, 8	NW	S, 10	S-SW.
Empress of Japan, Br. S. S.	Honolulu	Victoria, B. C.	42 43 N.	134 59 W.	27	8a, 28	28	30.14	N	N, 7	N	NNW, 9	
Montreal Maru, Jap. S. S.	Yokohama	Los Angeles	45 53 N.	174 10 W.	27	1a, 29	29	29.27	SE	SSE, 10	WSW	SE, 10	SSE-SW.
Texas, Am. S. S.	do	San Francisco	45 42 N.	170 10 E.	28	6p, 28	29	28.83	ESE	SSE, 10	WNW	SSE, 10	SE-SW.
Hoyo Maru, Jap. M. S.	do	Los Angeles	40 55 N.	178 50 E.	28	Noon, 29	29	29.08	SSE	S, 9	NW	S, 10	S-WNW.
Texas, Am. S. S.	do	San Francisco	46 20 N.	179 00 W.	30	3p, 29	30	29.75	SSE	S, 10	S	S, 10	
Golden Sun, Am. S. S.	do	do	42 00 N.	176 40 E.	30	6p, 30	30	29.62	S	S, 9	S	S, 9	None.
Heiyo Maru, Jap. M. S.	Hilo	do	21 12 N.	153 18 W.	30	8a, 30	31	29.92	ENE	ENE, 6	ENE	ENE, 8	

\* Position approximate.

NORTH PACIFIC OCEAN, DECEMBER 1936

By WILLIS E. HURD

**Atmospheric pressure.**—During December 1936, owing to the prevailing movement of cyclones in higher latitudes of the North Pacific, the average center of the Aleutian Low lay over the Bering Sea, with the lowest recorded average pressure, 29.49 inches, at St. Paul. The lowest single barometer reading of the month was 28.44, reported by the British steamship *Empress of Russia* on the 21st, near 52° N., 147° W.

Anticyclonic conditions prevailed for the most part between approximately 20° and 40° N., except for a few days in east longitudes during which cyclones penetrated the high pressure region. Pressure departures along this belt were abnormally high, except on waters adjacent to the California coast as indicated by the average barometer at San Francisco, 30.06, which is 0.06 inch below the normal. The highest departure, +0.15, occurred at Midway Island. In the Far East the plus departures of 0.11 inch at Naha and of 0.09 at Chichishima attest to the prevalence of anticyclones from China as dominating the weather conditions in lower Japanese and eastern Chinese waters.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean, December 1936, at selected stations

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Point Barrow	29.84	-0.19	30.60	2	29.10	30
Dutch Harbor	29.59	+0.03	30.24	25	28.74	9
St. Paul	29.49	-0.09	30.06	25	28.74	9
Kodiak	29.58	+0.02	30.40	29	28.68	9
Juneau	29.70	-0.09	30.34	31	28.87	16
Tatoosh Island	29.94	-0.02	30.59	10	29.42	26
San Francisco	30.06	-0.06	30.43	17	29.56	30
Mazatlan	29.93	0.00	30.04	20	29.86	8, 11, 30
Honolulu	30.04	+0.03	30.22	15	29.84	4
Midway Island	30.16	+0.15	30.40	17	29.88	25
Guam	29.84	-0.03	29.92	7, 10, 11	29.56	15
Manila	29.84	-0.02	29.94	11, 12	29.74	24
Hong Kong	30.06		30.17	13	29.97	16
Naha	30.09	+0.11	30.30	15	29.74	4
Chichishima	30.09	+0.09	30.36	15	29.71	4
Urakawa	30.00		30.69	15	29.68	26

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.

**Storminess and gales.**—December was less violently stormy in 1936, according to ship reports, than the preceding month. In November there were 9 days on which gales of force 11 to 12, well scattered as to locality, occurred; in December there were only 2, one reported by the British Steamship *Irisbank*, near 52½° N., 159° W. on the 12th; the other by the American Steamship *Olympia*, in 41°31' N., 148°47' W., on the 19th. There were, in addition, 9 days—the 5th, 8th to 10th, 14th, and 27th to 30th—with local gales of force 10, occurring principally along the northern routes between longitudes 155° E. and 145° W., as itemized in the accompanying table of gales.

**Extratropical cyclones.**—The majority of the December cyclones, as they appear on our North Pacific maps, were of purely oceanic nature. That is, they were largely the fluctuating disturbances, some of considerable depth, of the type peculiar to the Aleutian low. This month these cyclones had their centers mostly in high latitudes and, except on the western part of the ocean, affected the weather south of the fortieth parallel to only a minor degree.

Eastward from Yokohama fresh to strong gales were experienced by ships near the coast on the 12th and 21st. Between 150° and 165° E., 34° and 38° N., gales of force 8 to 10 were reported on the 3d, 4th, 8th, 9th, and 27th. Of these dates, the 8th and 9th were more generally widespread in storminess than any others of the month as, in addition to the more southerly locality of storm occurrence, those dates were also locally stormy to the northward, northeastward as far as the Aleutian Islands, and eastward along the northern routes as far as longitude 155° W. On the 9th the island stations of St. Paul, Dutch Harbor, and Kodiak had their lowest barometer readings of the month as noted in table 1.

During the period 13th–18th storminess abated along the northern routes, although scattered gales were reported in middle longitudes on the 14th to 16th.

On the 19th–21st disturbed conditions intensified between the Gulf of Alaska and the fortieth parallel. In the southern part of the area on the 19th the Steamship *Olympia*, as previously mentioned, encountered a gale of storm force, one of the two heaviest gales of the month, but with lowest barometer only 29.61. On the 20th, between 45° and 51° N., 140° and 145° W., pressure had fallen to 28.76 inches, with fresh westerly gales