

| Vessel | Voyage | | Position at time of lowest barometer | | Gale began | Time of lowest barometer | Gale ended | Lowest barometer | Direction of wind when gale began | Direction and force of wind at time of lowest barometer | Direction of wind when gale ended | Highest force of wind and direction | Shifts of wind near time of lowest barometer |
|----------------------------------|------------------|------------------|--------------------------------------|-----------|------------|--------------------------|------------|------------------|-----------------------------------|---|-----------------------------------|-------------------------------------|--|
| | From— | To— | Latitude | Longitude | | | | | | | | | |
| NORTH PACIFIC OCEAN | | | | | | | | | | | | | |
| Silverbelle, Br. M. S. | Manila | San Francisco | 36 50 N | 173 45 W | Dec. 1 | 8 a, 1 | Dec. 1 | 29.86 | NW | WNW, 7 | NW | NW, 9 | Steady. |
| Oregon, Am. S. S. | Otaru | do | 45 53 N | 151 54 W | Dec. 1 | 2 p, 2 | Dec. 3 | 28.65 | E | W, 5 | SW | SE, 9 | E-S-SW. |
| Admiral Farragut, Am. S. S. | Kodiak | Seattle | 58 00 N | 151 00 W | Dec. 2 | —, 3 | Dec. 3 | 28.78 | NE | NNE, 9 | NE | NNE, 9 | NE-NNE. |
| Hakubasan Maru, Jap. M. S. | Yokohama | San Francisco | 46 50 N | 155 00 W | Dec. 2 | 8 a, 2 | Dec. 3 | 28.76 | NW | S, 6 | S | W, 9 | NE-S-NE. |
| Michigan, Am. S. S. | Portland, Oreg. | The Orient | 47 10 N | 164 00 E | Dec. 2 | 2 p, 2 | Dec. 5 | 29.26 | WSW | WSW, 8 | W | W, 9 | WSW-W. |
| Everett, Am. S. S. | Zamboanga, P. I. | San Francisco | 45 07 N | 171 30 E | Dec. 4 | 11 p, 4 | Dec. 6 | 29.35 | SW | NW, 8 | NW | W, 9 | SW-NW. |
| Oregon, Am. S. S. | Otaru | do | 45 14 N | 141 30 W | Dec. 4 | 8 p, 4 | Dec. 5 | 29.21 | S | S, 9 | W | W, 9 | S-SW-W. |
| Olympia, Am. S. S. | do | do | 42 25 N | 178 30 W | Dec. 4 | 2 a, 5 | Dec. 6 | 29.15 | W | W, 8 | W | W, 10 | Steady. |
| Wisconsin, Am. S. S. | Portland, Oreg. | Shanghai | 49 00 N | 169 00 E | Dec. 4 | 4 a, 4 | Dec. 7 | 28.78 | NNW | NNW, 7 | NW | NW, 9 | N-W-NW. |
| Stuart Dollar, Am. S. S. | Tabaco, P. I. | Los Angeles | 37 15 N | 168 25 E | Dec. 5 | 1 p, 5 | Dec. 6 | 29.51 | NW | NW, 7 | NW | NW, 9 | NW-NNW. |
| Tamaha, Br. S. S. | Shanghai | San Pedro | 38 38 N | 172 50 W | Dec. 5 | 10 p, 7 | Dec. 8 | 29.11 | W | W, 12 | NW | W, 12 | SW-W-WNW. |
| Mojave, Am. S. S. | San Pedro | Nagasaki | 30 14 N | 158 26 E | Dec. 6 | 10 p, 6 | Dec. 7 | 29.73 | SE | SE, 8 | SW | SW, 9 | SW-W. |
| Maliko, Am. S. S. | Puget Sound | Hawaiian Islands | 35 30 N | 143 00 W | Dec. 6 | 10 p, 10 | Dec. 12 | 29.68 | SSE | SSW, 7 | W | W, 10 | SSW-SW. |
| Stuart Dollar, Am. S. S. | Tabaco | Los Angeles | 40 42 N | 170 30 W | Dec. 7 | Mdt. 8 | Dec. 8 | 28.43 | SE | WSW, 7 | NW | NW, 11 | SSW-WSW. |
| Illinois, Am. S. S. | Hong Kong | San Francisco | 41 15 N | 155 20 E | Dec. 10 | 2 a, 11 | Dec. 11 | 29.09 | ENE | NE, 9 | NNW | N, 10 | NE-N. |
| Pres. Taft, Am. S. S. | Yokohama | do | 34 45 N | 153 05 E | Dec. 10 | 4 p, 10 | Dec. 12 | 29.40 | SSW | SW, 7 | NW | W, 9 | SSE-SW. |
| Columbia Maru, Jap. M. S. | do | Seattle | 41 30 N | 166 45 E | Dec. 10 | 6 p, 11 | Dec. 12 | 28.92 | SE | NE, 4 | N | N, 9 | SE-S-N. |
| Shiraha Maru, Jap. S. S. | Milke | Coos Bay | 49 54 N | 151 42 W | Dec. 10 | Noon, 11 | Dec. 15 | 29.10 | NNW | WNW, 6 | W | SW, 10 | NW-SW-WSW. |
| Pres. Jackson, Am. S. S. | Yokohama | Seattle | 49 40 N | 153 30 W | Dec. 11 | 5 p, 11 | Dec. 11 | 29.30 | SE | SE | SE | SE, 10 | Steady. |
| Dorothy Alexander, Am. S. S. | Seattle | San Diego | 43 23 N | 124 42 W | Dec. 12 | 2 a, 12 | Dec. 12 | 29.65 | SE | SE, 7 | SW | SE, 9 | SE-SSE-S. |
| Steel Trader, Am. S. S. | Honolulu | Yokohama | 29 45 N | 151 49 E | Dec. 13 | —, 13 | Dec. 13 | 29.79 | W | W, 9 | W | W, 9 | W-N. |
| Illinois, Am. S. S. | Hong Kong | San Francisco | 44 04 N | 168 56 E | Dec. 14 | 6 p, 14 | Dec. 16 | 29.17 | S | SW, 7 | SW | W, 10 | S-SW-W. |
| Protoslaus, Br. S. S. | Yokohama | Victoria | 45 05 N | 161 46 E | Dec. 14 | Noon, 14 | Dec. 16 | 29.66 | NW | NW, 9 | WNW | WNW, 10 | SW-NW. |
| Columbia Maru, Jap. M. S. | do | Seattle | 49 25 N | 159 30 W | Dec. 15 | 4 p, 16 | Dec. 16 | 29.35 | SSW | SW, 10 | WSW | SW, 10 | SW-SSW-SW. |
| Steel Trader, Am. S. S. | Honolulu | Yokohama | 31 55 N | 142 47 E | Dec. 15 | —, 15 | Dec. 15 | 29.97 | WNW | —, 9 | WNW | WNW, 9 | WNW-N. |
| Manoa, Am. S. S. | do | San Francisco | 36 15 N | 127 05 W | Dec. 16 | 8 a, 17 | Dec. 17 | 30.32 | NNW | NNW, 8 | NNW | NNW, 9 | Steady. |
| Columbian, Am. S. S. | Los Angeles | Balboa | 10 05 N | 85 32 W | Dec. 16 | —, 17 | Dec. 17 | 29.91 | ENE | NE, 8 | NE | NE, 8 | E-NNE-S. |
| City of Elwood, Am. S. S. | Shanghai | San Pedro | 47 06 N | 171 00 W | Dec. 17 | —, 17, 18 | Dec. 19 | 29.04 | SE | WSW, 10 | W | SW, 10 | SSW-W. |
| Pres. McKinley, Am. S. S. | Yokohama | Seattle | 42 20 N | 153 55 E | Dec. 19 | 6 a, 20 | Dec. 20 | 29.22 | WSW | SE, 9 | WSW | SE, 9 | SE-SSE. |
| Japan Arrow, Am. S. S. | San Pedro | Balboa | 15 38 N | 98 32 W | Dec. 23 | 1 a, 24 | Dec. 24 | 29.89 | NE | NE, 9 | NW | NNE, 10 | NE-NNE. |
| Mojave, Am. S. S. | Yokohama | San Pedro | 38 24 N | 171 27 E | Dec. 23 | 6 a, 25 | Dec. 29 | 29.47 | NW | S, 8 | WNW | WNW, 11 | NW-S-WNW. |
| Kansas, Am. S. S. | Los Angeles | Balboa | 9 27 N | 87 01 W | Dec. 23 | 4 p, 24 | Dec. 24 | 29.72 | E | NE, 8 | NE | NE, 8 | E-NE-S. |
| Ohioan, Am. S. S. | New York | Los Angeles | Gulf of Tehuantepec | | Dec. 24 | 4 p, 24 | Dec. 24 | 29.87 | WNW | N, 10 | NE | WNW, 11 | NNW-N-NE. |
| City of San Francisco, Am. M. S. | San Pedro | Balboa | 15 45 N | 95 30 W | Dec. 29 | 2 p, 29 | Dec. 29 | 29.98 | N | NNE, 9 | NW | NNE, 9 | N-NNE-NW. |
| Golden River, Am. S. S. | Hong Kong | San Francisco | 35 08 N | 156 10 W | Dec. 30 | 2 p, 30 | Dec. 30 | 29.89 | WNW | WNW, 9 | WNW | WNW, 10 | Steady. |
| Diana Dollar, Am. S. S. | Tabaco | Los Angeles | 41 09 N | 174 40 W | Dec. 30 | Noon, 30 | Jan. 4 | 29.24 | SW | SSE, 10 | W | W, 10 | SW-W-SSE. |
| SOUTH ATLANTIC OCEAN | | | | | | | | | | | | | |
| Brookwood, Br. S. S. | Port Natal | Swansea | 33 30 S | 27 50 E | Dec. 2 | 2 a, 2 | Dec. 2 | 29.73 | SW | SW, 8 | WSW | SW, 9 | ENE-S-SW. |

NORTH PACIFIC OCEAN

By WILLIS E. HURD

Atmospheric pressure.—A considerable fall in atmospheric pressure occurred over the upper waters of the North Pacific Ocean during December. The result was one of the deepest cyclones of the Aleutian region for the month in recent years, the average pressures in the western part of the Gulf of Alaska and the eastern part of the Bering Sea being about 29.20 inches, or four-tenths of an inch below the December normal. The lowest readings of the month occurred on the 27th, the absolute minimum reported being 28.24 inches, at Dutch Harbor.

In American waters south of the central part of the British Columbia coast line, pressure for the most part was higher than the average, as it was also at the island stations of Midway and Honolulu. The North Pacific anticyclone as a whole occupied all except the upper region of the eastern part of the ocean, and the greater part of the sea elsewhere in middle latitudes between the American and Asiatic coasts.

The following table gives the principal barometric data for several island and coast stations in west longitudes, including Point Barrow on the Arctic Ocean.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level at indicated hours, North Pacific Ocean and adjacent waters, December, 1930

| Stations | Average pressure | Departure from normal | Highest | Date | Lowest | Date |
|--------------------------------|------------------|-----------------------|---------|-------|--------|-------|
| Point Barrow ¹ | 29.86 | | 30.32 | 1st | 29.44 | 7th. |
| Dutch Harbor ¹ | 29.23 | -0.35 | 29.96 | 23d | 28.24 | 27th. |
| St. Paul ^{1, 4} | 29.20 | -0.41 | 29.92 | 23d | 28.54 | 27th. |
| Kodiak ¹ | 29.19 | -0.39 | 29.58 | 10th. | 28.46 | 6th. |
| Midway Island ¹ | 30.11 | +0.07 | 30.36 | 29th. | 29.84 | 12th. |
| Honolulu ² | 30.08 | +0.07 | 30.26 | 30th. | 29.87 | 14th. |
| Juneau ² | 29.67 | -0.12 | 30.16 | 27th. | 29.13 | 15th. |
| Tatoosh Island ^{3, 4} | 30.13 | +0.16 | 30.46 | 16th. | 29.54 | 31st. |
| San Francisco ³ | 30.17 | +0.06 | 30.44 | 28th. | 29.92 | 31st. |
| San Diego ^{3, 4} | 30.08 | +0.04 | 30.29 | 25th. | 29.91 | 2d. |

¹ P. m. observations only.

² A. m. and p. m. observations.

³ For 30 days.

⁴ Corrected to 24-hour mean.

Cyclones and gales.—Owing to the unusually steep slope of barometric pressure existing in December between the Aleutian area, on the one hand, and the lower central part of the ocean, on the other, stormy weather was frequently encountered along the upper and middle trans-Pacific routes throughout the month. In general, the storminess in west longitudes was more the result of the activities of the fluctuating disturbance known as the Aleutian Low, than of traveling cyclones, few storms moving across from the Asiatic region. West of the one hundred and eightieth meridian gales resulted from both progressive and fluctuating cyclones.

From the standpoint of high winds, the severest extratropical cyclone of the month was one that gathered in the southwestern part of the Aleutian storm area on the 7th and caused hurricane velocities near 39° N., 173° W. On the 8th the maximum force of the winds, as indicated by reports, had diminished to 11 near the same position, although the barometer had dropped considerably, the minimum reading on this date being 28.43 inches, as obtained on the American steamer *Stuart Dollar*, in about 40° N., 170° W. Thereafter the storm lessened in intensity, as it entered and for several days lay over the Gulf of Alaska.

The succeeding storm of next highest wind violence developed intensity southeast of the Kuril Islands about the 22d, but may have originated as a Siberian depression at an earlier date. From the 23d to 26th it caused scattered westerly gales of force 10 to 11 between latitudes 35° and 50° N., and longitudes 160° E. and 180° . By the 27th it was central over the eastern Aleutians, where it gave the lowest barometric pressures of the month at Dutch Harbor and St. Paul. At this time, however, the

wind intensity seems to have decreased to moderate to strong gales over a large area. During the 28th the storm center began filling in, and by the 29th, still central near the western extremity of the Peninsula of Alaska, it had become comparatively shallow and of little violence.

For the upper two-thirds of the ocean the month may well be characterized as a stormy one. In addition to the heavy gales already referred to, winds of force 10 occurred on several days in scattered localities, and of force 9, on about 20 days of the month, covering most parts of the ocean north of the twenty-fifth parallel. Strong to whole cyclonic gales occurred off the Washington and Oregon coasts on the 11th and 12th, and an anticyclonic gale of force 9, off the central California coast on the 17th.

Northeast monsoon gales blew in Taiwan Channel on the 1st to 5th, and were strong in the neighborhood on other dates.

In the Gulf of Tehuantepec fresh to strong northers occurred on the 1st, 2d, 7th, 8th, 12th, 23d, and 29th, and in addition attained a maximum force of 11 on the 24th. Off the lower Central American coast moderate to strong northeasters blew on the 17th and 24th.

The prevailing wind at Honolulu continued from the east, with a maximum velocity of 30 miles from the same direction on the 22d. Velocities of force 8 were reported some 200 to 300 miles northwest of Honolulu on the 14th and 15th.

Fog was of little consequence over the North Pacific during December. There were no reports of its occurrence west of the one hundred and eightieth meridian, and very few for any other part of the ocean, except off the California coast, where it was encountered on six days between the 1st and the 12th.