

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  $46^{\circ}$  N.,  $171^{\circ}$  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  $47^{\circ}$  N.,  $162^{\circ}$  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  $45^{\circ}$  N.,  $143^{\circ}34'$  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  $38^{\circ}34'$  N.,  $140^{\circ}38'$  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  $17^{\circ}24'$  N.,  $102^{\circ}11'$  W. On the *Asuka Maru* the wind attained force 11, lowest barometer 29.31, in  $17^{\circ}44'$  N.,  $102^{\circ}25'$  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