

On the 16th and 17th the general conditions over the ocean were quieter than usual, although on the former date a number of vessels encountered moderate gales in widely scattered localities, while a "norther" prevailed in the Gulf of Mexico. Storm log:

Honduran S. S. Yoro:

Gale began on the 16th, wind NE. Lowest barometer 29.99 inches at 5.30 p. m. on the 16th, wind NNW., in latitude 20° 21' N., longitude 95° 18' W. End on the 17th, wind ESE. Highest force of wind 9; shifts 6 points.

On the 18th two well developed lows appeared; the first in the vicinity of Newfoundland and the second over the North Sea.

On the 19th the eastern low did not appear within the limits of the map, while the movement of the western disturbance was slight during the next 4 days. From the 19th to 21st moderate to strong northerly gales swept over the region between the 30th and 45th parallels and the 55th and 65th meridians. Storm logs:

American S. S. Ophis:

Gale began on the 19th, wind NW. Lowest barometer 30.06 inches at 4 a. m. on the 19th, wind NW., 9, in latitude 33° 20' N., longitude 56° 40' W. End on the 21st, wind NW. Highest force of wind 9, NW.; steady NW.

American S. S. Innoko:

Gale began on the 18th, wind NNW. Lowest barometer 29.82 inches at noon on the 21st, wind NW., 7, in latitude 40° 53' N., longitude 54° 17' W. End on the 21st, wind NW. Highest force of wind 8; shifts NNW.-NW.

On the 23d westerly to southwesterly gales were reported near Hatteras, and the third "norther" of the month made its appearance in the Gulf of Mexico.

On the 24th heavy winds continued along the American coast and storm logs were received from vessels as far east as the 54th meridian. On the same day an area of low pressure covered a portion of Great Britain, accompanied by westerly gales off the southern coast of England.

On the 25th the western disturbance was central near latitude 35° N., longitude 65° W., and winds of gale force were encountered in the vicinity of the Bermudas. Storm log:

British S. S. Bradford City:

Gale began on the 25th, wind SW. Lowest barometer 29.69 inches at 3 p. m. on the 25th, wind SW., 9, in latitude 34° N., longitude 57° 50' W. End on the 27th, wind NW. Highest force of wind 9; shifts SSW.-SW.-WNW.

On the 25th a second depression appeared near latitude 52° N., longitude 55° W., with southerly gales in the easterly quadrants.

On the 26th the western disturbance was central near latitude 42° N., longitude 42° W., while it was impossible to locate the eastern low on account of lack of observations. Storm logs:

British S. S. Aral:

Gale began on the 26th, wind SW. Lowest barometer 29.58 inches at 3 a. m. on the 26th, wind SW., 9, in latitude 41° 20' N., longitude 44° 40' W. End on the 27th, wind SW. Highest force of wind 9; shifts SW.-W.-SW.

American S. S. Conness Peak:

Gale began on the 25th, wind SW. Lowest barometer 29.91 inches at 4 p. m. on the 25th, wind W., 9, in latitude 46° 39' N., longitude 11° 52' W. End on the 28th, wind NW. Highest force of wind 9, NW.; shifts WSW.-W.

Charts VIII to XII show the conditions from the 27th to the 31st, inclusive, during which period the heaviest storms of the month occurred, as the ocean was swept by gale after gale, the wind at times attaining hurricane

force. A glance at the charts will show the different areas of low pressure that caused these conditions, and also how the storm area varied in extent from day to day.

British S. S. Manchester Merchant:

Gale began on the 26th, wind SW. Lowest barometer 29.53 inches at 4 a. m. on the 27th, wind WNW., in latitude 40° 28' N., longitude 49° 02' W. End on the 30th, wind W., 10. Highest force of wind 10; shifts SW.-WNW.-SSW.

British S. S. Galtymore:

Gale began on the 27th, wind SE. Lowest barometer 28.89 inches at 2 a. m. on the 28th, wind WSW., 12, in latitude 48° 28' N., longitude 45° 08' W. End on the 28th, wind WSW. Highest force of wind 12; shifts SSW.-WSW.

French cable S. S. Edouard Jeramec:

Gale began on the 28th, wind SE. Lowest barometer 28.68 inches at 2:30 a. m. on the 29th, wind WNW., in latitude 43° 30' N., longitude 63° 40' W. End on the 30th, wind WNW. Highest force of wind 10; shifts ESE.-SE.-SW.-NW.-WNW.

British S. S. Aral:

Gale began on the 28th, wind SW. Lowest barometer 29.59 inches at noon on the 29th, wind SW., 10, in latitude 36° 30' N., longitude 52° 08' W. End on the 30th, wind NW. Highest force of wind 12; shifts SW.-W.-WNW.

NORTH PACIFIC OCEAN.

By WILLIS E. HURD.

In the report for the preceding month it was indicated that November, as regards the severity of the weather, lay between months having periods of maximum activity. December opened in the Far East with the entrance upon the ocean of an extensive area of high pressure from Mongolia. The North Pacific high was practically normal in location and pressure, and the Aleutian cyclone was central as a major disturbance over the Gulf of Alaska. Between these two great atmospheric pressure extremes of the eastern Pacific a sharp gradient existed which, on December 4, covered a range of 2.31 inches, or between 30.32 and 28.01 inches within latitudes 35° and 50° N., longitudes 155° and 161° W. In consequence of such conditions strong gales to full hurricane winds prevailed along the northern shipping routes to the eastward of the 170th meridian of west longitude from the 1st to the 6th of the month.

During the period of maximum intensity of this storm, which occurred on the 3d to 5th, six vessels encountered winds of hurricane force. These were the Japanese S. S. *Yogen Maru*, the British S. S. *Mongolian Prince*, and the American steamships *Dewey*, *Northwestern*, *President Madison*, and *West Jena*. With the exception of the *West Jena*, these vessels were eastward bound.

The *Yogen Maru*, Capt. G. Kuwana, Observer K. Sato, passed through the heaviest winds on the 3d, direction west-northwest, lowest pressure 28.41 inches, in latitude 50° 50' N., longitude 165° 45' W. The *Mongolian Prince*, Capt. J. Chilvers, Observer H. A. Shaw, experienced gales from the 1st to the 6th, along the 49th parallel, between longitudes 169° W., and 140° W., accompanied by fierce rain, snow, or hail squalls. On the 2d the wind attained a force of 11 from the west-southwest, lowest pressure 28.71 inches, in 49° 16' N., 165° 53' W. On the 4th the highest wind was from the west, force 12, lowest pressure 28.71 inches, in 49° 32' N., 146° 35' W. On the 5th the vessel still was in the terrific gale, highest force 11, west-southwest, with precipitous seas. The wind moderated and pressure rose on the 6th.

The *Dewey*, Capt. C. Ash, Observer L. A. Snyder, bore the brunt of the hurricane on the 4th. At Greenwich mean noon the vessel was in $50^{\circ} 12' N.$, $162^{\circ} 26' W.$, pressure 28.16, experiencing a whole gale from the south. It was followed by hurricane velocities, and lowest pressure of 28.01 inches. At G. M. N. of the 5th, in $48^{\circ} 56' N.$, $157^{\circ} 39' W.$, there was still a whole gale from the south, pressure 28.12 inches, but shortly afterward conditions moderated.

The *West Jena*, Capt. P. T. Hansen, Observer T. V. Hughes, had a rough voyage between Portland, Oreg., and Japan. Stormy conditions began on December 1, near $49^{\circ} 22' N.$, $135^{\circ} 50' W.$, and continued until after the 17th, when in $49^{\circ} N.$, $173^{\circ} 55' E.$ She experienced the hurricane of the 5th, near $50^{\circ} 30' N.$, $147^{\circ} W.$, wind northwest, lowest recorded pressure 28.80 inches. Several other vessels involved in this storm encountered winds of forces 10 and 11.

On the 6th an important offshoot of the cyclone entered the Canadian northwest and traversed the northern part of the United States during the succeeding two or three days.

Occasional gales of force 7 or 8 were reported from the northern courses in east longitudes during the first ten days of the month, but there seems to have been no decided storm activity in these waters during this decade.

The Aleutian center until the 10th was practically confined to the eastern area. On this date, however, a disturbance from the west appeared, and two centers of minimum pressure were apparent over northern waters. Gales were not extensively reported at this time, although violent winds occurred over various sections of the middle and northern routes east of 170° west longitude on the 9th to 12th. Later, or from the 11th to the 17th, stormy conditions prevailed to the westward.

The British S. S. *Ocean Prince* encountered heavy squalls while running up the coast between North Head and Vancouver on the 9th to 11th. During the early half of the period a strong HURRI was entering the northwest coast of the United States. With falling barometer, late on the 10th, the *Ocean Prince* for a time proceeded in a southerly gale, highest force 12, lowest pressure 29.77, in $48^{\circ} 07' N.$, $125^{\circ} 17' W.$ North Head recorded a 73-mile wind on the 11th.

On the 12th three steamships near $45^{\circ} N.$, $162^{\circ} E.$, were caught in severe weather during the passage of a cyclone. The American S. S. *Crosskeys* reported a west-northwesterly gale, force 11, lowest pressure 29.48. The Japanese S. S. *Shidzuoki Maru* encountered a northwesterly gale, force 10, lowest pressure 29.61. The Japanese S. S. *Nankai Maru* also reported a whole gale from the west-northwest, lowest pressure 29.38. This storm was closely followed by a strong anticyclone.

Late on the 9th a slight disturbance appeared near the Hawaiian Islands, and on the 10th was central somewhat to the north-northeastward, with moderate gain in energy. The storm moved northward and by the 13th was occupying a position in the eastern Gulf of Alaska. Gales as high in force as 10 attended this storm, being noted on the 10th and 11th near latitude $33^{\circ} N.$, longitude $157^{\circ} W.$, by the American S. S. *Melrose*. North Head station on the 13th experienced an 80-mile gale from the southwest.

From the 15th to the 17th of the month storm conditions approximating in energy those of the 4th and 5th in more eastern waters settled over the northern routes between 45° and $50^{\circ} N.$, and $160^{\circ} E.$ and $170^{\circ} W.$ The storm had swept seaward from northern Japan on the

13th, accompanied by gales of reported forces 9 to 11 which extended through the 14th.

On the 15th, in latitude $48^{\circ} 32' N.$, longitude $179^{\circ} 05' E.$, the American S. S. *West Cayote* experienced a southeasterly gale, force 12, lowest pressure 29.32 inches. On the following day the Japanese S. S. *Nankai Maru* fell in with a westerly gale, force 11, lowest pressure 29.07, in $49^{\circ} 52' N.$, $175^{\circ} 30' E.$ On the 17th hurricane velocities from a westerly direction were encountered by the Japanese S. S. *Toku Maru*, in $50^{\circ} 05' N.$, $174^{\circ} 16' E.$, lowest pressure 29.10; by the British S. S. *Doonholm*, in $47^{\circ} 30' N.$, $165^{\circ} E.$, lowest pressure 29.22; and by the American S. S. *West Jena*, in $49^{\circ} N.$, $173^{\circ} 55' W.$, lowest pressure 29.64. After this date the storm seems to have lost energy.

During a storm which lay off the coast of Canada and northern United States on the 17th, North Head recorded a maximum wind velocity of 88 miles from the south. Reports at sea some distance to the southward and westward indicate only light to moderate gales at this time.

On December 20 a general intensification of storm conditions took place over the northeastern part of the Pacific. Near $41^{\circ} N.$, $164^{\circ} W.$, the American S. S. *Manulani* reported a southwesterly gale, force 9, pressure 29.18, and the American S. S. *Northwestern* entered upon a period of stiff southerly gales which lasted until the 22d, while the vessel was off the Alaskan coast above Sitka. On the 21st the American S. S. *Crosskeys* was beset by a south gale, force 10, lowest pressure 29.40, in $49^{\circ} 36' N.$, $135^{\circ} 12' W.$

A second depression formed in the neighborhood of Hawaii during the 23d and 24th, and gave some gales of force 8 to the northeastward of the islands on the 24th. It had moved westward on the 25th, and on the 26th lay to the northeastward of Midway Island, whence it seems to have moved into the Aleutian area on the 29th or 30th.

Another storm entered the Oregon, Washington, and British Columbia coasts on the 24th and 25th. This did some damage to shipping, and, on the 25th, broke all previous records for high wind velocities at Tacoma and Seattle: at Tacoma with a maximum wind of 52 miles, and at Seattle, with 66 miles, both from the south. At Gray's Harbor an 80-mile gale lashed the coast. At North Head the highest velocity was 72 miles an hour from the south, on the night of the 24th. The storm was accompanied by almost unprecedented lightning for December. Few vessel reports of this storm are at hand, and these give no wind-force higher than 10. After crossing the United States, the cyclone entered the North Atlantic Ocean vigorously on the 28th and 29th.

Severe gales occurred to the southward of the Aleutian Islands on the 24th, due to a strengthening of the cyclonic conditions to the westward of Dutch Harbor. The American S. S. *Bearport*, bound toward Seattle, reported the highest force of wind, SSE. 11, in connection with the storm, in latitude $49^{\circ} 10' N.$, longitude $178^{\circ} 13' E.$, lowest pressure 29.15.

On December 25 and 26 an Asiatic cyclone entered the sea from northern Japan. While no very low pressures were observed during its passage, several vessels within its influence were involved in strong to dangerous gales. The American S. S. *Tejon*, in $40^{\circ} N.$, $146^{\circ} 50' E.$, on the 26th, encountered a southwest gale, force 10, lowest pressure 29.69 inches, accompanied by severe electrical phenomena. The British S. S. *Canadian Transporter*, eastward bound, experienced whole gales to hurricane winds, from the west to northwest on the

26th and 27th, lowest pressure 29.50. On both days the ship's position was near 41° N., 153° E. Southerly gales, force 10, occurred near the 180th meridian on the 27th and 28th, and were reported by the American S. S. *West Jessup*, eastward bound, in latitudes 47° to 48° N.

At the close of the month moderate to whole north-westerly gales occurred off the American coast from northern California to Washington, following the passage inland of a slight depression. These gales were apparently severest between 40° and 50° N., near and along the 130th meridian.

Variable weather was met with along the American coast from Panama to San Diego. Calms and light airs were frequent, although gales of forces 7 to 10 occurred on several days. The strongest winds, as usual, blew from the Gulf of Tehuantepec.

In the lower Far East two tropical storms occurred. These receive mention below.

Pressure for December, 1923, based on p. m. observations taken at the island stations, was at Honolulu the same as the average, at Dutch Harbor slightly below, and at Midway Island much above average. The average for the month at Midway Island was 30.20 inches, whereas that for the 12 years of record, 1912 to 1923, inclusive, is but 30.03. The previous high value was 30.14, in 1918. The highest pressure of the month, 30.38, was recorded on the 10th, 11th, and 12th; the lowest, 29.74, on the 26th. The p. m. pressure at Dutch Harbor was 29.52 inches, as compared with an average of 29.55. The highest pressure, 30.16, was recorded on the 15th, 23d, and 27th; the lowest, 28.52, on the 4th—absolute range 1.64 inches. The p. m. pressure at Honolulu was 30.01 inches, which is the same as the normal. The highest pressure, 30.12, occurred on the 16th; the lowest, 29.77, on the 23d.

The North Pacific high-pressure area, while it fluctuated in size and intensity, was broken up comparatively little during December. The Hawaiian storms of the 10th and 24th were the main disturbing elements to the high, except from the north, whenever the Alcutian cyclone oscillated southward.

The weather at Honolulu was fine, but the cloudiest on record. The average wind velocity was 10 miles per hour, with velocities exceeding 35 miles per hour on the following dates: 39 NE., 12th; 39 NE., 15th; 41 NE., 16th; 37 NE., 17th. The prevailing direction was east.

Very little fog was reported by ocean observers. The heaviest percentage occurred outside of San Francisco harbor, where it was noted on five days. In addition scattered occurrences were reported off the coast of southern California, along the northern steamer routes, and to the eastward of Japan.

TWO TYPHOONS IN THE FAR EAST DURING DECEMBER, 1923.

By REV. JOSÉ CORONAS, S. J.

[Weather Bureau, Manila, P. I.]

There were only two typhoons in the Far East during the last month of December—one over the southern part of Luzon and the other over the Pacific to the east of the southern part of the Philippines.

The first typhoon appeared on the 3d to the NE. of Samar and E. of the southern part of Luzon near 127° longitude E., and between 13° and 14° latitude N. It

moved W. by N. on the 3d and then inclined to W. and W. by S. on the 4th. The body of the storm was very small, the barometer at Daet (about 120 miles E. by S. of Manila) having fallen to 740.75 mm.,¹ 29.16 inches, at 2 p. m. of the 4th, while in Manila it was as high as 760 mm., 29.92 inches. The center passed over the northern part of Camarines Norte, over 100 houses and many big trees having been blown down in the town of Paracale, where this typhoon is considered as one of the strongest typhoons experienced there in many years.

The intensity of the typhoon decreased considerably while traversing the northernmost part of Camarines Norte and the southern part of the Province of Tayabas. The center passed during the night about 50 miles to the south of Manila moving W. by S. or WSW.

The other typhoon was of hardly any importance for the Philippines. It appeared south of Yap on the 18th near 138° longitude E. and between 6° and 7° latitude N., and moved W. by N. until the 20th, when it recurved slowly to the north and northeast near 130° longitude E. and between 7° and 11° latitude N. On the 24th the center was still shown by our Weather Maps in about 134° longitude E., 19° latitude N. moving NE. or ENE., it having been impossible to follow it after the 24th.

TROPICAL CYCLONE IN THE NORTH INDIAN OCEAN.

The British S. S. *Cyclops*, Capt. W. Cosker, proceeding from Suez to Singapore, on December 19, while southwest of the Laccadive Islands, encountered a tropical cyclone moving in a westerly direction. Observers C. A. Blow, second officer, and R. W. Ellis, fourth officer, reported the following:

December 18th, midnight. Overcast, frequent rain squalls. Wind N., force 4.

December 19th, 4 a. m.: Continuous rain. Moderate NE. sea. Wind N., force 4. 9:30 a. m.: Barometer 29.68 inches (uncorrected), commenced falling. Heavy rain. Wind N., force 6. Noon. Latitude 9° N., longitude 67° E. Heavy rain. Wind NW., force 7. Rough sea. Bar. 29.44 inches. 0:55 p. m.: Hove to. 2:30 p. m. to 3 p. m. Heavy squall, force 12. Barometer 29.08 inches, with wind shifts from NW. to W. High NW. and w'ly sea. 3:30 p. m.: Similar conditions, barometer 29.22 inches. 4 p. m.: Wind SW. by W., force 8, same confused sea, barometer 29.29 inches. 4:30 p. m.: Weather moderated, sky cleared, rain ceased, vessel kept away on course. 8:30 p. m.: Wind SE., force 4-5, barometer 29.63 inches. Slight w'ly swell. (A. J. McC., jr.)

DETAILS OF THE WEATHER IN THE UNITED STATES.

GENERAL CONDITIONS.

By ALFRED J. HENRY.

The outstanding characteristic of the month was the continued low pressure in Alaska and thence southward to about 50° north latitude. As a direct result the drift of the atmosphere over the United States and Canada was, in general, in an east-west direction with remarkably few interruptions in a north-south direction. Anticyclones came in from the Pacific and moved rapidly across the country, yet east of the Rocky Mountains the temperature was exceptionally mild for the season. The usual details follow.

¹ Gravi y correction not applied.