

on the 13th, 14th, and 18th, in connection with a cyclone that developed to the northeastward of the Hawaiian Islands on the 11th and, slowly moving eastward, entered the California coast on the 19th.

The greater part of the strong extratropical cyclonic activity of the month occurred in connection with low pressure systems east of Japan and those peculiar to the Aleutian Low. Many of these were of enormous extent and on several days caused fresh to strong and even whole gales as far southward as the 30th parallel, as well as over considerable areas in higher latitudes in both west and east, but principally in east, longitudes. An inspection of the accompanying table, *Ocean Gales and Storms*, will indicate the intensity and distribution of the stormy conditions encountered by North Pacific ships.

On the 1st to 3d of the month fresh gales were experienced within the area 30° to 50° N., 145° to 160° W., and fresh to whole gales along the central and western parts of the northern steamer routes. On the Japanese motorship *San Clemente Maru* pressure fell to 28.42, with a northwest wind of force 9, in the vicinity of 44° N., 164° E., on the 2d. Near midnight of the 1st, in about 49° N., 179° W., the British steamship *Anglo-Peruvian* had a north-northeast gale of force 10, lowest barometer 28.70. This ship had a rough passage thence westward toward Yokohama, since on the 6th, near 45° N., 165° E., she encountered a northeast gale of force 11, and on the 10th, near 42° N., 157° E., she met a wind of similar force, from the northwest, barometer 28.74.

December 10 and 11 were particularly stormy days over considerable regions in east longitudes—of force 10 to 11 in northern waters, and of force 8 to 9 between the 30th and 40th parallels. On the central Aleutians pressure was very low, with a minimum of 28.10 reported on the 11th.

On the 14th to 16th widespread gales, some rising to force 10, were reported within the region between 160° W. and 155° E. The strongest gales of the period occurred on the 14th near 34° N., 159° E., and 41° N., 171° W.

On the 23d a storm developed over Japan and moved rapidly northeastward, on the 24th causing strong gales outside of the port of Yokohama. On the 23d a storm central near 47° N., 167° E., where the pressure was reported as 28.03 inches, caused strong gales in the vicinity, and strong to whole gales (forces 9–10) as far eastward as 170° W.

There was a considerable general abatement in storminess during the last week in December.

Typhoons and depressions over the Far East.—One typhoon of hurricane strength, that of December 3–10, occurred in tropical waters of the Far East and was destructive in the central Philippines on the 8th. An account of this storm and of three depressions, prepared by the Rev. Bernard F. Doucette, S. J., Weather Bureau, Manila, P. I., is subjoined.

Tehuantepecers.—The following northerly gales in the Gulf of Tehuantepec, due to strong anticyclones pressing southward into the Gulf of Mexico, were reported: Of force 8 on the 7th, 9th, 10th, 28th, and 30th.

Intensified trade wind.—The American S. S. *Dickenson*, Fanning Island toward Honolulu, reported a northeast gale of force 8 in latitude 5°10' N., longitude 159°17' W.

Fog.—Fog occurred on three or four scattered dates on the open North Pacific in west longitudes during December, but it was mostly confined, so far as reports indicate, to United States coastal waters. There were 2 days with fog off the Washington and Oregon coasts; 8 days with fog off the California coast; and 3, off Lower California.

Fog was reported on December 31 a short distance southwest of Costa Rica.

TYPHOONS AND DEPRESSIONS OVER THE FAR EAST, DECEMBER 1938

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Depression, December 1–5, 1938.—A depression, apparently of minor importance, formed over the western Caroline Islands, moved west, then west-northwest, finally inclining to the west-southwest as the center moved across the Visayan Islands to the Sulu Sea where it disappeared.

Typhoon, December 3–10, 1938.—This storm appeared about 300 miles south of Guam on December 3, apparently well developed, after it had formed over the regions adjacent to the eastern Caroline Islands. On December 4 there was no doubt that the storm was of typhoon intensity and was moving in a west-northwesterly direction; it later inclined to the west, thus approaching northern Samar. As it came near San Bernardino Strait, it again took a course to the west-northwest, passing a short distance north of Laoang during the late evening hours of December 7. The typhoon crossed the Archipelago December 8, passing about 100 miles south of Manila, moving west-northwest, at approximately 2 p. m. The center moved across the northern part of Mindoro Island into the China Sea, where it weakened as it rapidly progressed toward Indochina. On December 10, it entered the continent, where it quickly disappeared, apparently of weak intensity.

Over the Philippines, this was the worst typhoon of the year. On December 14, the final total of deaths was published, the number being 305. The greatest havoc occurred over northern Samar and the extreme southern portions of Luzon. The lowest barometric readings occurred at Legaspi, Sorsogon, and Laoang. At Laoang, Samar Province, 723.84 mm. (28.50 in.) was recorded December 7, at 9:30 p. m. Sorsogon, Sorsogon Province, had its minimum of 726.90 mm. (28.82 in.) at 2 a. m. December 8. Legaspi, Albay Province, reported a value of 732.71 mm. (28.85 in.) as its minimum, at 2:20 a. m. December 8. The storm center passed very close to and south of Sorsogon. Winds of force 12 were experienced at these three stations as well as at a few neighboring cities. Later on in the day, Boac, Marinduque Province, had a minimum reading of 740.76 mm. (29.16 in.) when the center was within 50 miles south of the station (10 a. m. December 8) indicating that the storm was weakening. The steamship *Admiral Halstead* was anchored in Sorsogon Bay while the typhoon approached and passed over the locality. Two radiograms were sent to the observatory, the messages reading as follows: "15:45 G. M. T. Dec. 7, lat. 12°56' long. 123°55' 11:30 p. m.; wind north-by-west force 10; barometer 29.20; steady heavy rain". "December 8, 1 a. m., at Sorsogon Bay, wind north-northeast, force 12, barometer 28.50, 2 a. m., wind light southeast; barometer commenced rising." The steamship *Baron Stranraer* sent the following message during the forenoon hours of December 8: "Dec. 8, lat. 13°00' N., long. 122°20' E., typhoon, severe center, passed over vessel 7 a. m. local time; lowest barometer 28.50; present weather: wind south, 11, decreasing; barometer 29, rising; severe squall."

As the series of extra observations ordered as the typhoon approached the archipelago arrived at the observatory, it seemed that a secondary disturbance of consider-