

F I J I M E T E O R O L O G I C A L S E R V I C E

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TROPICAL CYCLONE REPORT 92/3

TROPICAL CYCLONE TIA

14 - 21 NOVEMBER 1991

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Note: Tropical Cyclone Reports are intended to be quickly available, preliminary, descriptive reports for public use. Their early issue means that details may be subject to subsequent correction.

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FIJI METEOROLOGICAL SERVICE

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Introduction

"Tia" was not a particularly intense tropical cyclone. Associated maximum average winds probably did not exceed 75 knots and fortunately, apart from some small islands, no major inhabited areas lay directly in the track of the cyclone. Unusual features of its track were two abrupt changes in direction, one during its development phase, the other towards the end of its life-cycle.

Tia developed on the 16th of November 1991 from a small depression that originated in the Solomon Islands two days earlier. The cyclone initially moved eastwards at about 05 knots and then southwestwards as it intensified rapidly, reaching storm strength about 0000 UTC* on the 17th and hurricane intensity about 1500 UTC on the 17th. The presence of hurricane force winds was confirmed when the automatic weather station on Anuta Island, in the Solomons, reported winds averaging 65-70 knots between 1500 and 2100 UTC on the 17th. The cyclone passed about 30 nautical miles to the west of this island around 1800 UTC on the 17th and close to Tikopia about 1800 UTC on the 18th.

More than 1,000 people were made homeless during the passage of Tia through the easternmost islands of the Solomons Group (Tikopia and Anuta), but there was no report of loss of life. On Tikopia, which bore the brunt of the cyclone, 160 out of the 180 houses were destroyed. In Vanuatu, damage was minimal and confined mainly to fruit trees on islands in the north of the group. One case of slight injury by flying corrugated iron was reported.

History

The first indications of a cyclonic circulation developing were on 13th November. At this stage satellite imagery and peripheral surface observations showed that a small tropical depression had developed in the Solomons area, over the sea, just to the east of Malaita Island. Surface winds close to the depression at this stage were estimated to be no more than 20 knots, but with the system lying under an area of light winds in the upper troposphere and sea-surface temperatures around 30C, further development of the depression was expected.

*UTC - Co-ordinated Universal Time (same as Greenwich Mean Time)

During the next three days the depression moved eastwards at between 05 and 10 knots. By the 15th, satellite imagery showed a marked increase in cloud organisation and curvature, with the system becoming more symmetrical and winds already estimated to be averaging between 25 and 30 knots close to the centre. By 0600 UTC on the 15th an upper outflow pattern had developed over the depression favouring intensification. On the 16th the depression acquired tropical cyclone characteristics with central pressure estimated to have fallen below 998 hPa and winds increasing to 35 knots near the centre. The system was named "Tia" by the Nadi Tropical Cyclone Warning Centre (TCWC) at 0103 UTC that day. At that time Tia was located near latitude 8 decimal 5 degrees South and longitude 171 degrees East, or about 250 nautical miles northeast of Santa Cruz Islands in the Solomons Group. By 1200 UTC on the 15th the cyclone had become slow-moving while continuing to intensify. It then started to move slowly towards the southwest, partly under the influence of a light northerly upper-level windflow, and rapidly reached storm intensity by about 1800 UTC on the 16th and hurricane intensity by 0000 UTC on the 17th. Tia passed about 30 nautical miles to the west of Anuta Island around 1800 UTC and close to nearby Tikopia (12.3S 168.8E) about 0000 UTC on the 18th. Maximum intensity of the cyclone was probably reached about this time, with estimated maximum average winds near the centre about 75 knots and movement towards the southsouthwest at about 10 knots. At this time the radius of storm force winds was estimated to be about 60 nautical miles. At no time was the radius of gales estimated to be more than 150 nautical miles from the centre of the cyclone.

During the next 24 hours Tia entered an area of strengthening upper-level northerly winds and started to curve more towards the south at about 10 knots, passing about 80 nautical miles east of Banks Island in the Vanuatu Group around 1200 UTC on the 18th and about 80 nautical miles east of Ambae, Epi and Tongoa Islands, also in Vanuatu, about 1800 UTC that same day.

The cyclone then started to turn towards the southeast under the influence of increasing upper-level northwest winds, thus strengthening vertical wind shear which gradually weakened the system. Satellite imagery suggested weakening of the system and the cyclone was downgraded to storm intensity by 0600 UTC on the 19th and to gale twelve hours later. The system became slow-moving about 200 miles east of Port Vila at 0000 UTC on the 20th. It then moved northwestwards and was subsequently downgraded to a tropical depression at 1200 UTC on the 20th. During its dying stages, it crossed the earlier part of its track just east of Vanuatu at a point where it had been a hurricane just two days previously.

Warnings and Advisories

The first international marine warning on the system was issued from Nadi at 2130 UTC on 14th November, when it was still a tropical depression and lying some 100 nautical miles north of Santa Cruz Islands. At that time average winds were estimated at 25 to 30 knots close to the centre and expected to increase to 35 knots within the next 12 hours. In fact, it took a little over 24 hours for the disturbance to reach gale

intensity, being upgraded to tropical cyclone status and named "Tia" at 0100 UTC on the 16th. At 0120 UTC on the 16th the first storm warning on Tia was issued. The abrupt change in direction of movement on the 16th was handled satisfactorily in the warning bulletins.

As Tia showed signs of further rapid intensification, the warning was upgraded to that of a hurricane at 0115 UTC on the 17th. At that time maximum average winds were estimated at 55 knots and expected to reach 65 knots within the next 12 hours. In fact, Tia first reached hurricane intensity 18 hours later, around 1800 UTC on the 17th. Subsequent warnings were adjusted accordingly as Tia reached peak intensity around 0000 UTC on the 18th, maintained this intensity for about 18 hours, and then began a rapid weakening trend. The cyclone was downgraded to storm status at 0715 UTC on the 19th, to gale at 2015 UTC on the 19th and to a tropical depression at 0715 UTC on the 20th. Nadi issued the final international marine warning on the system at 1915 UTC on the 20th after which the winds dropped to below gale force.

Tropical Disturbance Advisories

The Nadi TCWC started issuing tropical disturbance advisories on the system from about the same time as its first international marine warning on the depression. They were issued at approximately 12-hourly intervals, around 0800 and 2000 UTC. They were tailored for the requirements of the various meteorological offices in the region and contained information additional to the contents of the warnings. Altogether, 13 tropical disturbance advisories were issued by the Nadi TCWC on Tia.

Bulletins on Tia were also issued by various other warning and advisory centres including the Joint Typhoon Warning Centre (JTWC) in Guam and the Satellite Centre in Honolulu. Bracknell also supplied data on the cyclone derived from their global model.

Special Advisories

Solomons

The first Special Advisory (SA) for the Solomon Islands was issued at 2200 UTC on the 14th of November when the system was in its early stages of development and located about 100 nautical miles north of Reef Is. in the Santa Cruz in the Solomons Group. The advisory mentioned that Duff Islands, Santa Cruz Islands and Anuta were under tropical cyclone threat with winds becoming strong and possibly reaching gale force in some areas within the next 24 to 36 hours. In SA numbers two to four issued at approximately six hourly intervals, the threat was maintained although the depression had been moving slowly eastwards on a track that appeared to be taking the system well away from those islands. However, with continued eastward movement of the system, it was stated in SA number five (issued at 1930 UTC on the 15th): "On its current track (the depression) does not now appear to pose any immediate threat to any part of the Solomons Group. This will be the final Special Advisory for the Solomons unless there is any change in the situation."

The situation did indeed change 36 hours later after the system, now approaching hurricane intensity and named Tia, had changed direction and was heading southsouthwestwards. In SA number six, issued at 0800 UTC on the 17th, it was stated that Anuta Island could be under direct threat and could experience gales or stronger winds from the cyclone in the next 24 hours. It was also indicated that as the cyclone intensified, the area of gales were expected to increase and this could cause gale force winds over Duff Island also. This message was repeated in SA number seven issued at 1345 UTC on the 17th, and at about the same time advice was received from the Solomon Islands Meteorological Service that it had issued tropical cyclone warnings for Anuta, Tikopia and Duff Islands.

Three further Special Advisories were issued for the Solomons as the cyclone moved through the easternmost islands of the Group, and then steadily moved away. The final advisory, number 10, was issued at 0730 UTC on the 18th.

Vanuatu

The first Special Advisory (SA) for Vanuatu was issued at 1930 UTC on the 17th November when it had become evident that the continued southsouthwest movement of Tia would bring the cyclone sufficiently close to Banks Island to cause storm force winds there and gales over Torres later. Essentially, similar advice was given approximately six hours later in SA number two.

In SA number three issued at 0730 UTC on the 18th, with the cyclone now starting to turn more towards the south, it was stated that on its projected track Tia was expected to be located within 40 nautical miles east of Pentecost Island around 1800 UTC on the 18th, and in SA number four issued at 1300 UTC on the 18th, it was expected to be located within 60 nautical miles east of Epi around 0300 UTC on the 19th. In the next two advisories it was stated that the cyclone was expected to weaken and curve towards the southeast. The final SA, number 6 was issued at 0130 UTC on the 19th.

Effects

Fortunately, apart from some small islands, no major inhabited areas lay in the path of Tia. However, hurricane force winds wrought much damage on the two eastern-most islands of the Solomons Group, namely Tikopia and Anuta. Tikopia, which sustained most damage, was declared a disaster area by the Solomon Islands National Disaster Council.

Maximum winds reported during the history of the cyclone was 72 knots, with gusts up to 93 knots, recorded at the automatic weather station 91548 on Anuta Island between 2000 and 2100 UTC on the 17th. The lowest pressure of 987.9 hPa was reported at Anuta only a few hours before the strongest winds were experienced.

The maximum average wind reported in Vanuatu was only 22 knots, at station 91568 (Aneityum) at 0400 UTC on the 19th, but gusts of 35 knots were reported at station 91555 (Malakula) at 1800 UTC on the 18th.

Solomons

Reports from Tikopia confirmed that, although miraculously there was no loss of life, more than 1,000 people were left homeless on the island as a result of the cyclone. Ninety percent of all dwellings were completely destroyed and the remaining ten percent either had walls destroyed or roofs blown off. The cyclone also destroyed seven of the eight church buildings and all but one of the classroom buildings belonging to the two primary schools. Food crops were completely destroyed with all coconut trees either blown down or uprooted. High seas and waves caused extensive damage to the coasts and flooded low-lying areas, salinating food crops such as taro, and destroying the water supply system on the island.

Estimates of the total cost of damage sustained in the Solomons were not available at the time of preparation of this report.

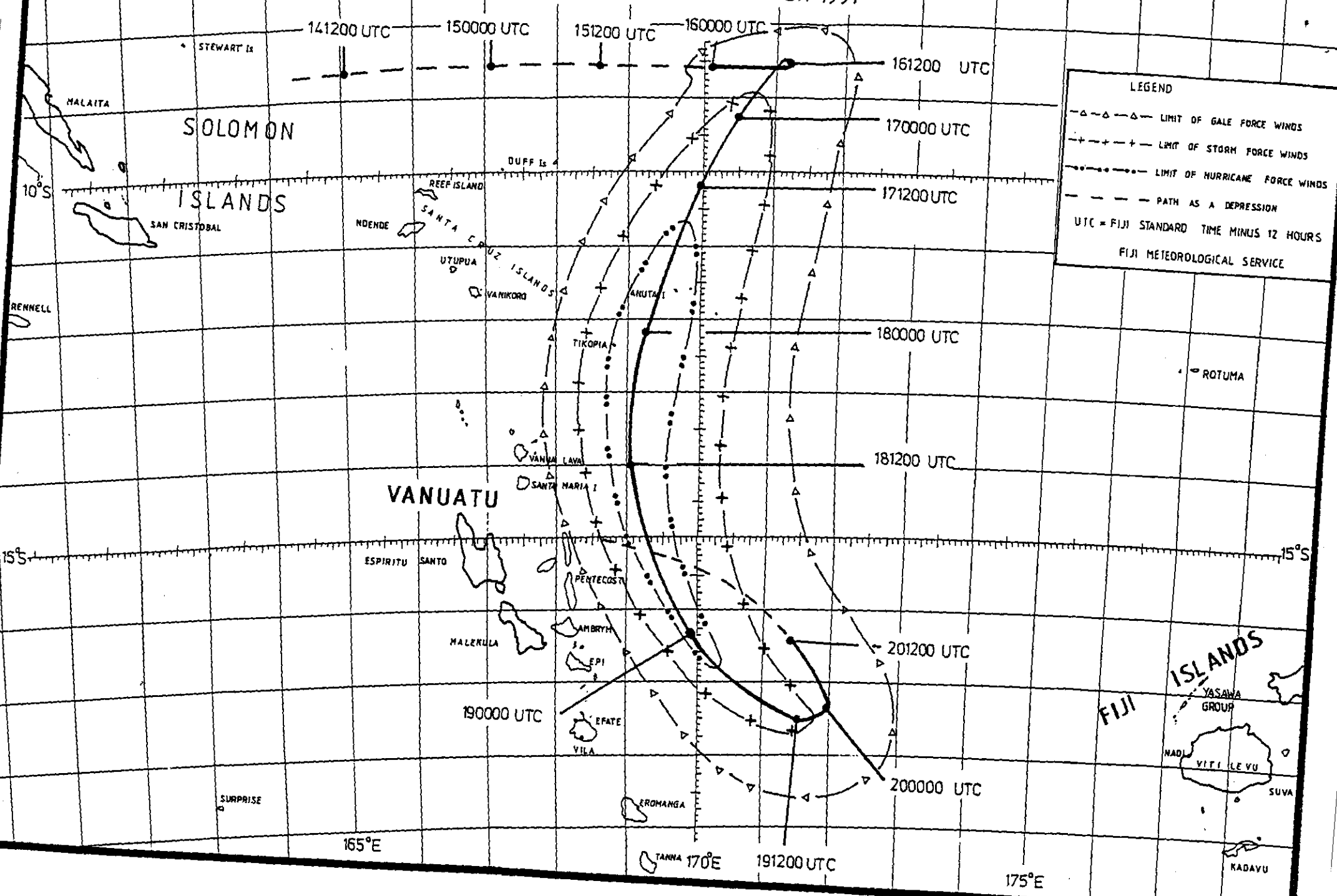
Vanuatu

In Vanuatu, damage was minimal and confined mainly to fruit trees on Banks and Torres Islands, and slight damage to fruit trees and old houses on Ambae, Epi and Tongoa Islands. On Mota (Banks Islands) one man was slightly injured by flying corrugated iron and a church building (bamboo construction) was flattened. Roads were blocked on Sola (Banks Islands). Estimates of the total cost of damage sustained in Vanuatu were not available at the time this report was prepared.

Conclusion

Tropical cyclone Tia was unusual in that it abruptly changed direction twice during its life cycle, thus making prediction difficult. Fortunately, most of its energy was expended over the open ocean and, consequently, apart from extensive damage on two small inhabited islands which lay directly in its path, the overall effect of the cyclone was minimal.

PRELIMINARY TRACK OF TROPICAL CYCLONE TIA 14-21 NOVEMBER 1991



LEGEND	
-△-△-△-	LIMIT OF GALE FORCE WINDS
+ + + + +	LIMIT OF STORM FORCE WINDS
•••••	LIMIT OF HURRICANE FORCE WINDS
- - - - -	PATH AS A DEPRESSION
UTC = FIJI STANDARD TIME MINUS 12 HOURS	
FIJI METEOROLOGICAL SERVICE	