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Preliminary Report on Tropical Cyclone "June" *3-5 May 1997*

Tropical Cyclone June was the 10th cyclone to occur in the Regional Specialised Meteorological Centre - Nadi (RSMC-Nadi) area of responsibility in the 1996/97 season.

A weak low pressure system was first analysed to the northwest of Rotuma early on 30 April. The system was drifting only very slowly southwestwards and remained poorly organised for the next three days. However, during this time, a very active convergence zone associated with this low was lying just north of Fiji and causing widespread rain over the Group. At the same time an intense high pressure system, located to the east of New Zealand, was directing fresh to strong easterly winds over the country and a strong wind warning was in force for all Fiji waters during the entire period.

On the afternoon of 2 May, the low pressure system began showing signs of improved organisation. The following night it underwent rapid intensification and began moving slowly towards the southeast even though most numerical guidance at this time was forecasting a general movement towards the southwest. Locating the exact position of the system during these early stages was difficult due to its location over the data sparse open ocean and its relatively poor organisation as seen on satellite imagery. This difficulty is not uncommon during the early stages of a tropical cyclone's development.

On the early morning of the 3rd, the Depression began accelerating towards the southeast and continued its rapid development. It was officially named "June" by RSMC-Nadi at 10:30am on the 3rd when it reached tropical cyclone status with sustained winds estimated at 63 km/hr (34 knots) completely surrounding the cyclone centre. Shortly thereafter, when the cyclone was still located some 600 kilometres (km) northwest of Nadi, Fiji was put on "Tropical Cyclone Alert" with the issuance of the first Special Weather Bulletin (SWB) at 11:00am. This bulletin indicated the cyclone's steady movement towards the southeast at 15 km/hr but the likelihood of it curving southwards and passing to the west of Fiji on the following day. This expected curvature was based on early numerical model guidance, but it was still felt prudent to place Fiji on Alert in the event that the cyclone maintained its southeast track. These sentiments were also expressed within the SWB.

During the early afternoon of the 3rd, the cyclone continued to intensify and was now moving towards the southeast at about 20 to 25 km/hr. Based on this latest information, a Gale Warning was issued for the Yasawa and Mamanuca Groups and for Northwestern Viti Levu at 3:30pm on the 3rd, while the Alert was maintained for the rest of Fiji. At this time, average winds near the centre were estimated at 75 km/hr (40 knots) with momentary gusts to 110 km/hr (60 knots). Rain over the whole of Fiji was expected to be widespread and heavy with flooding of low lying areas also forecast.

On the night of the 3rd, the cyclone became very difficult to track with the absence of visible satellite imagery. The cyclone also appeared to be slowing down which is often a precursor to a change in movement. Consequently, the forecast strategy of a continued but slower southeastward movement and an expected curve towards the south was maintained overnight. The main operational difficulties during this time were in determining the exact location of the cyclone centre and in reconciling the marked decrease in speed compared to the previous steady movement.

The Gale Warning was extended to Western Vanua Levu at 7:30am on the 4th when it was evident that the system was continuing to intensify and maintaining a persistent, albeit slow, southeast movement. Average winds near the cyclone centre were now estimated at 80 km/hr (43 knots) with momentary gusts to 120 km/hr (65 knots).

June first appeared on radar several hours later, some 280 km north-northwest of Nadi at the range limit of the radar. It was also evident that the cyclone was continuing to develop and average winds near the centre were estimated at 90 km/hr (50 knots) with momentary gusts to 130 km/hr (70 knots) in the SWB issued at 10:30am. The SWB also mentioned that the system had become slow moving, and it was because of this fact that the Gale Warning wasn't immediately upgraded to Storm category (≥ 48 knots) despite this criteria being met near the cyclone centre.

Around midday, it was clear that the cyclone was continuing to intensify and it once again began moving steadily towards the southeast. Consequently, the 1:30pm SWB mentioned a Storm Warning for the Yasawa Group with average winds up to 100 km/hr (55 knots) and gusts to 140 km/hr (75 knots) expected. A Gale Warning remained in force for the Mamanuca Group, Western Vanua Levu, and Northern and Western Viti Levu with the rest of Fiji remaining under an Alert.

During the late afternoon and early evening of the 4th, it became evident from radar and satellite imagery that the cyclone was beginning to lose some of its structure. This was the first indication that the cyclone was beginning to experience strong vertical shear and beginning to weaken. Consequently, in the 7:30pm SWB, the estimated average wind near the centre was eased slightly to 90 km/hr with gusts to 130 km/hr, but still remaining in the (marginal) Storm force category. The Storm Warning was extended to the Mamanuca Group whilst the Gale Warning was also extended to cover the whole of Viti Levu, Kadavu, Vatulele, Beqa and nearby smaller islands. These warnings were based on the cyclone's existing southeast movement.

In the early hours of the 5th, the cyclone began to weaken quite rapidly with its centre no longer detectable on radar and the system continuing to lose its definition. Both radar and satellite imagery indicated that the system was losing much of the deep convection near its centre which is typical of a cyclone undergoing strong shear. However, it is also normal for winds associated with a weakening tropical cyclone to decrease at a much slower rate than that suggested by radar and satellite imagery. Hence, the 1:30am and 4:30am SWBs maintained the previous strategy in terms of wind strength and the former slow southeast movement.

By 7am on the 5th, it was now clearly evident that the cyclone had weakened substantially overnight and that the centre had become almost stationary just north of Yasawa-i-rara. Consequently, the warnings previously in force were downgraded significantly in the 7:30am issue of the SWB with just a Gale Warning remaining in force for the Yasawa and Mamanuca Groups. Average winds near the cyclone centre were now estimated at 75 km/hr with momentary gusts to 110 km/hr. The Tropical Cyclone Alert was maintained for the rest of Fiji just in case the system re-intensified.

Soon after, reception of the first high-resolution visible satellite image for the day confirmed the rapid weakening of the cyclone and also indicated that June was now moving slowly towards the southwest. This change in direction, based on numerical model guidance, had been anticipated since the first SWB was issued, but it wasn't until this time that a sharp turn finally occurred. The estimated average wind speed near the cyclone centre was decreased slightly to 70 km/hr in the 10:30am SWB, and on this track the weakening cyclone was expected to only cause gales over the Yasawa and Mamanuca Groups and fresh to strong winds over the rest of Fiji. The Alert for the rest of Fiji was dropped from this SWB as it was now considered extremely unlikely that the cyclone would re-intensify. Although the cyclone was expected to pass relatively close to Western Viti Levu, its continued weakening meant that it was unlikely to cause gales over that region.

The cyclone maintained its general south to southwest movement during the afternoon of the 5th and the Gale Warning was dropped for the Yasawa Group in the 4:30pm SWB. Tropical Cyclone June was downgraded to a Tropical Depression around 6:00pm, although marginal gale force winds temporarily persisted in the Depression's southern quadrant. The final SWB was issued at 7:30pm in which the Gale Warning for the Mamanuca Group was cancelled. However, a Strong Wind Warning remained in force for the whole of the Fiji Group and an International Marine Warning to shipping was maintained until 6:00am the following day.

June provided many difficulties in anticipating the system's rapid intensification and weakening. The cyclone's erratic movement, particularly with regard to its acceleration and deceleration, and its sudden change in direction of movement, also proved challenging.

The first SWB for Fiji was issued at 11:00am on the 3rd May. Bulletins were issued 3-hourly from 7:30pm on the 3rd until the final issue at 7:30pm on the 5th. In total, 19 SWBs were issued for Fiji.

In addition, 14 International Marine Gale/Storm Warnings to shipping were issued 6-hourly from 1800 UTC 2 May until 1800 UTC 5 May and 5 Tropical Disturbance Advisories were issued 12-hourly to other National and Regional Meteorological Centres throughout the SW Pacific and beyond.

A summary of wind, pressure, and rainfall reports from synoptic stations is given in Table 1 and a post-analysed preliminary track of the cyclone is attached.

Table 1. Maximum Winds, Lowest Pressures, and Rainfall at Meteorological Stations.

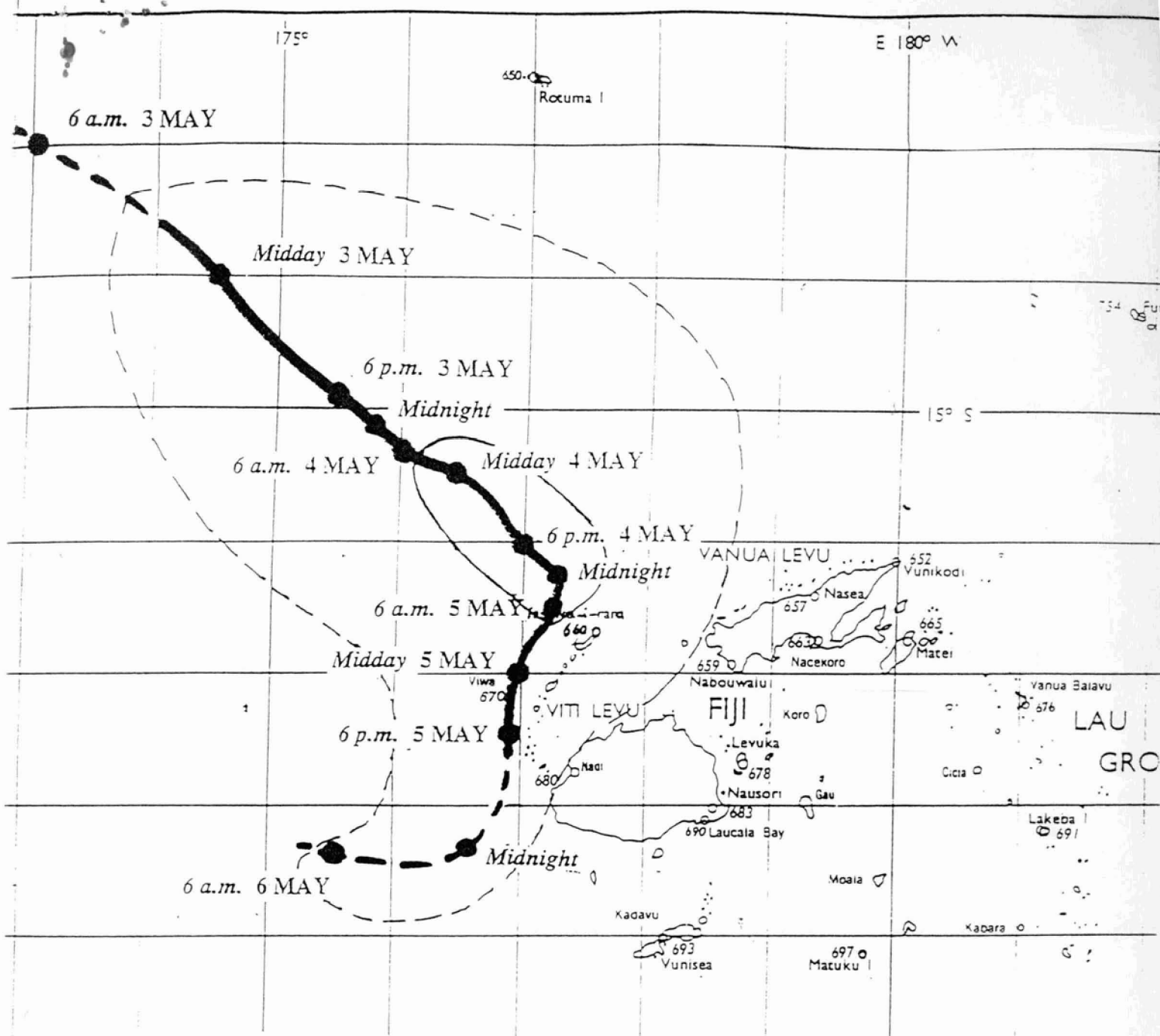
STATION	WINDS			PRESSURE		RAINFALL
	Maximum Average Wind Spd (knots [#])	Highest Gust (knots)	Date/Time (UTC*)	Lowest Pressure (hPa)	Date/Time (UTC)	72hr to 9am 6/5/97 (mm)
Yasawa-i-rara	45 (est)	60 (est)	04/1200	998.0	04/1500	113
Lautoka AWS [†]	29	39	05/0300	997.4	05/0300	
Nadi	23	38	05/0600	998.4	05/0300	62
Nabouwalu	25		04/0000	1001.3	04/0600	350
Udu Pt	20		04/1800	1003.6	04/1800	137 (48 hr)
Labasa	15		03/1800	1004.9	03/1800	216
Matei	20	30	03/1800	1004.2	04/1800	545
Nausori	25	40 (04/0600)	05/0600	1001.4	05/0600	119
Vunisea	25		05/0600	1003.7	05/0600	191
Lakeba	20		04/1500	1007.1	05/0600	136
Matuku	25		05/0600	1006.4	05/0600	149
Ono-i-lau	20		05/0600	1009.4	05/0600	98

[#] 1 knot = 1.853 km/hr

* UTC = local time minus 12 hours

[†] Operated by the National Tidal Facility, The Flinders University of South Australia

Note: Viwa station was not reporting during Cyclone June due to problems with the radio equipment caused by Cyclone Gavin.



Preliminary Track of
TROPICAL CYCLONE "JUNE"
 3-5 MAY 1997

LEGEND

- TROPICAL DEPRESSION STAGE
- TROPICAL CYCLONE STAGE
- Estimated Limit of Gale Force Winds*
- Estimated Limit of Storm Force Winds*

175°

E 180° W

Minerva Reef