

November 11, 6 a. m., 121° 15' longitude E., 11° 25' latitude N.
 November 12, 6 a. m., 118° 10' longitude E., 11° 35' latitude N.
 November 13, 6 a. m., 115° 50' longitude E., 12° 20' latitude N.
 November 14, 6 a. m., 113° 40' longitude E., 13° 10' latitude N.
 November 15, 6 a. m., 110° 40' longitude E., 14° 20' latitude N.

The other Pacific typhoon was shown in our weather maps of the 20th as forming to the south of Guam not far from 145° longitude E. and 9° latitude N. It moved northwestward until the 23d when it recurved to NNE. to the west of the southern part of the Ladrone Islands. The steamer *Ramapo* was involved in this typhoon near to the west of the Ladrone Islands with a falling barometer and strong winds and squalls from the southeast quadrant.

The approximate positions of the center of this typhoon at 6 a. m. of November 21 to 27 were:

November 21, 6 a. m., 144° 10' longitude E., 9° 30' latitude N.
 November 22, 6 a. m., 141° 00' longitude E., 11° 50' latitude N.
 November 23, 6 a. m., 139° 10' longitude E., 14° 30' latitude N.
 November 24, 6 a. m., 140° 20' longitude E., 17° 10' latitude N.
 November 25, 6 a. m., 140° 55' longitude E., 18° 00' latitude N.
 November 26, 6 a. m., 142° 50' longitude E., 21° 05' latitude N.
 November 27, 6 a. m., 149° 30' longitude E., 28° 25' latitude N.

551.515 (461.1)

THE FIJI HURRICANE OF DECEMBER, 1929

By WILLIS E. HURD

From the 7th to the 14th of December, 1929, a hurricane raged over and in the general vicinity of the Fiji Islands. Our present knowledge of this intense storm rests largely upon the facts contained in a series of reports submitted to the Weather Bureau by Mr. J. H. Berendsen, second officer of the American steamship *Golden Rod*, en route from Sydney, New South Wales, toward the Hawaiian Islands and San Francisco, via the Fijis. In addition to his own experiences, Mr. Berendsen kindly furnished radio messages received from other vessels and from Fijian and other land stations, including copies of hurricane warnings and advices transmitted from Suva.

The only additional report of the storm received was that of the British steamship *Waitemata*, Captain Jannay, Observer McCarry, Westport, New Zealand, to Vancouver. This vessel at midnight of the 10th, while at some distance south of the cyclone center, ran into whole southeasterly gales which persisted with incessant rain until 3 p. m. of the 11th when, to use the words of the observer, "the wind shifted to NE., reaching hurricane force, the ship being hove to in lat. 21° 45' S., long. 178° W., lowest barometer 29.26. About 2 a. m. of the 12th the wind shifted to ENE. and remained there throughout the day, the gale gradually decreasing in force."

The *Golden Rod* entered the extreme forward rim of the storm zone—which was many hundreds of miles in extent—with a southeasterly gale of force 7, near lat. 22° 23' S., long. 172° 39' E., on the afternoon of the 10th. Thence, though at no time close to the actual hurricane center, she had mostly rough seas and strong winds to strong or whole gales until she entered harbor on the 14th, at which time the storm had passed her and was central approximately 300 to 350 miles to the southward and was moving in the general direction of Norfolk Island.

The initial appearance of the storm, as gathered from the reports of the *Golden Rod*, seems to have been near the tenth parallel of south latitude to the southeastward of the Ellice Islands, although a radio message of Monday, December 8, leads one to the suspicion that it may have originated a few days earlier considerably to the north-eastward of the Ellice Group. Quoting this message:

The *Norwich City* went on reef and broke up last week at Garden Island in Phoenix Group. Eleven persons were drowned. The steamer *Lincoln Ellsworth* has 12 survivors aboard; the rest were picked up by some British steamer.

During its early days the cyclone was evidently traveling in a southwesterly direction, and on the 9th lay north or somewhat to the northwest of the Fijis. A report from the Norwegian steamship *Tyr*, at 8 p. m. of the 9th in lat. 16° 56' S., long. 176° 05' E., gave a southeast wind of force 10 and an atmospheric pressure of 29.33 inches. It was apparent on this date that the storm was curving into southward, and a report from Suva showed a barometer depressed to 29.56 inches, wind ESE., force 6.

On the 10th Suva sent out a report of a pressure of 29.39 inches, wind SE. by E., force 7 to 8, rainy and squally weather. At 8 a. m. the steamship *Pinna*, anchored in Nandi Bay, outside Lautoka, Fiji, reported a barometer of 29.18, wind SSE., 8. The storm had now recurved into southeast and was headed directly upon the Fiji Group.

At noon of the 11th the hurricane center was slightly north of Suva, where the barometer read 29.22, with a fresh southeast gale, and was moving upon Savu Savu, where at 12:40 p. m. a hurricane wind from northeast was raging, with barometer at 28.48.

On the 12th the hurricane, after passing Suva to the eastward, slowly recurved from southeast into south over the Koro Sea. Fresh to strong shifting gales were yet blowing at Suva, but the winds were diminishing rapidly at Savu Savu. At least one important line of communication—the land line to Levuka—was reported interrupted.

At 8:30 p. m. of the 13th Suva reported the storm as well to the southward, now apparently heading south-southwest. The Danish motor ship *Jane Maersk*, in 23° S., 178° E., at 8 p. m., with a barometer of 29.33, rising, was experiencing a south wind of force 11, which attests to the violence of the cyclone at this time.

THREE TROPICAL CYCLONES OF THE SOUTH PACIFIC OCEAN, 1927-28

By WILLIS E. HURD

His Excellency the Governor of New Caledonia, at Noumea, in a recent communication to the Hydrographic Office, which was forwarded to the Weather Bureau, inclosed data relative to three tropical disturbances in the South Pacific Ocean which occurred during the period December, 1927, to May, 1928.

The earliest was experienced at the beginning as a fresh northeast gale, pressure 29.33 inches, at Port Vila, Elate Island, in the New Hebrides Group, on the afternoon of December 29. Fresh to strong north gales occurred during the early hours of the 30th, with barometer dropping to a minimum of 29.13. At 10 a. m. the wind went into northwest, force 10, with rising pressure, as the cyclone passed the island to the westward, and after 2 p. m. the force lessened. The storm, which was encountered with moderate severity by the steamships *Makambo* and *Cassiopec*, proceeded in a south-southeasterly direction across the Loyalty Group midway between the New Hebrides and New Caledonia, the center passing a short distance east of Noumea at 2 a. m. of the 31st. It crossed Walpole Island at 10 a. m. and continued on the southward of the Fijis during January 1.

The cyclone of February 8-9, 1928, was of considerable violence over some portions of the New Hebrides Group, in particular devastating the south end of Santo Island and the northern part of the close-lying island of Aore, where it badly damaged buildings and broke down or uprooted the palm trees. At Lunganville, on the south-east of Santo, the barometer dropped from 29.84, at 7 p. m., to 28.78 inches, at 9 p. m. of the 8th, the wind at both hours being from east-southeast. The cyclone approached from the eastward, the center crossing five islands of the group, then going in a southwesterly

direction toward New Caledonia. It appears to have been of no great width, since at Port Vila, New Hebrides, the barometer remained in the neighborhood of 760 millimeters (29.92 inches).

The third disturbance was that of May 14-15 over and in the vicinity of the Society Islands. It passed slightly east of Tahiti, the largest island of the group and, proceeding south then southeast, became lost to observation. The steamship *La Bretagne* entered the storm area at some distance south of Tahiti about 1 p. m. of the

14th with increasing southeast wind and lowering barometer. At midnight the wind shifted to south, force 9, pressure 29.00 inches, and at 3:30 a. m. of the 15th the vessel passed through the eye of the cyclone. At this time a few stars were visible. From 10 p. m. of the 14th until 4 or 5 a. m. of the 15th the barometer oscillated rapidly between 28.98 and 29.13 inches. At 7 a. m. the south wind decreased in force, and at 1 p. m. changed to southwest with squalls of lessened violence, pressure rising in a few hours to 29.96 inches.

CLIMATOLOGICAL TABLES

CONDENSED CLIMATOLOGICAL SUMMARY

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Condensed climatological summary of temperature and precipitation by sections, December, 1929

Section	Temperature								Precipitation					
	Section average	Departure from the normal	Monthly extremes				Section average	Departure from the normal	Greatest monthly		Least monthly			
			Station	Highest	Date	Station			Lowest	Date	Station	Amount	Station	Amount
	°F.	°F.	°F.			°F.		In.	In.		In.	In.		
Alabama	45.6	-1.7	2 stations	81	19	St. Bernard	-4	24	3.72	-1.13	Robertsdale	6.57	2 stations	2.15
Arizona	47.5	+3.7	Supai	85	14	Payson	-3	22	0.14	-1.25	2 stations	0.91	66 stations	0.00
Arkansas	44.4	+1.9	Hope	82	12	Dutton	-5	20	3.84	-0.21	El Dorado	5.88	Jonesboro	1.51
California	49.7	+4.7	Santa Ana	90	29	Portola	4	31	4.61	+0.37	Kennett	35.84	57 stations	0.00
Colorado	28.6	+3.8	2 stations	75	10	Dillon	-28	22	0.26	-0.83	Silver Lake	2.03	11 stations	0.00
Florida	59.1	-0.6	Venus	90	8	Garniers	14	20	2.84	-0.02	Miami	9.03	La Belle	0.79
Georgia	46.7	-0.9	Millen	84	16	Tallapoosa	7	24	3.70	-0.56	Fargo	5.46	Atlanta	1.77
Idaho	32.6	+6.8	Hazelton	75	13	Felt	-12	21	3.07	+0.83	Roland	11.25	Sugar	0.23
Illinois	30.8	+0.3	Sparta	74	12	Danville	-11	3	2.32	+0.08	Carbondale	5.57	Morrison	0.46
Indiana	31.2	-0.9	Columbus	71	31	Marengo	-15	3	3.93	+1.03	Veedersburg	6.85	Plymouth	1.25
Iowa	24.8	+0.7	Guthrie Center	67	30	2 stations	-16	19	0.39	-0.75	Burlington	1.21	Glenwood	0.03
Kansas	34.7	+3.1	Richfield	79	10	Oberlin	-6	20	0.19	-0.75	Pittsburg	0.85	12 stations	0.00
Kentucky	39.1	+1.6	Greenville	76	16	Eubank	-15	3	2.73	-1.30	Grayson	4.56	Pikeville	1.38
Louisiana	50.7	-1.6	New Orleans (No. 2)	83	13	Plain Dealing	-1	23	4.27	-0.98	Abbeville	8.06	Burrwood	1.46
Maryland-Delaware	36.9	+1.8	Salisbury, Md.	75	15	2 stations	-6	1	2.45	-0.86	Wilmington, Del.	3.84	Chewsville, Md.	1.21
Michigan	23.6	-1.2	L'Anse	51	30	2 stations	-21	1	2.31	+0.16	Trowbridge	5.10	Seney	0.54
Minnesota	13.7	-0.8	2 stations	51	24	Red Lake Falls	-38	18	0.58	-0.18	Fosston	2.25	Worthington	0.03
Mississippi	47.0	-0.7	7 stations	81	2	Duck Hill	-4	23	3.66	-1.91	Rosedale	5.81	Water Valley	1.45
Missouri	35.2	+1.3	Rolla	76	11	Jackson	-9	3	1.66	-0.41	Poplar Bluff	5.46	Oregon	0.15
Montana	22.9	+0.7	Chinook	73	29	Glasgow	-47	18	1.82	+1.05	Heron	8.36	Ekalaka	0.12
Nebraska	29.0	+3.2	Sidney	80	14	Butte	-18	18	0.08	-0.68	Tekamah	0.78	24 stations	0.00
Nevada	39.5	+5.1	Las Vegas	78	29	San Jacinto	-6	13	0.75	-0.17	Marlette Lake	5.99	9 stations	0.00
New England	25.5	-1.1	Nantucket, Mass.	58	18	2 stations	-25	12	3.66	+0.28	Kingston, R. I.	6.01	Bar Harbor, Me.	1.21
New Jersey	33.8	+0.9	2 stations	68	15	do	2	12	3.01	-1.08	Woodcliff Lake	4.34	Asbury Park	1.00
New Mexico	36.1	+2.4	Richland	82	31	Elizabethtown	-28	21	0.12	-0.63	Clouderoft	0.62	9 stations	0.00
New York	26.6	0.0	Oneonta	63	19	Indian Lake	-28	12	3.71	+0.73	High Market	6.93	Lauterbrunnen	1.71
North Carolina	43.3	+0.9	2 stations	79	15	Brevard	-7	24	3.06	-0.95	Hatteras	5.87	Marshall	1.15
North Dakota	12.5	-0.5	Park River	59	30	Dunn Center	-38	18	0.81	+0.27	Cando	2.10	Amenia	0.10
Ohio	31.8	+0.6	Ironton	71	13	Wauseon	-4	20	3.41	+0.58	Marion	5.42	Portsmouth	1.86
Oklahoma	42.8	+3.6	5 stations	80	10	2 stations	-7	19	0.90	-0.76	Antlers	5.56	7 stations	0.00
Oregon	39.7	+5.3	2 stations	72	29	Danner	-6	3	8.13	+2.95	Valsetz	23.18	Andrews	0.35
Pennsylvania	32.2	+1.1	Hanover	70	14	Brookville	-9	1	2.77	-0.46	Clearfield	4.95	Newell	1.21
South Carolina	46.0	-0.5	Summerville	81	16	Caesars Head	5	20	4.14	+0.61	Caesars Head	6.24	Winthrop College	2.39
South Dakota	20.9	+1.3	2 stations	64	14	Strool	-30	18	0.24	-0.40	Hardy Ranger Station	1.09	2 stations	0.00
Tennessee	41.2	+0.7	Moscow	75	14	2 stations	-5	3	3.11	-1.42	Dresden	4.87	Altamont	1.40
Texas	49.8	0.0	2 stations	89	19	Junction	-11	22	1.69	-0.47	Nacogdoches	7.39	9 stations	0.00
Utah	33.4	+6.7	Springdale	71	15	Woodruff	-21	21	0.38	-0.80	Silver Lake	1.73	8 stations	0.00
Virginia	40.0	+2.0	Pedlar Dam	76	15	Burkes Garden	-8	1	2.11	-1.08	Randolph	3.30	Runnymede	0.90
Washington	35.5	+3.2	Lowden	67	9	Stockdill Ranch	-2	20	6.11	+0.42	Big Four	29.13	Ephrata	0.59
West Virginia	36.6	+3.1	Moorefield	73	14	Pickens	-13	1	2.51	-0.79	Bruceston Mills	5.59	Upper Tract	0.59
Wisconsin	20.3	+0.3	High Falls	59	30	2 stations	-25	19	0.73	-0.60	Brule Island	2.50	Amery	0.11
Wyoming	26.3	+5.9	Dull Center (near)	69	13	Riverside	-28	21	0.49	-0.27	Snake River	2.86	2 stations	0.00
Alaska (Nov.)	22.4	+7.3	2 stations	60	1	Barrow	-36	28	4.18	+1.48	Chignik	27.99	Barrow	0.10
Hawaii	69.2	-0.7	Kaanapali	89	12	Kula Sanitarium	41	27	15.92	+5.53	Eke	52.32	Waialua	0.00
Porto Rico	74.4	-0.5	San German	93	28	Guineo Reservoir	47	26	3.68	-1.17	Rio Grande	15.99	Coamo	0.26

1 For description of tables and charts, see REVIEW Jan. 1929, p. 36.

2 Other dates also.