

the 11th the storm apparently died out in the highlands of the southern half of Lower California.

At Honolulu light trades blew 99 per cent of the time, with prevailing direction from the east. The maximum velocity for the month was 22 miles from the northeast on the 23d.

Fog was about one-half as frequent along the western half of the northern sailing routes as in July, the percentage of occurrence falling to 20 to 30, or slightly more in some localities. Fog lessened in west longitudes, except along the American coast between latitudes 25° and 40° N., where it was reported on 7 to 10 days in most 5° squares. At St. Paul, in Bering Sea, there is record of fog forming on 13 days in August.

Waterspout.—The unusual occurrence for the region of a waterspout in 33° 55' N., 143° 56' W., is to be noted. It was observed by the American steamer *Manini* at 2 p. m. of the 19th and lasted for 15 minutes, traveling northeast for a distance of about 5 miles, during the prevalence of a southeast wind of force 4. Heavy sheets of rain fell in its immediate vicinity. At the end the spout sundered, the lower half falling to the sea, the upper rising to the cloud.

INDIAN OCEAN

By WILLIS E. HURD

Southwest monsoon.—Very strong monsoon currents were reported from a section of the southwestern part of the Arabian Sea on the 3d to 5th and 29th to 31st of August. On the earlier dates the British steamer *City of Chester*, in latitudes 9° to 13° N., longitudes 59° to 55° E., encountered daily fierce southwesterly squalls of forces 9 to 10. At the end of the month the American motor ship *William Penn*, in nearly the same position, reported high seas, with monsoon winds of forces 8 to 9.

Volcanic dust.—The British steamer *Emlynian*, H. E. Maber, captain and observer, sends the following report of volcanic dust observed in the South Indian Ocean:

August 5, 4:30 a. m., 12 miles NNW. of Toro Besi Point, Flores, encountered thick haze which an hour later became so dense as to enable us to see no farther than bows of ship. The cause was volcanic dust and sulphurous smoke blown off the land. The wind shifted to east about 7 a. m. and the sky began to lighten, but although an hour after sunrise at this time it was still quite dark. The ship was now completely covered from masts to water line with a thick coat of white powder resembling fuller's earth and an inch or more deep. At 7:45 daylight appeared, with small rain and general clearing of atmosphere, and at 10 a. m. sun shining with clear horizon to N. and E., and greenish appearance of sea.

TYPHOONS IN THE FAR EAST IN JULY AND AUGUST, 1928

By REV. JOSÉ CORONAS, S. J.

[Weather Bureau, Manila, P. I.]

July, 1928.—The first typhoon which has visited the Philippines during this year was probably formed on July 7 about 200 miles to the WSW. of Guam. Yet the first part of its track is rather indefinite until 2 p. m. of the 10th, when its center was clearly shown by our weather map to the east of southern Luzon in about 130° longitude E. and 14° latitude N. From that time the typhoon moved to WNW. and NW. by W. until it reached northern Luzon shortly after midnight of the 11th. The center of the storm passed across the Provinces of Cagayan and Ilocos with a due W. direction. The barometric minimum recorded in our stations was that of Tuguegarao 737.25 mm. at 4:30 a. m. of the 12th.

Once in the China Sea the typhoon moved to NNW. for several hours, and then to WNW. and W. from 2 p. m. of the 13th until it reached the northernmost part of Indo-China in the early morning of the 16th.

The center passed very close to the south of Pratas at about 2 a. m. of July 14, with a barometric minimum of 738.9 mm. and hurricane winds from the easterly quadrants.

The approximate positions of the center at 6 a. m. and 2 p. m. of July 11 to 14 were as follows:

July 11, 6 a. m., 126° 25' longitude E., 15° 05' latitude N.
 July 11, 2 p. m., 125° 00' longitude E., 16° 00' latitude N.
 July 12, 6 a. m., 121° 10' longitude E., 17° 55' latitude N.
 July 12, 2 p. m., 120° 15' longitude E., 17° 55' latitude N.
 July 13, 6 a. m., 119° 00' longitude E., 19° 00' latitude N.
 July 13, 2 p. m., 118° 10' longitude E., 19° 50' latitude N.
 July 14, 6 a. m., 115° 20' longitude E., 20° 50' latitude N.
 July 14, 2 p. m., 113° 45' longitude E., 21° 05' latitude N.

The second typhoon of this month appeared as developing on the 18th in the China Sea, about 100 miles to the west of central Luzon near 118° longitude E. and 15° latitude N. It moved WNW. for a short time, and then due W. until it reached Indo-China in the early morning of the 21st. The center was over the Paracels at 6 a. m. of the 20th.

The third typhoon followed a very abnormal track. It was formed about 300 miles to the north of Yap on the 20th to 22d near 138° longitude E. and 14° latitude N. It moved NE. on the 23d, ENE. in the morning of the 24th, and E. in the afternoon of the same day and during the 25th. On the 26th it recurved to the N. and WNW. in the neighborhood of 147° longitude E., between 17° and 18° latitude N. The WNW. direction was kept until the morning of the 28th, when the typhoon recurved again to the NE. near 135° longitude E. and 22° latitude N. From 12 noon of the 29th until the 31st the direction of the track was almost due N.

The steamer *President Harrison* was near the coast of southeastern Japan when this typhoon was just between the Bonins and Japan. She reported a barometric minimum of 732.3 mm. at 12 midnight of July 31, and a whole gale from the east quadrants on the 31st, and from the north quadrants on August 1.

On August 1 the typhoon seems to have moved eastward, but we have no means to follow its track after that day.

The approximate positions of the typhoon at 6 a. m. of July 24 to 31 were as follows:

July 24, 6 a. m., 140° 50' longitude E., 16° 15' latitude N.
 July 25, 6 a. m., 144° 45' longitude E., 17° 10' latitude N.
 July 26, 6 a. m., 145° 45' longitude E., 17° 20' latitude N.
 July 27, 6 a. m., 143° 20' longitude E., 19° 15' latitude N.
 July 28, 6 a. m., 134° 45' longitude E., 22° 00' latitude N.
 July 29, 6 a. m., 138° 50' longitude E., 26° 25' latitude N.
 July 30, 6 a. m., 140° 00' longitude E., 29° 45' latitude N.
 July 31, 6 a. m., 140° 00' longitude E., 31° 45' latitude N.

The fourth typhoon was of a short duration. It was formed on the 22d near 144° longitude E. and 20° or 21° latitude N. and moved northwestward to the south and southwest of the Bonins, filling up in the afternoon of the 24th near 137° longitude E. and 27° or 28° latitude N.

August, 1928.—The first typhoon of August appeared on our weather maps of the 8th far to the southwest of the Bonins near 135° longitude E. and 22° latitude N. It moved ENE., passing to the south of the Bonins in the afternoon of the 9th. From the 10th to the 13th the typhoon moved to the N. about 500 miles to the east of the Bonins and of central Japan. The steamer *Empress of Russia* was well under the influence of this typhoon on August 12 in about 145° longitude E. and