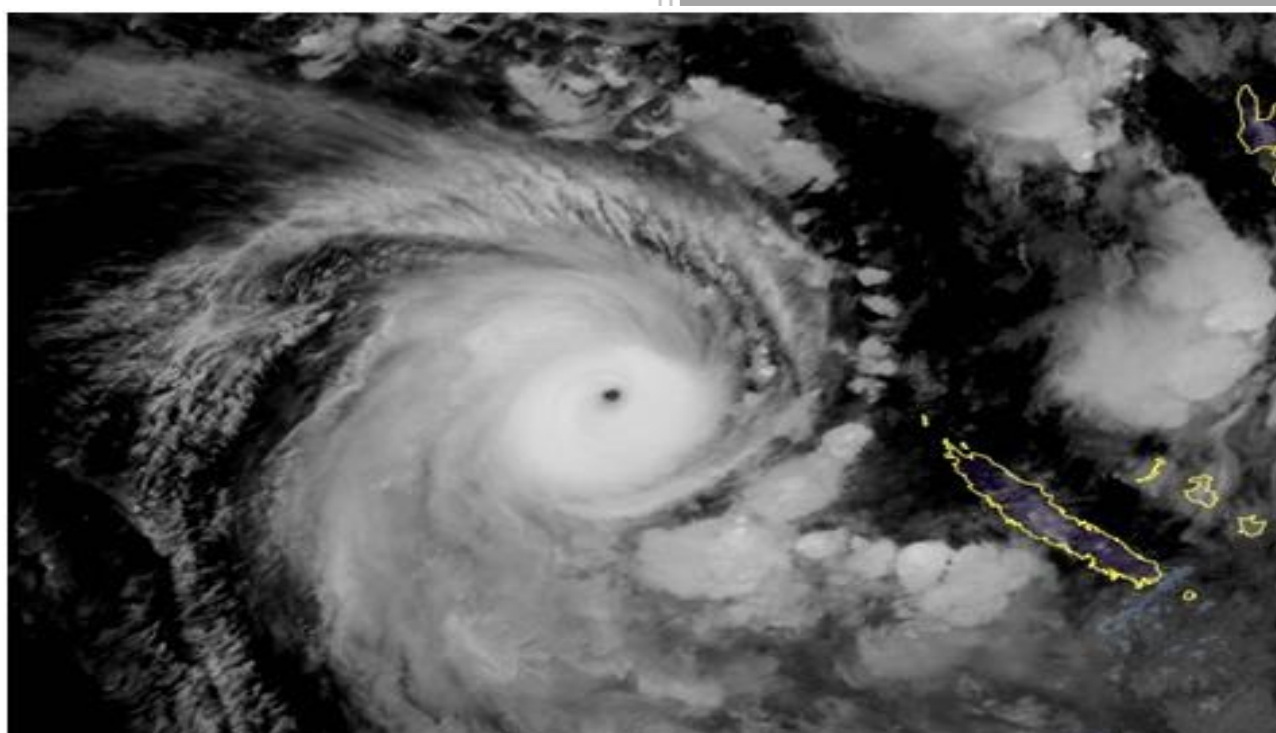


**FIJI METEOROLOGICAL
SERVICE**

2021

2nd to 7th March

**SEVERE TROPICAL CYCLONE
NIRAN REPORT**



Severe Tropical Cyclone "Niran" at 14:20 UTC on March 5, 2021.

Priya Singh

Scientific Officer NWFC

5/7/2021

ACKNOWLEDGEMENT

I would like to thank everyone who contributed to the completion of this preliminary report. A special thank you to:

- 1) Senior Scientific Officers Forecasting, Mr. Sakeasi Rabitu for firstly compiling TC Niran Summary followed by post event analysis, verification and providing discussion details of TC Niran track and data.
- 2) Senior Scientific Officer Forecasting Mr. Stephen Meke and Mr. Sakeasi Rabitu) for the monitoring of tropical cyclone Niran in the Nadi Area of Responsibility, analyzing observed meteorological data with numerical weather prediction models during TC Niran and the issuance of warnings accordingly.
- 3) NWFC scientific officers for assisting cyclones forecasters in answering phone calls, analyzing the environment of TC Niran and ensuring consecutive numbering in SIGMETS and warnings.
- 4) My family for supporting me during work from home to be able to compile this report.

For without their assistance this report would not be as comprehensive as it is.

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1. INTRODUCTION

Tropical Cyclone Niran developed on 2nd March 2021 and was named by Australian Bureau of Meteorology Tropical Cyclone Warning Centre. TC Niran moved into RSMC Nadi area of responsibility¹ on 05/1900UTC² and is the 6th tropical cyclone in the 2020/2021 TC season.

A tropical low was first analysed on February 26/1800UTC which became a tropical disturbance on February 28/1800 UTC that eventually became Tropical Cyclone Niran on March 02/0000 UTC.

On 3rd March, TC Niran intensified as it headed south-eastwards away from the north tropical coast of Queensland and became a severe tropical cyclone (category 3 strength). By 5 March it reached category 5³ strength with the development of a well-defined eye, well offshore of the Australian coast. STC Niran passed to the south of New Caledonia as a category 3 cyclone before weakening to an extra tropical strength. STC Niran did not have any impact on Fiji.

The Regional Tropical Cyclone Warning Centre at Nadi provided regular warnings, advisories on STC Niran. Hence, the following section of this report on STC Niran looks into the history of intensity and movement of Niran through the SW Pacific during the 1-7 March, 2021. The details of all the warnings and advisories issued for STC Niran are also given. An Appendix section provides some extra information on Cyclone Niran including verification statistics, track map, satellite image, and track details.

¹ RSMC Nadi's area of responsibility is between equator and 25S and between 160E and 120W.

² Universal Coordinated Time

³ The category system is based on the Australian Tropical Cyclone Category system. Category 1 cyclone has mean winds 34-47 knots, category 2 cyclone has mean winds 48-63 knots, category 3 cyclone has mean winds 64-85 knots, category 4 cyclone has mean winds 86-107 knots and category 5 cyclone has mean winds greater than 107 knots.

2. METEOROLOGICAL HISTORY

Conditions were favorable for the formation of Niran as it developed over the Coral Sea. Good upper divergence (Figure 1) with its corresponding satellite image (Figure 2). Good shear tendency (Figure 3) with the satellite image showing sharp temperature gradients about the eastern edge (Figure 5) and corresponding Ascat passes (Figure 4) & (Figure 6). Developing eye can be seen in the satellite images while still in Brisbane's AoR. (Figure 7) & (Figure 8).

Severe TC Niran (Category 5) was handed over to the Nadi Tropical Cyclone Warning Centre area of responsibility at 05/1900UTC from the Brisbane Tropical Cyclone Warning Centre after it moved east of 160E. STC Niran Category 5 was located near 19.9S 161.4E at 05/1800UTC (Figure 9). The fast moving system was moving east southeast. Maximum winds near the centre were estimated to be about 110 knots (205km/h). SSTs in the area was around 28-29 degrees Celsius. The system was south of the upper ridge and CIMMS analysis showed moderate to high shear aloft (Figure 10).

STC Niran weakened into a category 4 tropical cyclone at 06/0300UTC (Figure 11) and further weakened into a category 3 tropical cyclone at 06/0600UTC (Figure 12)

At 06/1800 UTC, Tropical cyclone Niran (Category 3) moved south of 25S latitude and exited Nadi RSMC's area of responsibility and was located near 25.7S 172.8E or about 405 nautical miles (750km) to the southeast of Noumea, New Caledonia. Maximum winds near the centre were estimated to be about 65 knots (Figure 13). The system was moving east-southeast and was weakening rapidly due to high shear as it moved into Wellington's, New Zealand area of responsibility (Figure 15)

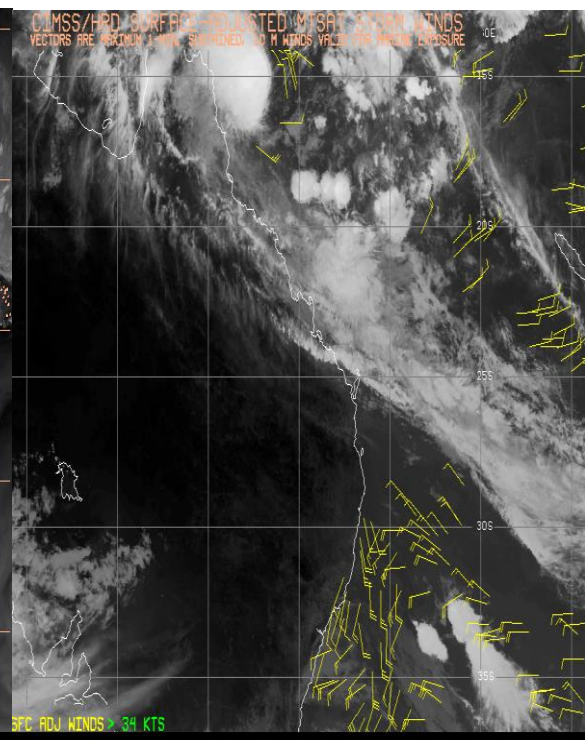
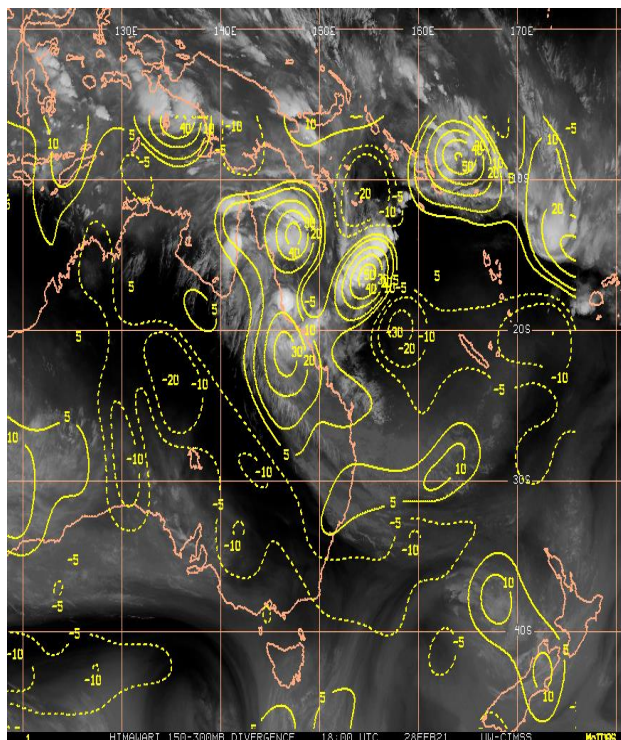


Figure 1⁴: Upper Divergence

Figure 2⁵: Satellite Image

4 Source: CIMSS Tropical Cyclone Data Archive

5 Source: CIMSS Tropical Cyclone Data Archive

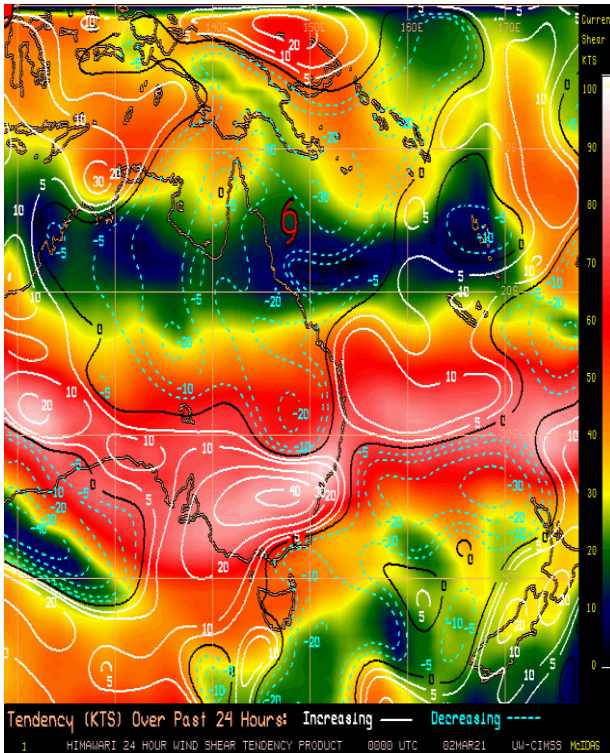


Figure 3⁶: Shear Tendency

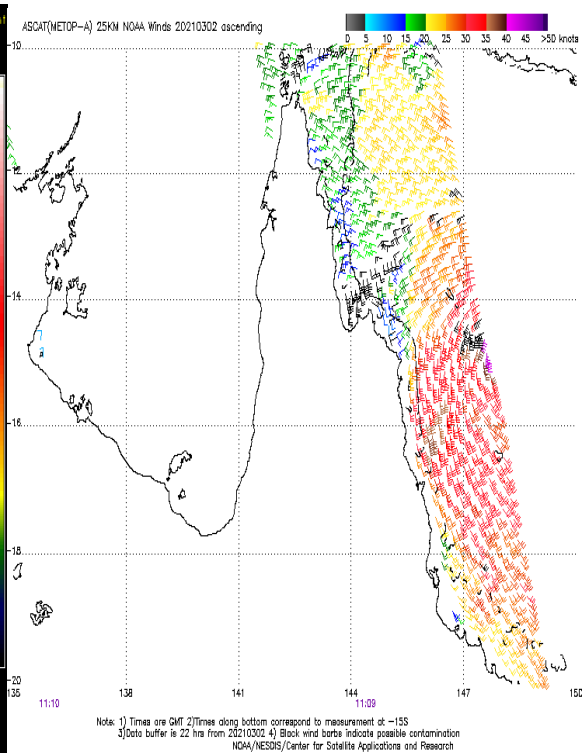


Figure 4⁷: Ascatt winds

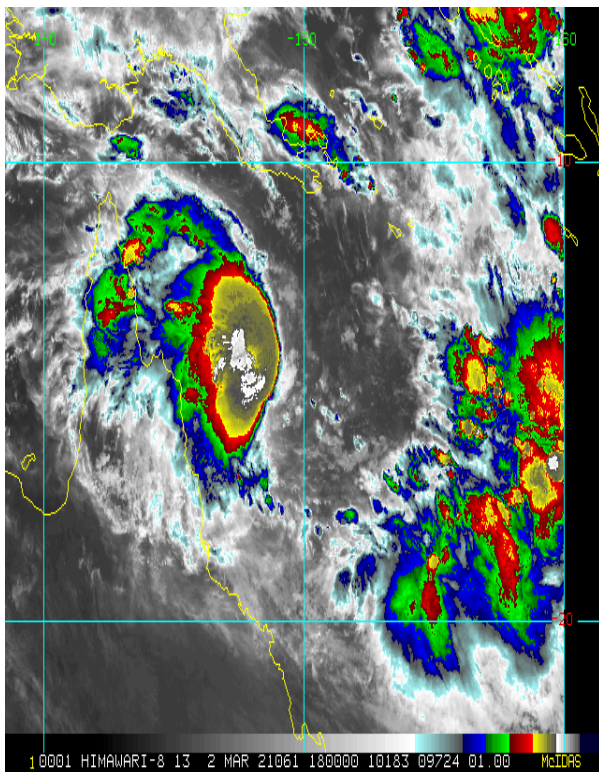


Figure 5⁸: Satellite images showing sharp temp gradients

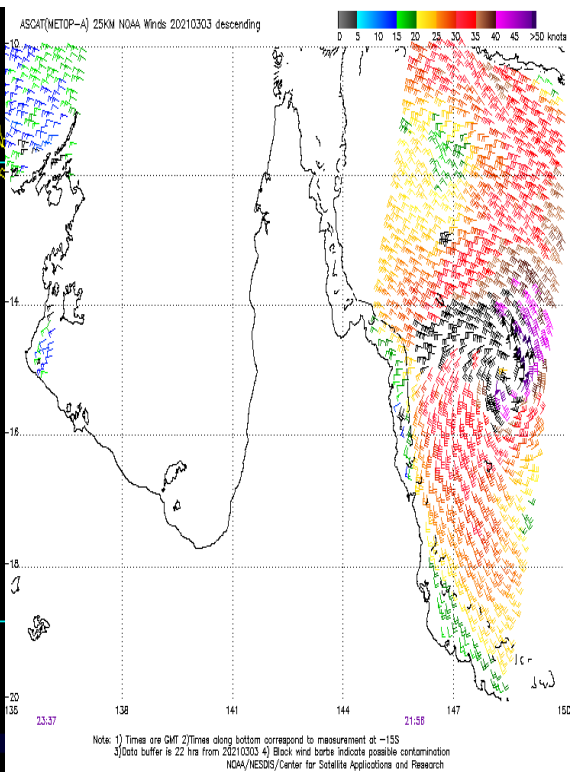


Figure 6⁹: Ascatt image

6 Source: CIMSS Tropical Cyclone Data Archive

7 Source: NOAA Centre for Satellite Application and Research: Advanced Scatterometer Data Archive

8 Source: CIMSS Tropical Cyclone Data Archive

9 Source: NOAA Centre for Satellite Application and Research: Advanced Scatterometer Data Archive

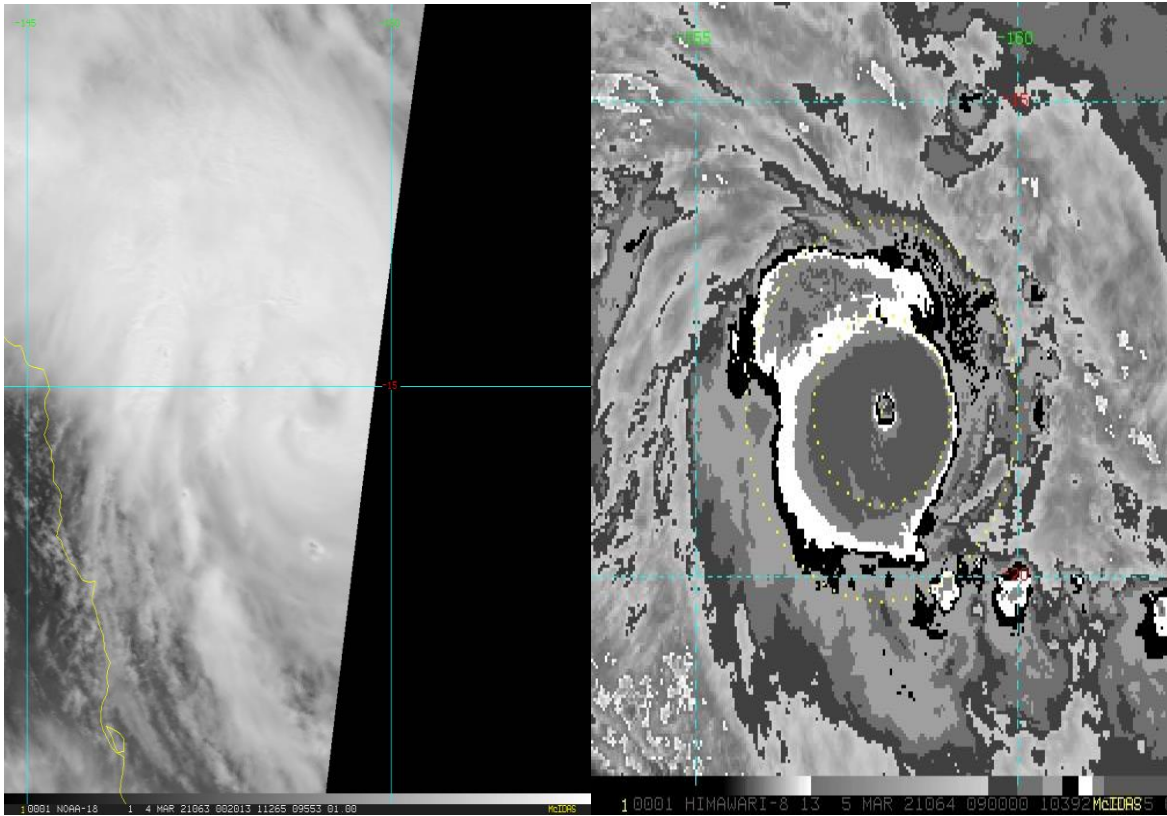


Figure 7¹⁰: Satellite image showing the formation of an eye Figure 8¹¹: Satellite image 5/1800 UTC

¹⁰ Source: NOAA CIRA Tropical Cyclone Archive

¹¹ Source: CIMSS Tropical Cyclone Data Archive

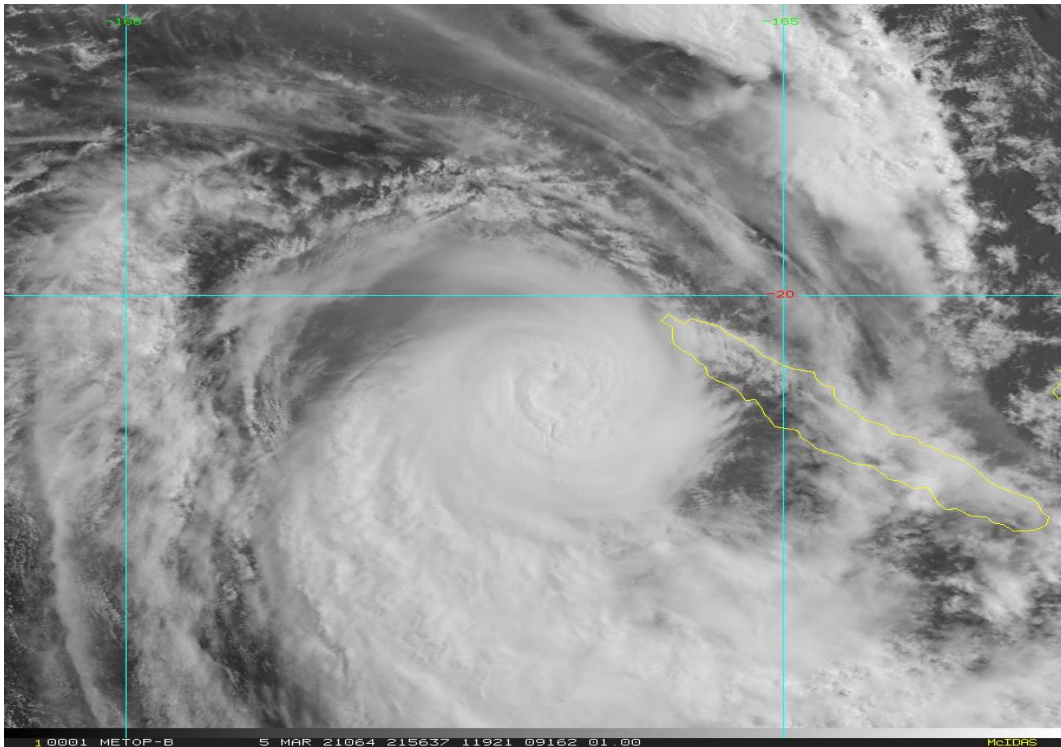


Figure 9¹²: Satellite image TC Niran Cat 5 at 05/1800 UTC

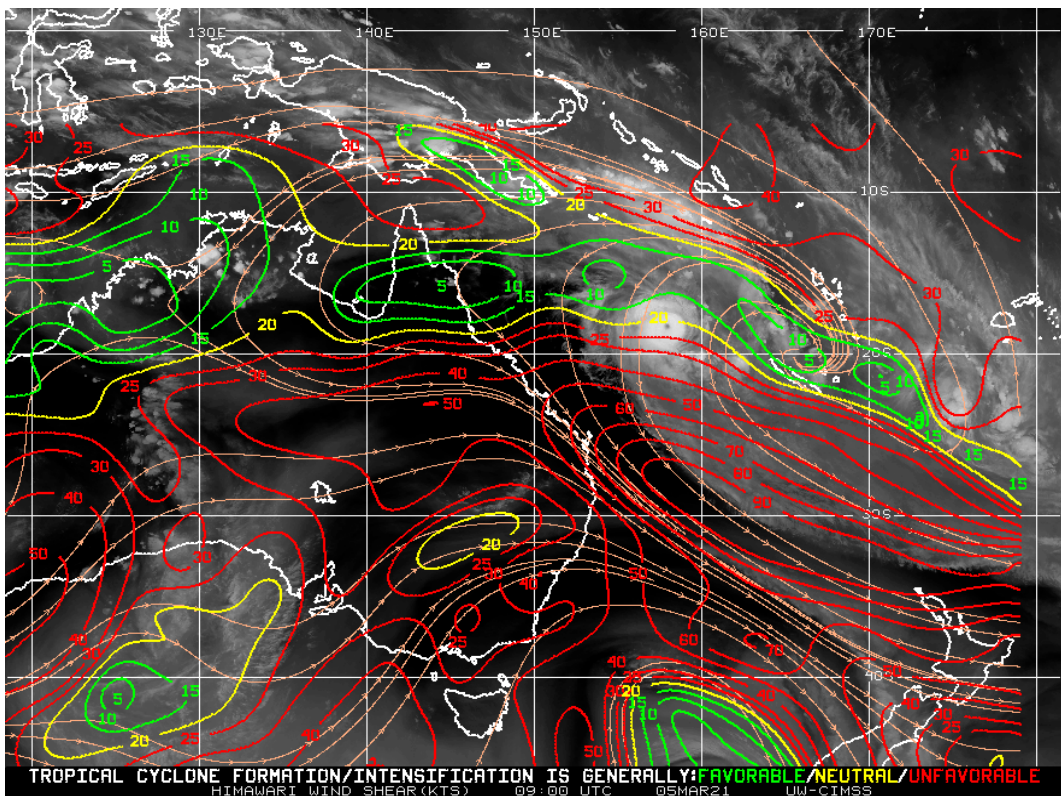


Figure 10¹³: Shear Tendency

¹² Source: NOAA CIRA Tropical Cyclone Archive

¹³ Source: CIMSS Tropical Cyclone Data Archive

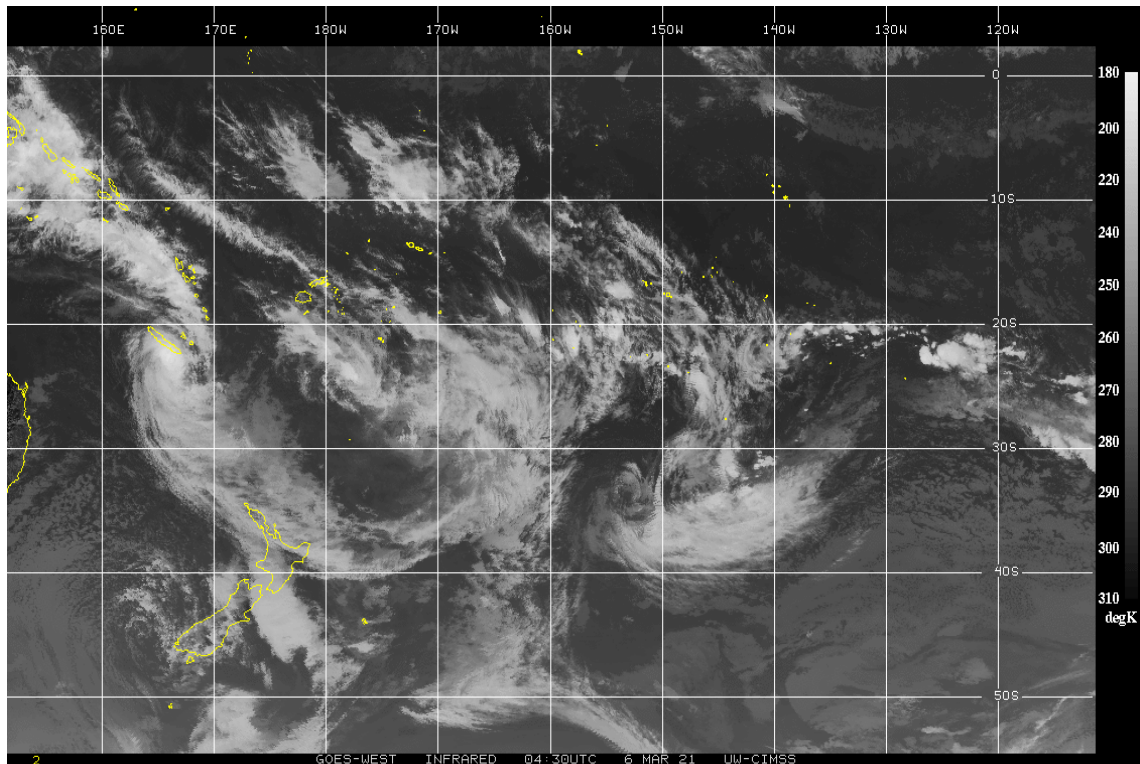


Figure 11¹⁴: Goes-West Infrared 04:30UTC 6 Mar 21 UW-CIMSS

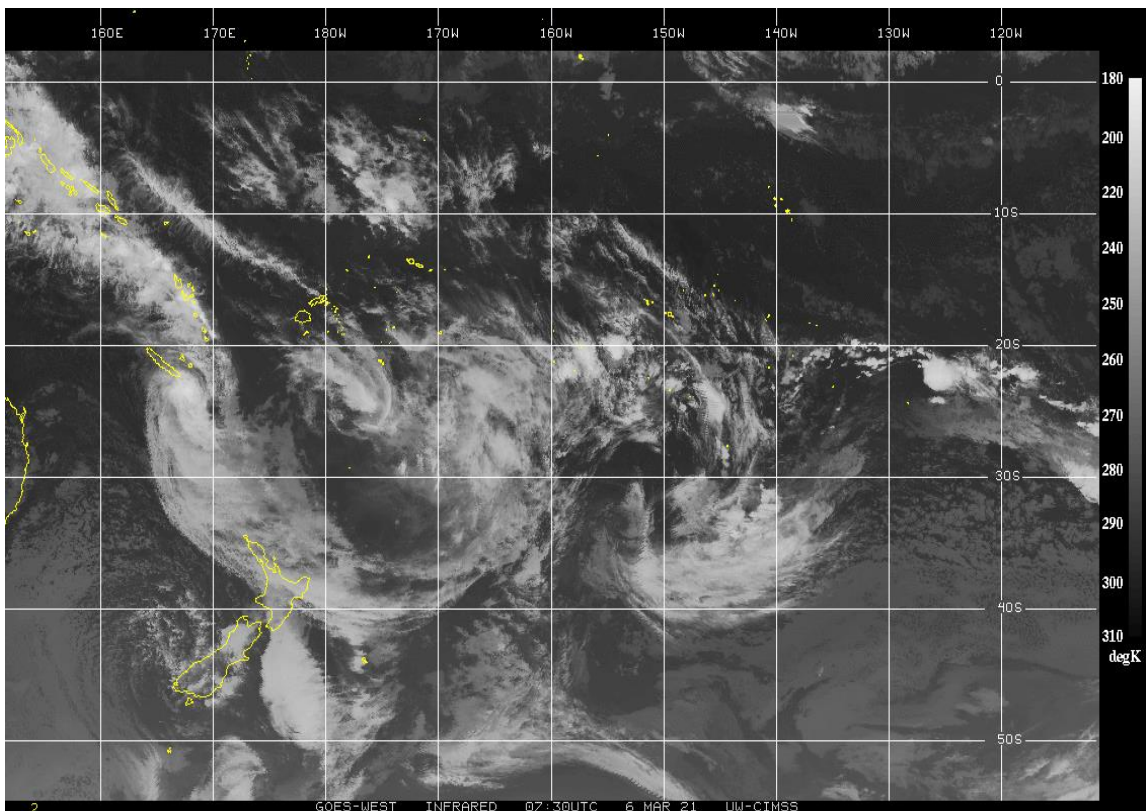


Figure 12¹⁵: Goes-West Infrared 07:30UTC 6 Mar 21 UW-CIMSS

¹⁴ Source: CIMSS Tropical Cyclone Data Archive

¹⁵ Source: CIMSS Tropical Cyclone Data Archive

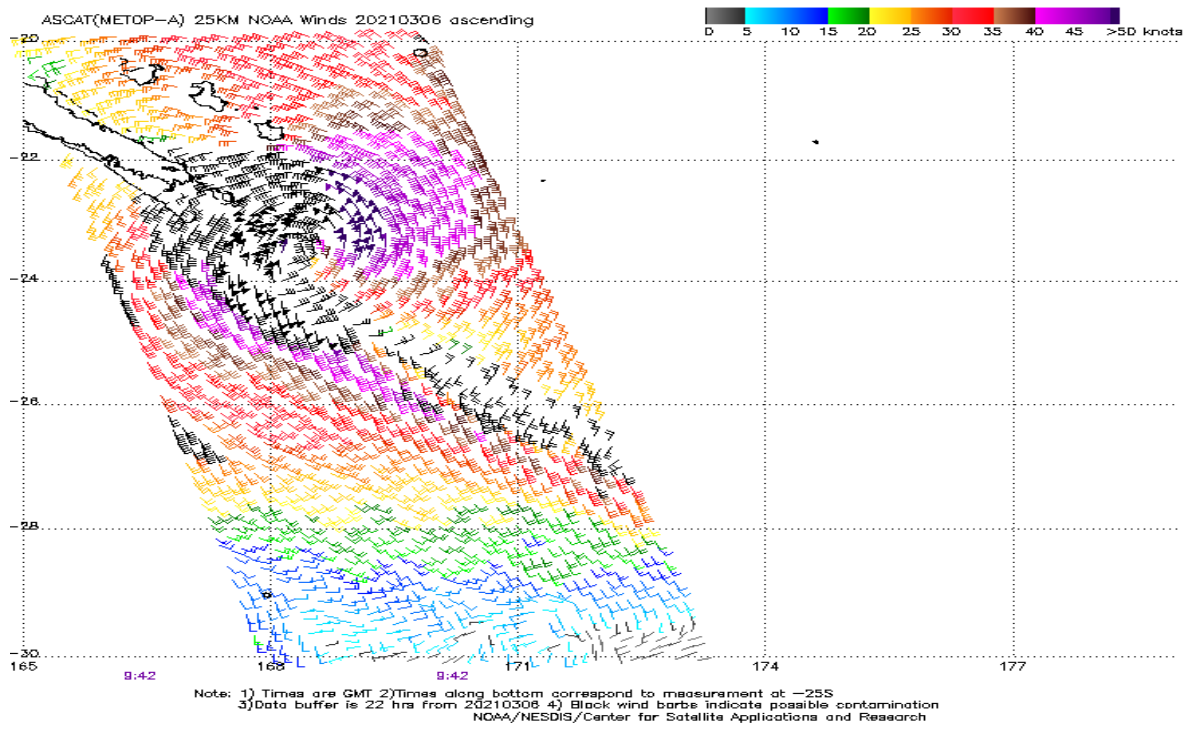


Figure 13¹⁶: Ascats winds

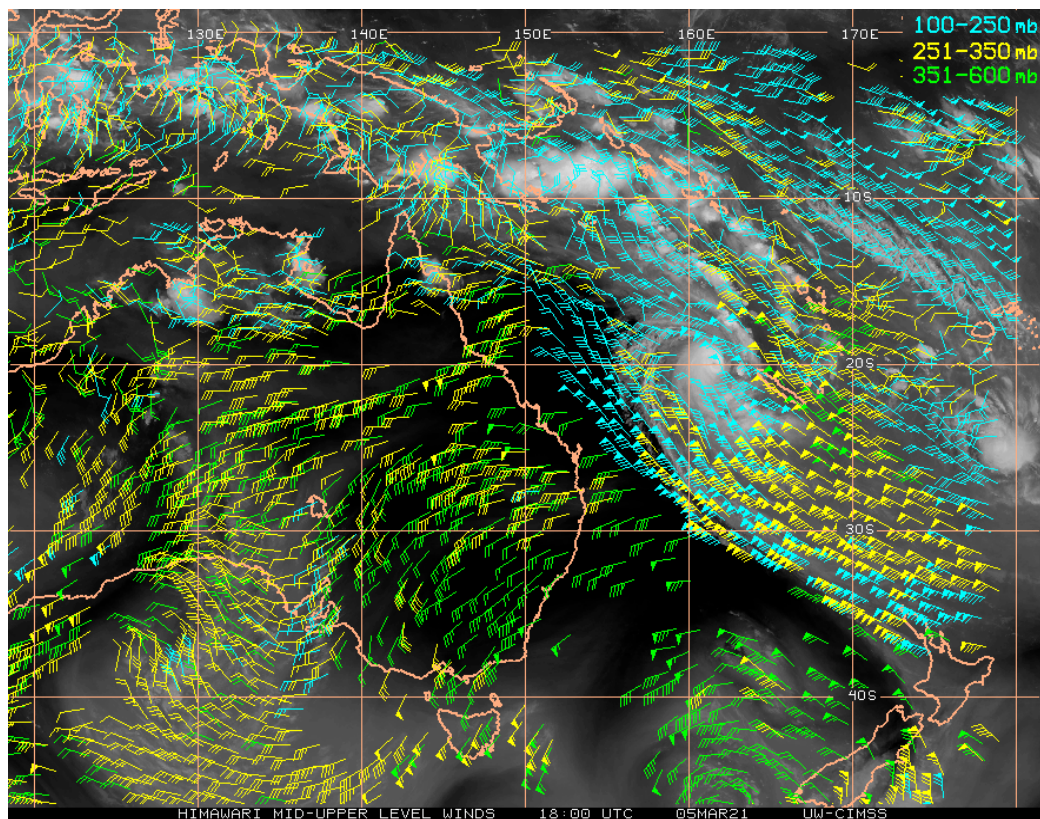


Figure 14¹⁷: Upper Level winds showing the upper ridge

¹⁶ Source: NOAA Centre for Satellite Application and Research: Advanced Scatterometer Data Archive

¹⁷ Source: CIMSS Tropical Cyclone Data Archive

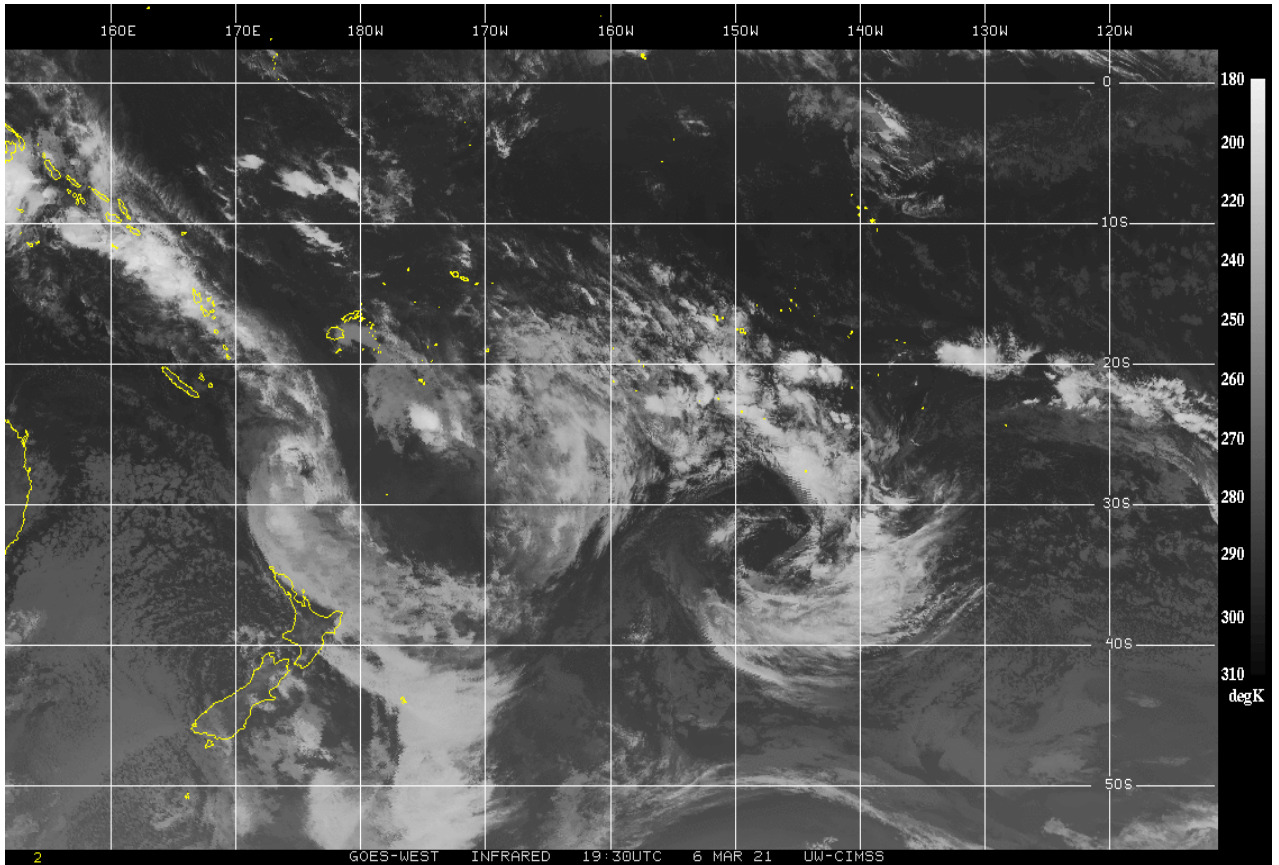


Figure 15¹⁸: Goes-West Infrared 19:30UTC 6 Mar 21 UW-CIMSS

¹⁸ Source: CIMSS Tropical Cyclone Data Archive

3. WARNINGS AND ADVISORIES

a) International Marine Warnings.

The first *International Marine Warning* issued by Nadi was a hurricane warning issued at 051332 UTC with winds of 110 knots close to the centre. A total of 4 hurricane warnings were issued by RSMC Nadi before the handover was done to the Wellington RSMC. At 061919 UTC, Hurricane warning was issued referring to hurricane warnings issued by RMC Wellington with Niran already south of 25S latitude. At 070100, Nadi issued its final warning; a gale warning referring to the warnings issued by Wellington RSMC. A total of 7 international marine warnings were sent.

b) Tropical Disturbance Advisory (TDA)

The Nadi TCWC issued the first *Tropical Disturbance Advisory (TDA)* on the system at 052035 UTC. Subsequent advisories were issued at approximately 6-hour intervals containing information on Tropical Cyclone Niran's position, movement, intensity, wind distribution and organizational characteristics with the expected changes every 12 hours out to 48 hours. RSMC Nadi issued a total of 4 six hourly advisories with the last TDA being issued at 061344UTC.

c) CREX Messages

RSMC Nadi issued 4 **CREX** messages (specially coded information) on TC Niran to the major Global Numerical Weather Prediction Centers.

d) Aviation Weather Advisories and Warnings

RSMC Nadi issued 5 *Tropical Cyclone Advisories (TCA)* on Niran. The Nadi TCWC issued the first *Tropical Cyclone Advisory* on the system at 051920 UTC. However, subsequent six hourly advisories were issued till 061800UTC. These bulletins were solely for the purpose of international air navigation in Fiji's Tropical Cyclone Advisory area of responsibility.

e) SIGMET

The first SIGMET on TC Niran was sent at 052300UTC and subsequently a total of four six hourly TC SIGMETs were sent. The last SIGMET on TC Niran was issued at 061315UTC valid till 061915UTC.

4. IMPACTS

Tropical cyclone Niran affected New Caledonia in RSMC Nadi's area of responsibility. An intense category 5 cyclone moved very close to New Caledonia around midnight on 6 March with destructive winds and heavy rainfall causing extensive damages to the power grid and vegetation (Figure 1.a.). Later that day, the cyclone passed 400 km north of Norfolk Island, generating large swells and hazardous surf conditions. Severe Tropical Cyclone Niran injured at least one person and caused extensive damages in New Caledonia.

Damages in New Caledonia.



Figure 1.a. Pointe de l'Artillerie, the roof of the Portalis building crashed into the building opposite it.¹⁹

¹⁹ Source: FranceTV.info



Figure 1.b. The fence of the Pentecost stadium, in Anse-vata²⁰



Figure 1.c. A boat sunk in Nouméa during Severe Tropical Cyclone Cyclone Niran.²¹

²⁰ Source: FranceTV.info

²¹ Source: FranceTV.info

STC Niran impacts in Australia.



Figure 2.a. Wind gusts from TC Niran damaged banana plantation.²²



Figure 2.b. Cyclone Niran wipes out banana crops in far-north Queensland²³

²² Source: Brisbane Times

²³ Source: The Guardian



Figure 2.c. A tree falls onto the roof of a Mena Creek house in North Queensland on Monday.²⁴



Figure 2.d. Power lines down on highway north of Codfish Creek in north Queensland.²⁵

²⁴ Source: ABC News

²⁵ Source: ABC News

5. OPERATIONAL ASPECTS

The tracking and forecasting of tropical cyclone Niran was very well handled by RSMC Nadi with the regular availability Himawari-8 visible, infrared (both cast and cloud) and microwave satellite imagery. The handovers from both Australian Bureau of Meteorology tropical cyclone warning centre and to New Zealand Wellington tropical cyclone warning centre was carried out successfully and in a timely manner. All warnings and advisories were issued accordingly.

6. RECOMMENDATIONS

- i. Microsoft Teams to be installed on the TC Bench to be able to have better collaboration with NZ Met Service and BOM Australia especially during handovers as in this case of Severe Tropical Cyclone Niran.
- ii. Generally, it is recommended to have the forecasters recalled during Tropical Cyclones especially for those affecting Fiji. This is to assist the only TC Forecaster on the bench to prepare and disseminate products in a timely manner, as well as to answer media and public queries.
- iii. Another TC forecaster bench PC to be setup for dueling purposes.
- iv. Tropical cyclone forecasting refresher training to be done before the tropical cyclone season for all the forecasters.

7. CONCLUSION

Tropical Cyclone Niran had a short life in the Fiji's area of responsibility and was the sixth in Nadi's area of responsibility in the 2020/2021 tropical cyclone season. Tropical Cyclone Niran developed on 2nd March 2021 over the Coral Sea near northern Queensland. It was named by the Australian Bureau of Meteorology Tropical Cyclone Warning Centre. TC Niran moved into RSMC Nadi area of responsibility on 5th March at 1500UTC. TC Niran moved southeast and passed to the south of New Caledonia with category 5 winds strength weakening to a category 3. The cyclone caused extensive damages over New Caledonia. By the 7th March at 3am, TC Niran had rapidly weakened to a low-pressure system and had moved out of Fiji's area of responsibility i.e. south of 25S. TC Niran did not have any direct impact on Fiji. TC Niran was operationally handled well by TCWC Nadi and all the warning and advisories were sent accordingly and archived.

8. REFERENCES

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Bureau of Meteorology Australia <http://www.bom.gov.au/cyclone/history/niran21.shtml>

CIMMS ARCHIVE

<http://tropic.ssec.wisc.edu/archive/index.php?action=getdatalist&basin=SEPacific&startdate=20210305&enddate=20210307&ptimes=00,03,06,09,12,15,18,21&products=DeepShearTendencyStorm,LowerConvergenceLarge,LowerConvergenceStorm,MidLowerWindsLarge,MidLowerWindsStorm,MidUpperWindsLarge,MidUpperWindsStorm,UpperDivergenceLarge,UpperDivergenceStorm,AllWindsMD,OceanOnlyWindsMD,AllWindsQIText,AllWindsText,OceanOnlyWindsQIText,OceanOnlyWindsText,DeepShearColorStorm,IRImage,IRImageBDEnhancement,IRImageColorBackground,IRImageNHCEnhancement,WVImage&searchmethod=date&pagenum=1>

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RNZ News <https://www.rnz.co.nz/international/pacific-news/437806/cyclone-niran-causes-damage-and-injures-one-in-new-caledonia>

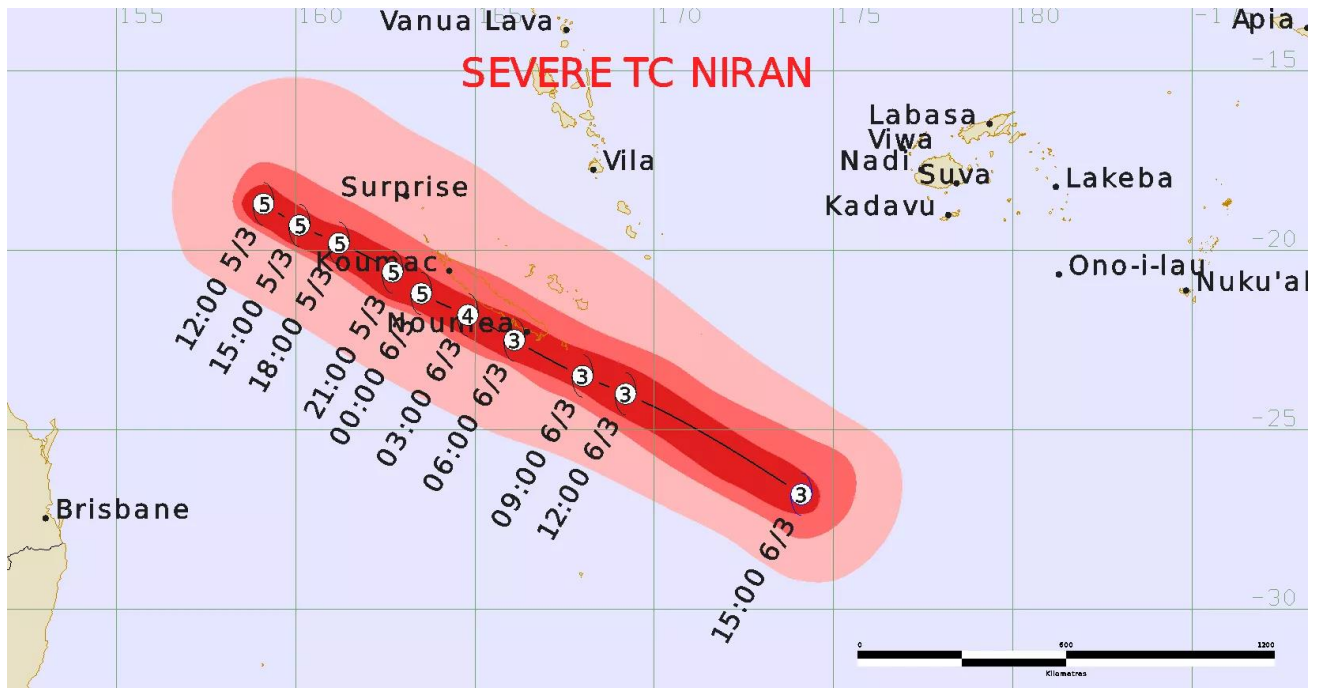
The Guardian <https://www.theguardian.com/australia-news/2021/mar/03/cyclone-niran-wipes-out-banana-crops-in-far-north-queensland>

TC Module

Appendices

Appendix 1: Post Event Analysis.

1. Post Event Best Track Analysis for STC Niran



Note:

- 1) All time in UTC.
- 2) The track highlights the extent of:




	Gale force wind
	Storm force wind
	Hurricane force wind

Figure 6²⁶: The post-analysis best track map of Cyclone Niran. The light shaded area is the estimated extent of gales.

2. Best Track Data and Intensity

Table 1

Time (UTC)	Lat.	Long.	Uncertainty (Nm)	Mean Wind (knots)	Wind Gust (knots)	Category	Pressure (hpa)	Radius of Max. Winds (Nm)
05/1200Z	-18.7	159.1	20	110	155	5	931	20
05/1500Z	-19.3	160.1	20	110	155	5	931	20
05/1800Z	-19.8	161.2	20	110	155	5	931	20
05/2100Z	-20.6	162.7	20	110	155	5	931	20
06/0000Z	-21.2	163.5	20	110	155	5	931	20
06/0300Z	-21.8	164.8	25	105	150	4	940	20
06/0600Z	-22.5	166.1	25	85	120	3	958	20
06/0900Z	-23.5	168	30	80	110	3	960	20
06/1200Z	-24	169.2	60	75	105	3	966	20
06/1500Z	-26.8	174.1	25	70	100	3	970	20

Verification Statistics for Tropical Cyclone Niran

3. Position forecast verification

Table 2: The forecasts for Severe Tropical Cyclone Niran issued by the Nadi RSMC have a good degree of skill as they have smaller mean distance errors in the position forecast. Most of the Global Models performed well but was limited with timely access

	Distance	0hr	12hr	18hr	24hrs
NFFN	Mean (km)	0	55	74	0
	Std Dev (km)	0	35	0	0
GFS-AVNI	Mean (km)	20	53	0	203
	Std Dev (km)	20	18	0	0
ECMWF	Mean (km)	28	15	0	0
	Std Dev (km)	24	0	0	0
JTWC	Mean (km)	22	43	0	90
	Std Dev (km)	23	28	0	0
UKMO	Mean (km)	12	33	0	30
	Std Dev (km)	17	1	0	0
JMA	Mean (km)	12	32	0	159
	Std Dev (km)	17	16	0	0

Note: RSMC Nadi standard for mean distance error are:

Less than 30 Nm (55.6 km) – Good b) 30 to 60 Nm (55.6 to 111 km) c) More than 60Nm (111 km) - Poor

1. The forecasts issued by the Nadi RSMC have a good degree of skill as they have smaller mean distance errors. Most of the Global Models performed well but was limited with timely access.
2. RSMC Nadi along with ECMWF and JTWC did well upto 24 hours as the error remained less than 100km.

4. Intensity forecast verification

Table 3: The Intensity forecast verification statistics for Severe Tropical Cyclone Niran based on Dvorak analysis, microwave imagery analysis and ASCAT by RSMC Nadi (NFFN) and some other sources. Mean is the mean speed error in knots from the forecast to the estimated intensity of STC Niran.

	Intensity	0hr	12hr	18hr	24hr
NFFN	Mean (knots)	0	15	25	0
	Std Dev (knots)	0	0	0	0
GFS-AVNI	Mean (knots)	15	18	0	18
	Std Dev (knots)	16	25	0	0
ECMWF	Mean (knots)	18	34	0	0
	Std Dev (knots)	4	0	0	0
JTWC	Mean (knots)	12	20	0	45
	Std Dev (knots)	10	9	0	0
UKMO	Mean (knots)	110	93	0	75
	Std Dev (knots)	0	25	0	0
JMA	Mean (knots)	10	25	0	66
	Std Dev (knots)	0	6	0	0

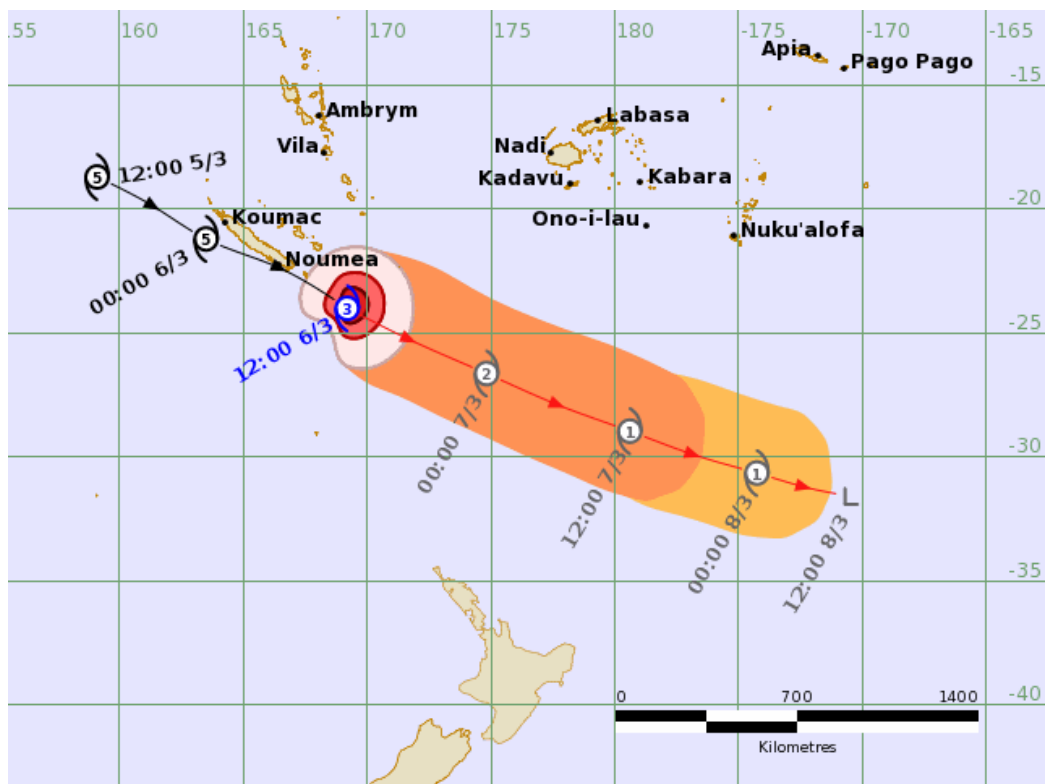
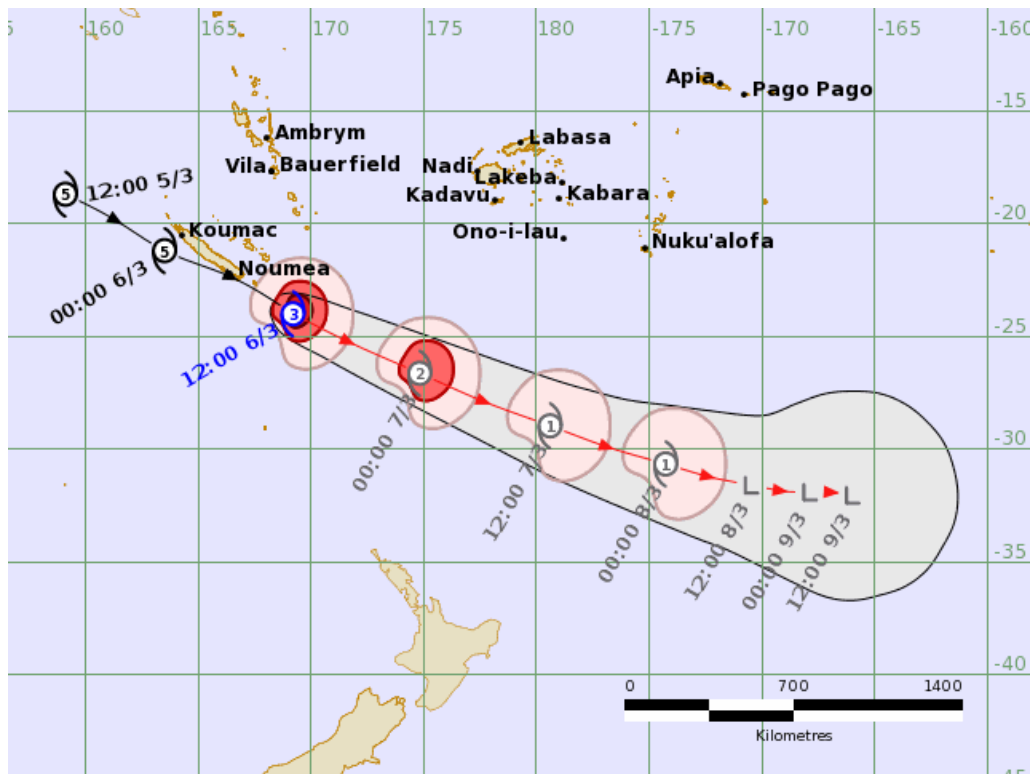
1. RSMC Nadi did well in the intensity forecast of TC Zazu, as well as ECMWF as the mean error remained less than 15knots. However, UKMO and JMA performed poorly in terms of STC Niran intensity forecast.

Appendix 2: Observations

POSTE	NOM	LON	LAT	DATE (UTC+11)	HH:MN (UTC+11)	Vent moyen max sur 10 min	Direction du vent moyen max
98832004	MTGNE SOURCES	166°35'35"E	22°08'37"S	20210306	1518	36.6	NA
98802003	BOURAKE	165°59'59"E	21°56'32"S	20210306	1622	34.3	220
98818003	PHARE AMEDEE	166°28'02"E	22°28'41"S	20210306	1725	33.3	220
98803003	NESSADIOU	165°28'48"E	21°37'13"S	20210306	1412	33.1	340
98818001	NOUMEA	166°27'10"E	22°16'33"S	20210306	1710	29.7	240
98832104	GORO_RESIDUS	166°54'45"E	22°18'49"S	20210306	1542	26.1	30
98818002	MAGENTA	166°28'25"E	22°15'37"S	20210306	1610	26	340
98826002	POINGAM	164°01'52"E	20°04'52"S	20210306	922	25.9	330
98817104	GORO_USINE	166°54'31"E	22°20'22"S	20210306	1529	25.7	100
98832006	RIVIERE BLANCHE	166°43'34"E	22°07'57"S	20210306	1548	25.6	340
98830002	TOUHO AEROD.	165°15'16"E	20°47'21"S	20210306	1239	23	340
98805004	NAKUTAKOIN	166°26'07"E	22°10'16"S	20210306	1706	22.3	240
98809001	MOUE	167°27'07"E	22°35'23"S	20210306	1715	22	360
98821001	LA TONTOUTA	166°13'20"E	22°01'02"S	20210306	1646	22	230
98832101	GORO_ANCIENNE_PEPINIERE	166°58'03"E	22°16'09"S	20210306	1617	21.3	360
98811001	KONE	164°50'00"E	21°03'04"S	20210306	1337	20.9	270
98812001	KOUMAC	164°17'03"E	20°33'31"S	20210306	1226	20.3	250
98814001	OUANAHAM	167°14'28"E	20°46'39"S	20210306	1616	19.6	320
98815001	LA ROCHE	168°02'08"E	21°28'53"S	20210306	1736	17.3	320
98820001	OULOUP	166°34'15"E	20°38'21"S	20210306	1356	17.2	330
98829102	THIO	166°14'16"E	21°36'48"S	20210306	1705	15.7	250
98823002	AOUPINIE	165°17'07"E	21°10'37"S	20210306	1423	13.3	270

Appendix 3

Track Map and Threat Map for Tropical Cyclone Niran from the TC Module.

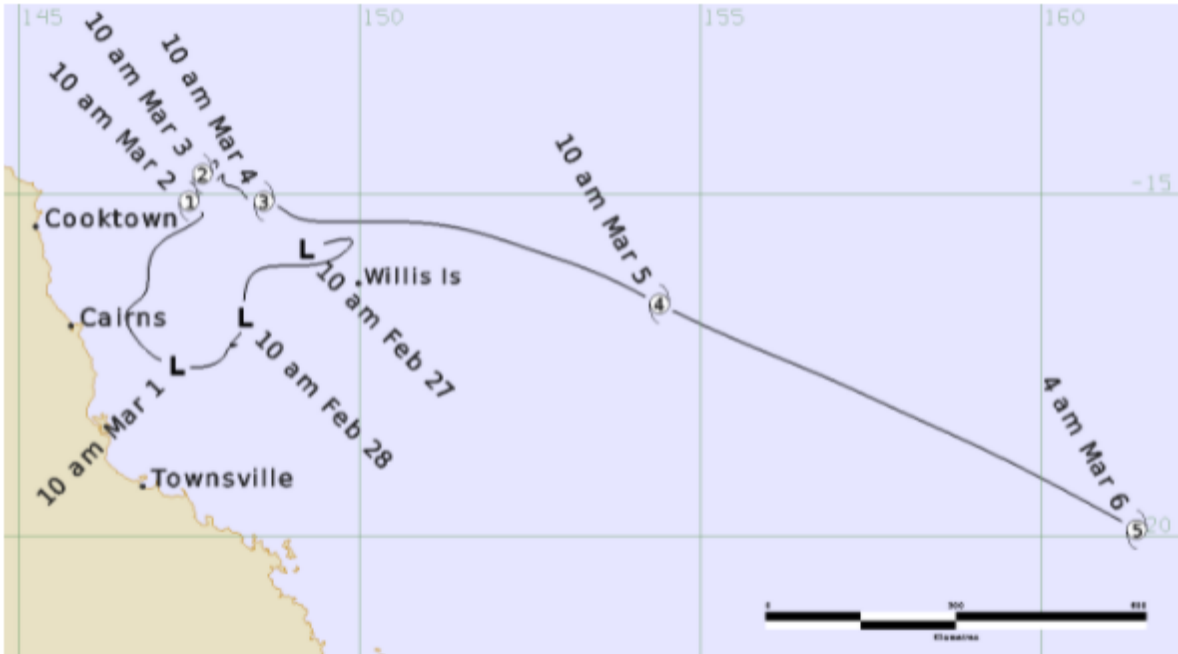


Appendix 4

Severe Tropical Cyclone Track Map from Bureau of Meteorology in Brisbane RSMC area of responsibility.

Severe Tropical Cyclone Niran

27 February - 5 March 2021



All times shown are in Australian Eastern Standard Time (AEST), that is UTC + 10 hours.