



TONGA METEOROLOGICAL SERVICE
MINISTRY OF TRANSPORT
P. O. Box 845, Fua'amotu Airport, Tongatapu, TONGA

Meteorological Report on

TROPICAL CYCLONE "LIN"

3 – 5 April 2009

(prepared by Director of Meteorology)

INTRODUCTION

Tropical Cyclone "LIN" had its origin in a monsoonal trough that lay across the tropical South West Pacific from the Solomon Islands to the north of Fiji and stretching South East to the Southern Cooks. The cyclone developed from a tropical depression (TD14F) which formed in this monsoonal trough just north of Fiji. TD14F moved South East and intensified into a tropical cyclone on 4 April 2009 when it was 135km SSW of Niuafu'ou. Tropical Cyclone "LIN" then moved south along the Western side of the Tonga islands. The system was named by the Nadi Regional Specialized Meteorological Centre (RSMC) at 032030Z (09:30am on 4 April 2009 Tonga Time). Tropical Cyclone "LIU" was the 5th cyclone to develop in the South West Pacific Region in the 2008/2009 tropical cyclone season and the 2nd to affect Tonga during the same period.

WARNINGS

A total of 19 Special Weather Bulletins were issued by the National Weather Forecasting Centre Fua'amotu. 5 when the system was still a depression and 14 when it had tropical cyclone characteristics. Please refer to Table 1 for details of the Special Weather Bulletins.

TROPICAL CYCLONE WARNING SYSTEM

The NWFC Fua'amotu experienced power failure (mains) at 041636UTC (5:36am LT on 5 April). From that time till the end of the warnings NWFC Fua'amotu operated using a small portable 4.5KVA generator. This limited the Centre's capacity to operate in full capacity. 3 computers had to be switched off to enable enough power to operate the Emergency Weather Information Network (EMWIN) Satellite Receiver, TMS Server and one PC and a printer. Despite these difficulties, the internet was operational throughout and warnings were issued on time apart from SWB No. 18 where a delay of 40mins was experienced due to refueling of the manual generator and restarting all specialized equipment. All warnings were issued to A3Z Radio Tonga One, the National Emergency Management Office, disseminated via the TMS Website, email via the Tropical Cyclone mailing list and to Mariners via HF Radio. Mains power was restored at NWFC Fua'amotu at 050945UTC (10:45pm on 5 April 2009). Difficulties experienced from the Outer Island Meteorological Stations were also power related. Despite these, reports were received on a regular basis through HF radio and mobile phone.



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SPECIAL WEATHER BULLETINS

Table 1. Below shows the breakdown of warnings

SWB No.	Issue time (UTC)	System	Position of System		Time (UTC)	Bearings from nearest island	Type of Warning
			Lat.	Lon.			
1	022321	TD14F	14.6S	178.8E	1000am	522km W of NF	TC ALERT FOR ALL TONGA
2	030500	TD14F	15.0S	179.2E	0500pm	540km WNW of NF	TC ALERT FOR ALL TONGA
3	031100	TD14F	15.3S	179.5E	1000pm	510km WNW of NF	TC ALERT FOR ALL TONGA
4	031700	TD14F	15.8S	178.6W	0400am	318km W of NF	TC WARNING FOR NIUAS TC ALERT FOR REST OF TONGA
5	032000	TD14F	15.9S	178.5W	0700am	310km WSW of NF	TC WARNING FOR NIUAS TC ALERT FOR REST OF TONGA
6	032130	TC "LIN"	16.6S	176.4W	0900am	135km SSW of NF	TC WARNING FOR ALL TONGA
7	032330	TC "LIN"	17.6S	176.0W	1100am	200km S of NF	GALE WARNING FOR NIUAS STORM WARNING FOR REST OF TONGA
8	040140	TC "LIN"	18.0S	175.7W	0100pm	185km WNW of VV	GALE WARNING FOR NIUAS STORM WARNING FOR REST OF TONGA
9	040500	TC "LIN"	18.6S	175.5W	0500pm	175KM NW of TOFUA	GALE WARNING FOR NIUAS CANCELLED GALE WARNING FOR VV STORM WARNING FOR REST OF TONGA
10	040800	TC "LIN"	18.8S	175.6W	0700pm	150 WSW of VV	GALE WARNING FOR VV STORM WARNING FOR REST OF TONGA
11	041100	TC "LIN"	19.0S	175.2W	1100pm	120KM SW of VV	GALE WARNING FOR VV STORM WARNING FOR REST OF TONGA
12	041400	TC "LIN"	19.5S	175.5W	0100am	125KM WNW of LIFUKA	GALE WARNING FOR VV STORM WARNING FOR REST OF TONGA
13	041730	TC "LIN"	19.9S	175.4W	0400am	65KM WNW of NOMUKA	GALE WARNING FOR VV STORM WARNING FOR REST OF TONGA
14	042015	TC "LIN"	20.5S	175.5W	0800am	70KM NNW of TBU	GALE WARNING FOR VV STORM WARNING FOR REST OF TONGA
15	042300	TC "LIN"	21.0S	175.6W	1100am	30KM WNW of TBU	GALE WARNING FOR VV CANCELLED GALE WARNING FO HP/NMKA STORM WARNING FOR REST OF TONGA
16	040200	TC "LIN"	21.4S	175.1W	0100pm	10KM S of TBU	GALE WARNING FO HP/NMKA STORM WARNING FOR TBU/EUA
17	050600	TC "LIN"	22.5S	174.8W	0500pm	155KM SSE of TBU	GALE WARNING FO HP/NMKA CANCELLED STORM WARNING FOR TBU/EUA
18	050900	TC "LIN"	23.4S	174.8W	0700PM	245KM S of TBU	GALE WARNING FOR TBU/EUA
19	051045	TC "LIN"	23.6S	174.8W	1000PM	260KM S of TBU	CANCELLATION

Table 1. Breakdown of Special Weather Bulletins issued by NWFC Fua'amotu



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OBSERVATIONS

The Observations recorded by Meteorological Stations throughout Tonga during Tropical Cyclone "LIN" were as follows.

Station Name	Direction/Sustained Winds (10min ave.) (Knots)/Time (UTC)	Maximum Gust (Knots)/Time (UTC ¹)	Lowest Pressure Recorded (hPa)/Time (UTC)	24hr Rainfall recorded at 0000UTC
Fua'amotu	340/38KT/050000	56KT/050000	987hPa/042300	137mm (5 th)
Lifuka	330/40KT/042200	50KT/042200	998hPa/041600	95mm (5 th)
Lupepau'u	030/35KT/040800	50KT/040800	1001hPa/041500	118mm (4 th)
Keppel	330/20KT/040600	30KT/040600	N/A	57mm (4 th)
Niufo'ou	340/25KT/040100	35KT/040100	1000hPa/040100	153mm (4 th)

DAMAGES TO METEOROLOGICAL SERVICE PROPERTY AND EQUIPMENT

Damages to Meteorological Service property and equipment

NWFC Fua'amotu

<u>Item</u>	<u>Damage</u>	<u>Estimated Value</u>
1. Office guttering	Damaged from heavy rain	\$200TOP
2. Stevenson screen	Damaged from strong winds	\$1000TOP
3. HF Radio Antennae	Damaged from strong winds	\$300TOP

Vava'u Meteorological Station

<u>Item</u>	<u>Damage</u>	<u>Estimated Value</u>
1. Satellite Receiver Signal Processor	Damaged from lightning	\$500TOP

¹ UTC – Co-coordinated Universal Time (same as Greenwich Mean Time), Local time is 13hrs ahead of UTC



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CONCLUSION

Tropical Cyclone "LIN" was a Category 2 cyclone. Storm warnings provided for Tonga by NWFC Fua'amotu was for sustained winds of 60knots gusting to 80knots. The "eye" of the cyclone approached very close to the west of Tongatapu. Barometer and wind observations suggests that there may have also been a double "eye" wall with Tongatapu being affected partially by the inner "eye" wall and the calmness of the outer subsidence (outer eye) before being affected by the outer "eye" wall again as the cyclone moved south.

TRACK OF TROPICAL CYCLONE "LIN"

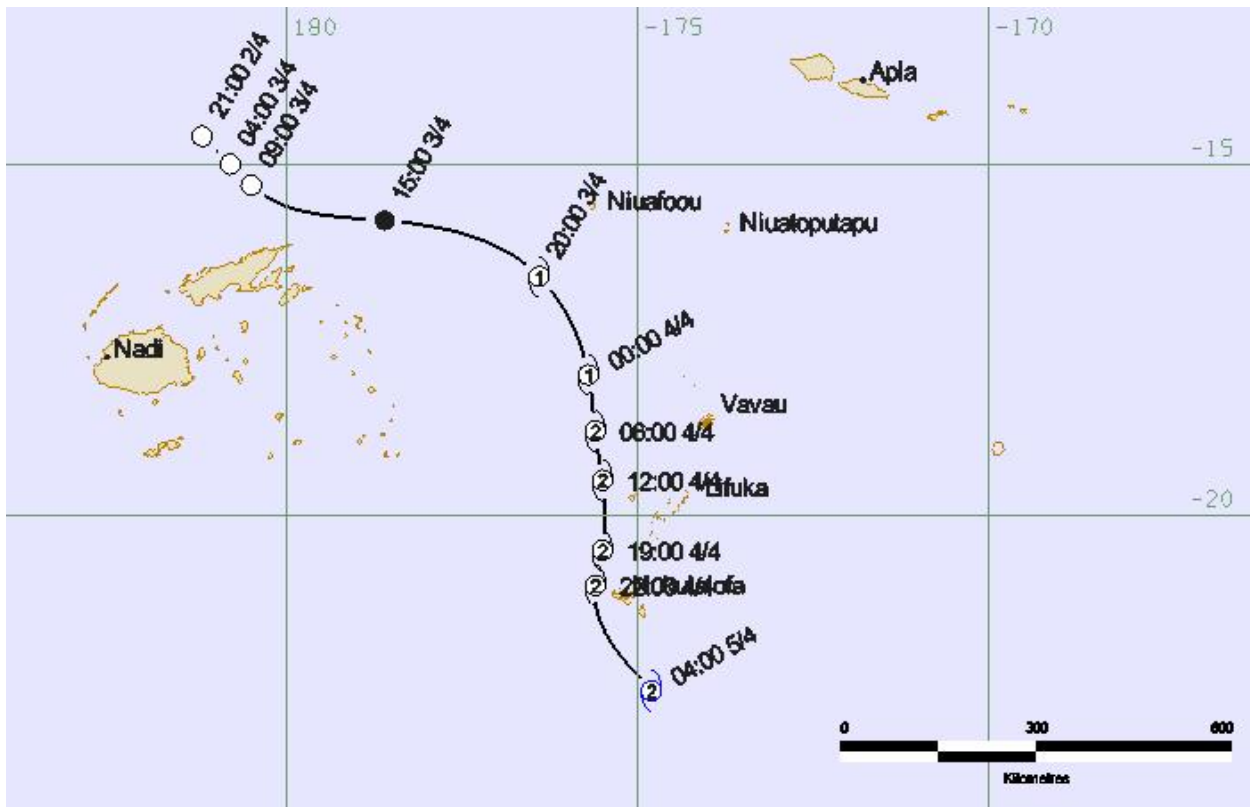


Figure 1. Track of Tropical Cyclone "LIN" plotted by NWFC Fua'amotu, Tonga Meteorological Service



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SATELLITE IMAGERY

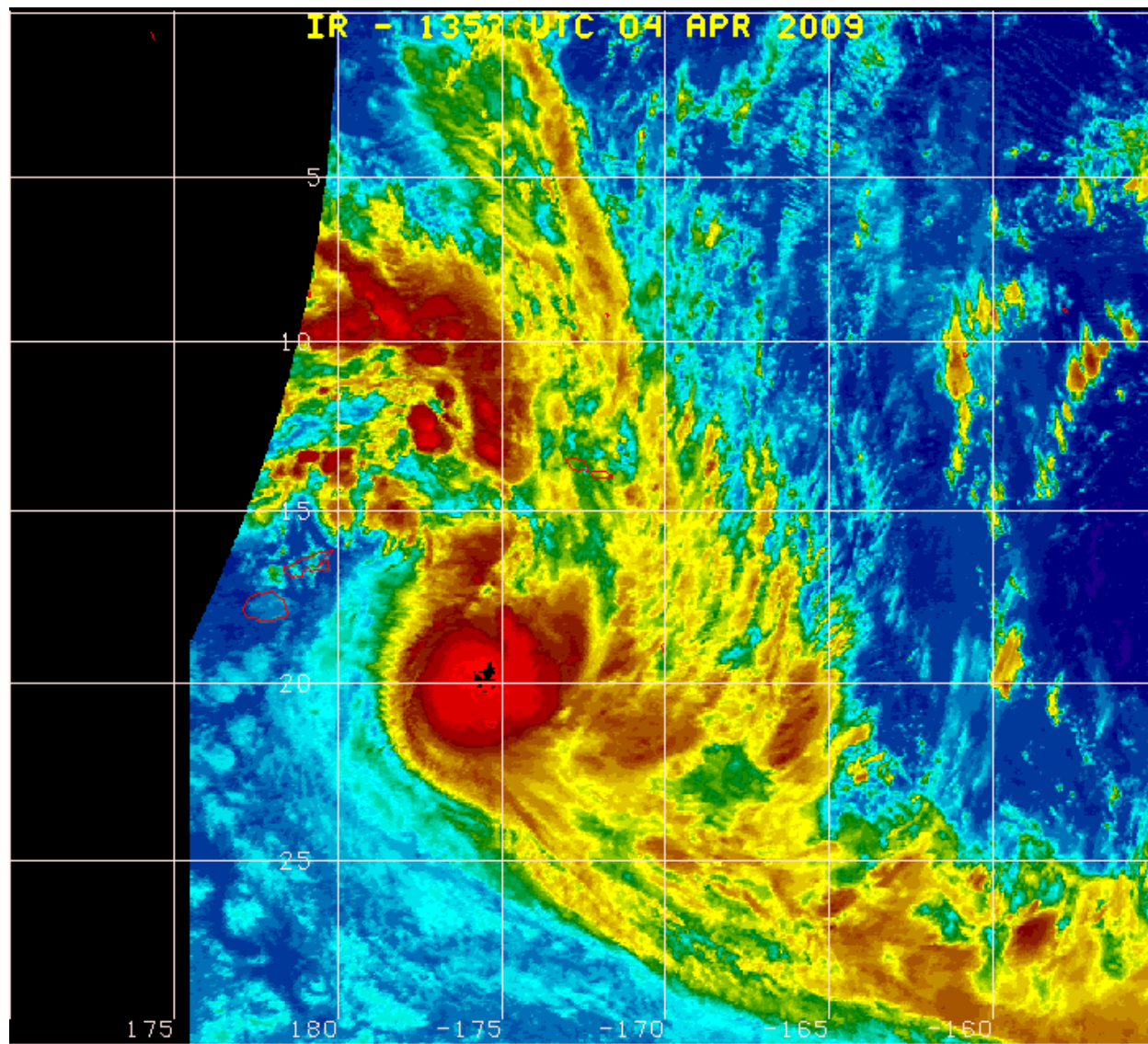


Figure 2. Infrared Satellite Image of Tropical Cyclone "LIN" taken from the GOES Meteorological satellite at 2:52am on 5 April 2009.



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