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Fiji Climate Summary

January 2019



**ISO 9001:2015
certified Climate
Services**

Issued: February 11, 2019

Since : August 1980*

Volume 40 : Issue 01

1. IN BRIEF

The weather during January was influenced by a series of troughs of low pressure and tropical cyclone Mona. Consequently, most parts of the country experienced *average* or *above average* rainfall. Udu Point, Savusavu Airfield and Vanuabalavu, which lay in the close proximity to the path of Mona, recorded more than twice the *normal* rainfall. In contrast, Lautoka Mill, Yaqara and Penang Mill registered *below average* rainfall.

Tropical cyclone Mona was the first cyclone to pass through the Fiji Group in the 2018-19 tropical cyclone season. TC Mona reached a maximum intensity of category 2 system.

The associated trough with Mona and its predecessor, tropical depression, resulted in widespread rainfall across the country between 1st and 7th. The highest 24-hour rainfall during this period was registered at Lakeba with 159mm on the 4th, followed by Udu Point with 146mm on the 2nd, Korolevu with 146mm on the 4th and Savusavu Airfield with 146mm on the 6th.

The wind related damage due to tropical cyclone Mona was limited. While strong breeze were recorded at a number of

places during the passage of Mona, only Vanuabalavu and Ono-i-Lau reported near-gale force winds. Vanuabalavu recorded maximum sustained wind of 53km/h and gust of 81km/h on the 6th, while Ono-i-Lau registered maximum sustained wind of 59km/h and gust of 90km/h in the early morning of 8th.

Another very notable period of rainfall was experienced in the Central and Northern Divisions between 19th and 20th. Nasinu registered 152mm of rainfall on the 20th, followed by Nausori Airport with 141mm on the 20th and Nabouwalu with 136mm on the 19th. Over a 48-hour period between 19th and 20th, Nasinu and Nausori Airport both registered 268mm of rainfall.

The month ended with another significant rainfall episode across the country from the 27th to the 30th. During this event, the highest 24-hour rainfall was registered at Rarawai Mill with 126mm on the 28th, followed by Seaqaqa with 106mm on the 28th.

A record new high mean monthly minimum air temperature for January was set at Lakeba during the month with 25.2°C.

2. WEATHER PATTERNS

The weather during the first week of January was mostly unsettled as an active trough of low pressure from the south of Solomon Islands extended towards the northern parts of Vanua Levu. Embedded along this trough were tropical disturbances 04F (TD04F), 05F (TD05F), and tropical depression 03F (TD03F).

TD04F intensified and developed into a tropical cyclone (TC) Mona (Category 1) on the 3rd, further upgraded to Category 2 the following day before gradually weakening again and then downgraded to a Ex-TC on the 7th. The associated trough and rain bands affected mostly Vanua Levu, but heavy rainfall was also experienced in the eastern parts of Viti Levu and interior of the larger islands triggered by the deep moist easterlies.

A trough then further developed over the group with associated rain affecting the eastern parts and interior of the larger islands from the 10th to the 12th. Meanwhile, another trough of low pressure slowly approached the group from the west as it tracked southeastwards from the 14th to the 16th affecting the western parts and moist easterlies causing widespread heavy falls over the eastern parts and interior of the larger islands.

From the 19th to the 21st another trough of low pressure with an embedded low developed over the north of Vanua Levu with associated rain and isolated heavy falls affecting Vanua Levu and the eastern parts of Viti Levu.

The broad easterlies continued to persist until the 26th when another trough approached the group from the north with associated rain affecting Vanua Levu with isolated heavy falls over most places. This trough of low pressure remained slow moving within the vicinity of Fiji till the end of the month and affected the group from time to time.

Rotuma's weather was affected by troughs of low pressure with showers experienced on most days of the month.

3. RAINFALL

Most parts of the country experienced *average* or *above average* rainfall during the month. Udu Point, Savusavu Airfield and Vanuabalavu, which lay in the close proximity to the path of tropical cyclone Mona, recorded more than twice the *normal* rainfall. In contrast, Lautoka Mill, Yaqara and Penang Mill registered *below average* rainfall.

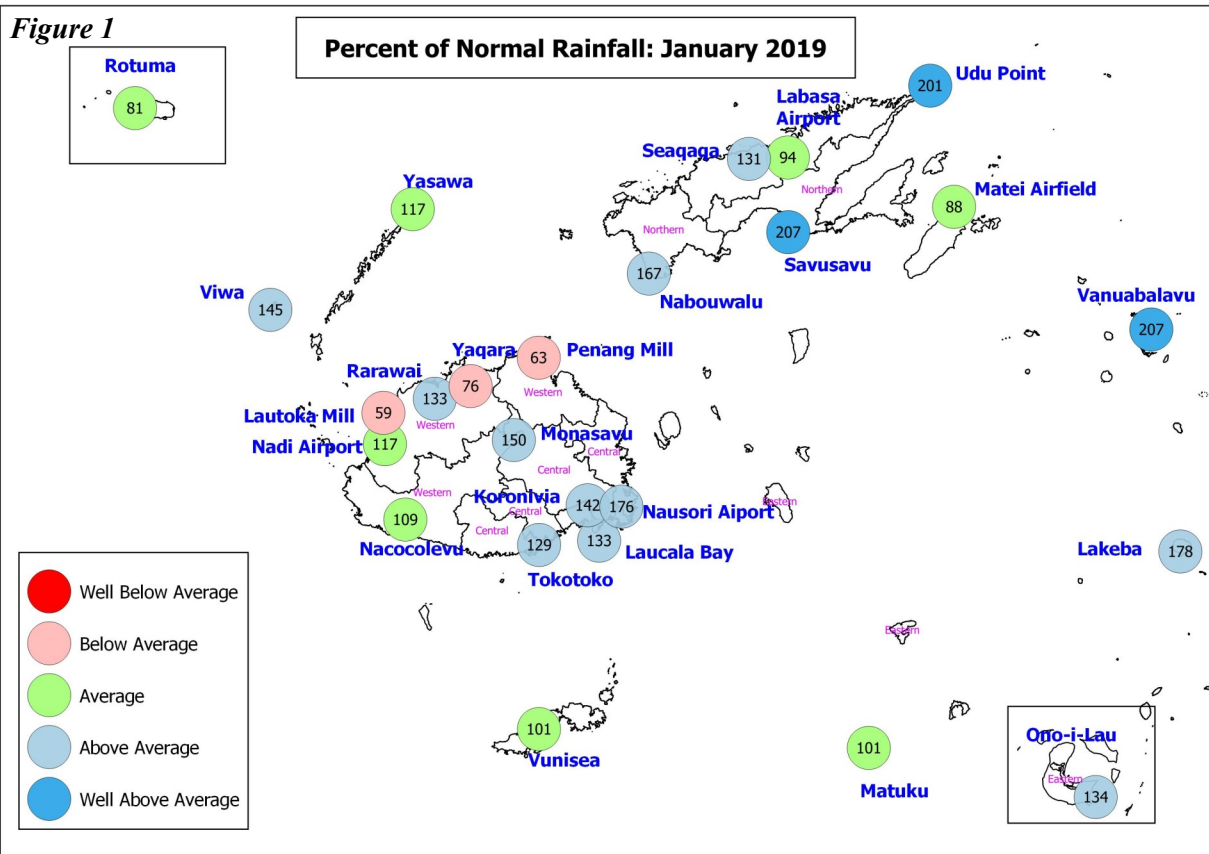
Three notable rainfall events were registered during the month. Widespread rainfall was experienced across the country between the 1st and the 7th. The highest 24-hour rainfall during this rainfall episode was registered at Lakeba with 159mm on the 4th, followed by Udu Point with 146mm on the 2nd, Korolevu with 146mm on the 4th and Savusavu with 146mm on the 6th.

Another very notable period of rainfall was experienced in the Central and Northern Division between 19th and 20th. Nasinu registered 152mm of rainfall on the 20th, followed by Nausori Airport with 141mm on the 20th and Nabouwalu with 136mm on the 19th. Over a 48-hour period between 19th and 20th, Nasinu and Nausori Airport both registered 268mm of rainfall.

The month ended with another significant rainfall episode across the country from the 27th to the 30th. During this event, the highest 24-hour rainfall was registered at Rarawai Mill with 126mm on the 28th, followed by Seaqqa with 106mm on the 28th.

Monasavu recorded the highest total monthly rainfall during the month with 913mm, followed by Nasinu with 709mm and Nausori Airport with 644mm. On the other hand, the lowest total monthly rainfall was registered at Momi with 218mm, followed by Lautoka Mill with 220mm and Yaqara with 234mm.

Monasavu and RKS registered the highest number of rain days ($\geq 0.1\text{mm}$) with both 30 days, followed by Nadarivatu with 29, and Penang Mill, Koronivia, Seaqqa and Saqani with all 27. On the other hand, Ono-i-Lau recorded the least number of rain days with 17, followed by Viwa and Lakeba with both 18, and Momi, Sigatoka and Labasa Airport with all 19.



Normal: Long term average from 1971 to 2000
Well Below Average: Rainfall less than 40% of normal
Below Average: Rainfall between 40 to 79%
Rain Day: Rainfall $\geq 0.1\text{mm}$

Average: Rainfall between 80 to 119%
Above Average: Rainfall between 120 to 199%
Well Above Average: Rainfall greater than or equal to 200% of normal

4. AIR TEMPERATURES

A. Maximum Daytime Air Temperatures

The mean monthly maximum air temperatures were generally *normal* to *above normal* during the month with 11 out of the 23 stations registering anomalies $\geq 0.5^{\circ}\text{C}$, 9 within $\pm 0.5^{\circ}\text{C}$ and 3 recorded departures $\leq -0.5^{\circ}\text{C}$ (Table 2 & Figures 2-5).

The warmest day-time temperatures on average was at Rarawai Mill with 32.9°C , followed by Yaqara with 32.8°C and Keiyasi with 32.7°C . On the other hand, the coolest day-time temperatures on average was at Monasavu with 25.5°C , followed by Nadarivatu with 25.6°C and Ono-i-Lau with 29.4°C .

Keiyasi registered the highest daily minimum air temperature during the month with 35.3°C on the 23rd, followed by Lautoka Mill, Rarawai Mill and Yaqara with all 35.0°C on the 31st, 30th and 10th, respectively, and Seaqaqa with 34.6°C on the 16th. On the other hand, majority of the stations registered the lowest daily maximum air temperature during the 1st week, with Monasavu registering 21.5°C on the 2nd, followed by Nadarivatu with 22.8°C on the 5th and Seaqaqa with 23.6°C on the 4th.

There wasn't any maximum air temperature record established during the month.

B. Minimum Night-time Air Temperatures

More than half of the stations registered *above normal* minimum air temperatures during the month, with 14 out of the 23 stations registering anomalies $\geq +0.5^{\circ}\text{C}$, 5 within $\pm 0.5^{\circ}\text{C}$ and 4 $\leq -0.5^{\circ}\text{C}$ (Table 2 & Figures 2-5).

The coolest nights on average during the month was at Nadarivatu with 19.3°C , followed by Monasavu with 20.1°C , and Labasa Airport with 21.4°C . On the other hand, Yasawa-i-Rara recorded warmest nights on average with 25.7°C , followed by Seaqaqa with 25.3°C and Lakeba with 25.2°C .

The coolest daily minimum air temperature was registered at Nadarivatu with 17.3°C on the 25th, followed by Labasa Airport and Monasavu with both registering 19.0°C on the 5th and 14th, respectively. On the other hand, significantly warm nights were recorded occasionally, especially during the 2nd half of the month. The warmest daily minimum air temperature was recorded at Yasawa-i-Rara with 27.1°C on the 27th, followed by Udu Point with 26.2°C on the 26th and Tokotoko with 25.0°C on the 24th.

A record new high mean monthly minimum record for January was set at Lakeba during the month, with the observations at the station beginning in 1955.

TABLE 1. CLIMATE RECORDS ESTABLISHED IN JANUARY 2019

<u>Element</u>	<u>Station</u>	<u>Observed (record)</u>	<u>On</u>	<u>Rank</u>	<u>Previous (record)</u>	<u>Year</u>	<u>Records Began</u>
Mean Monthly Min. Temp.	Lakeba	25.2°C	-	New High	25.1°C	1998	1955

Note: All comparisons in this summary are with respect to "Climatic Normals". This is defined to be the average climate condition over a 30-year period. Fiji uses 1971-2000 period as its "climatic normal" period, unless otherwise stated.

TABLE 2. DAILY CLIMATE REPORTING SITES: SUMMARY FOR JANUARY 2019

	RAINFALL				AIR TEMPERATURES								SUNSHINE		
	TOTAL	RAIN		MAX.	AVERAGE DAILY				EXTREME				TOTAL	*	
	MM	%	+	MM ON	MAX. #	C	MIN. #	C	MAX. #	C	ON	MIN. #	C	ON	HRS
NADI AIRPORT	403	117	22	94	28	32.0	0.5	23.9	1.1	34.2	22	20.4	23	187	89
SUVA/LAUCALA BAY	493	133	25	109	19	30.6	-0.2	24.8	0.9	32.7	24	22.9	20	118	61
NACOCOLEVU	314	109	24	58	15	32.0	0.8	23.0	0.7	34.1	15	21.4	27	152	86
ROTUMA	289	81	27	67	3	31.8	1.2	24.9	0.2	32.9	31	23.7	1	152	90
VIWA	366	145	18	83	20	32.6	1.5	24.4	-0.6	34.3	10	22.5	12		
UDU POINT	628	201	27	146	2	30.0	-0.5	24.9	0.6	31.7	16	23.4	2		
SAVUSAVU AIRFIELD	570	207	20	146	6	30.0	-0.6	24.1	0.6	32.8	15	23.0	13		
LABASA AIRFIELD	362	94	19	60	19	31.5	-0.2	21.4	-0.8	33.1	27	19.0	5		
NABOUWALU	520	167	26	136	19	30.5	0.3	25.1	0.9	33.4	13	23.3	29		
KORONIVIA	550	142	28	85	10	30.4	0.0	22.5	-0.2	32.8	20	21.4	1		
NAUSORI AIRPORT	644	176	27	141	20	30.4	-0.0	23.6	0.4	32.8	15	21.9	6		
NAVUA/TOKOTOKO	511	129	27	73	28	31.0	0.5	23.5	2.1	33.5	16	22.0	10		
MONASAVU	913	150	30	111	4	25.5	0.0	20.1	1.1	28.0	18	19.0	14		
LAUTOKA AES	220	59	20	53	28	32.6	1.6	23.6	-0.1	35.0	31	22.5	1		
BA/RARAWAI MILL	536	133	22	126	28	32.9	0.8	23.0	0.9	35.0	30	21.0	13		
PENANG MILL	250	63	28	38	16	31.3	1.0	24.5	0.5	33.1	15	22.8	29		
MATEI AIRFIELD	315	88	26	61	2	30.1	-0.0	24.6	0.5	32.1	18	22.0	29		
VANUABALAVU	464	207	23	107	4	29.8	-0.3	22.8	-1.6	31.8	16	21.5	1		
LAKEBA	432	178	18	159	4	30.6	0.5	25.2	1.2	32.9	10	23.5	28		
YASAWA	303	117	23	53	19	32.4	2.1	25.7	1.5	34.3	22	23.8	31		
VUNISEA	291	101	25	47	17	30.4	0.5	24.5	1.1	33.3	16	23.5	4		
MATUKU	278	101	21	38	18	29.7	-0.5	24.4	0.0	31.8	14	23.0	26		
ONO-I-LAU	235	134	17	57	12	29.4	0.2	23.7	-0.5	31.0	9	21.6	27		
LEVUKA AWS	U/S					32.7	4.9	23.7	-0.5	38.2	13	21.3	20		
YAQARA AWS	234	76	21	39	19	32.8		24.8		35.0	10	22.6	29		
KEYIASI AWS	325		22	52	20	32.7		22.8		35.3	23	21.0	1		
LOMAIVUNA AWS	U/S														
NADARIVATU AWS	568		29	56	15	25.6		19.3		27.3	1	17.3	25		
RKS LODONI AWS	586		30	130	19	30.1		23.3		31.9	29	21.4	20		
MOMI AWS	218		19	65	18	31.8		24.4		33.0	9	23.3	21		
KOROLEVU AWS	438		22	146	4	31.7		23.7		34.5	15	22.5	21		
KORO ISLAND AWS	U/S					29.8		24.1		33.7	9	22.2	29		
SIGATOKA AWS	426		19	66	20	30.4		23.3		33.5	12	21.3	31		
RAKIRAKI AWS	424		25	58	19	U/S									
WAINIKORO AWS	U/S					31.3		24.0		33.4	16	22.6	30		
SAQANI AWS	302		28	45	4	30.9		24.9		34.0	13	23.2	6		
VATUREKUKA AWS	311		25	48	22	31.3		24.2		33.4	16	23.0	23		
KUBULAU AWS	240		20	57	19										
SEAQAQA AWS	543	131	28	99	28	32.3		25.2		34.6	16	23.4	30		
NASINU TB3	709		27	152	20										
TAVUA TB3	U/S														

	TEMPERATURE (C)				HUMIDITY	WIND	SUN RAD	
	MEAN	DRY	WET	RH%			VP	%OF
		(AVERAGE AT 9AM)			KT	POS		
NADI AIRPORT	28.0	29.0	25.2	73	29.1	6.0	48	18.1
SUVA/LAUCALA BAY	27.7	28.3	25.9	83	31.7		32	18.0\$
NACOCOLEVU	27.5	28.6	25.7	79	30.8		40	19.5\$
ROTUMA	28.3	28.7	25.8	79	31.0		40	18.9\$
VIWA	28.5	29.9	26.8	78	32.9			
UDU POINT	27.4	28.0	26.0	85	32.2			
SAVUSAVU AIRFIELD	27.1	28.2	26.0	84	32.0			
LABASA AIRFIELD	26.5	27.1	25.2	99	30.6			
NABOUWALU	27.8	28.5	26.2	83	32.2			
KORONIVIA	26.5	28.2	25.7	82	31.1			
NAUSORI AIRPORT	27.0	28.0	25.6	82	31.0	5.1		
NAVUA/TOKOTOKO	27.2	28.0	26.1	86	32.3			
MONASAVU	22.8	23.2	21.9	89	25.3			
LAUTOKA AES	28.1	30.4	26.7	74	32.2			
BA/RARAWAI MILL	27.9	28.8	25.9	79	31.3			
PENANG MILL	27.9	28.1	25.7	83	31.2			
MATEI AIRFIELD	27.3	28.1	26.1	85	32.3			
VANUABALAVU	26.3	27.6	25.5	85	31.1			
LAKEBA	27.9	28.5						
YASAWA	29.1	28.9						
VUNISEA	27.4	28.2	25.5	80	30.5			
MATUKU	27.1	27.5	24.9	80	29.5			
ONO-I-LAU	26.5	27.4	25.0	82	29.9			

MEAN TEMPERATURE IS (MAX+MIN)/2; WIND IS MEAN SPEED AT 06,12,18,24 HOURS.
 \$:SOLAR RADIATION CALCULATED FROM SUNSHINE DURATION. # :DEPARTURE FROM LONG-TERM AVERAGES (1971-2000). + :NUMBER OF DAYS WITH 0.1 MM OR MORE RAIN. * :PERCENT OF LONG-TERM AVERAGES.
 BLUE FONT: MISSING RECORDS OF LESS THAN OR EQUAL TO 5 DAYS. U/S: UNSERVICEABLE

Figure 2

**Nadi Airport - Temperature & Rainfall for the last 13 Months
(January, 2018 - January, 2019)**

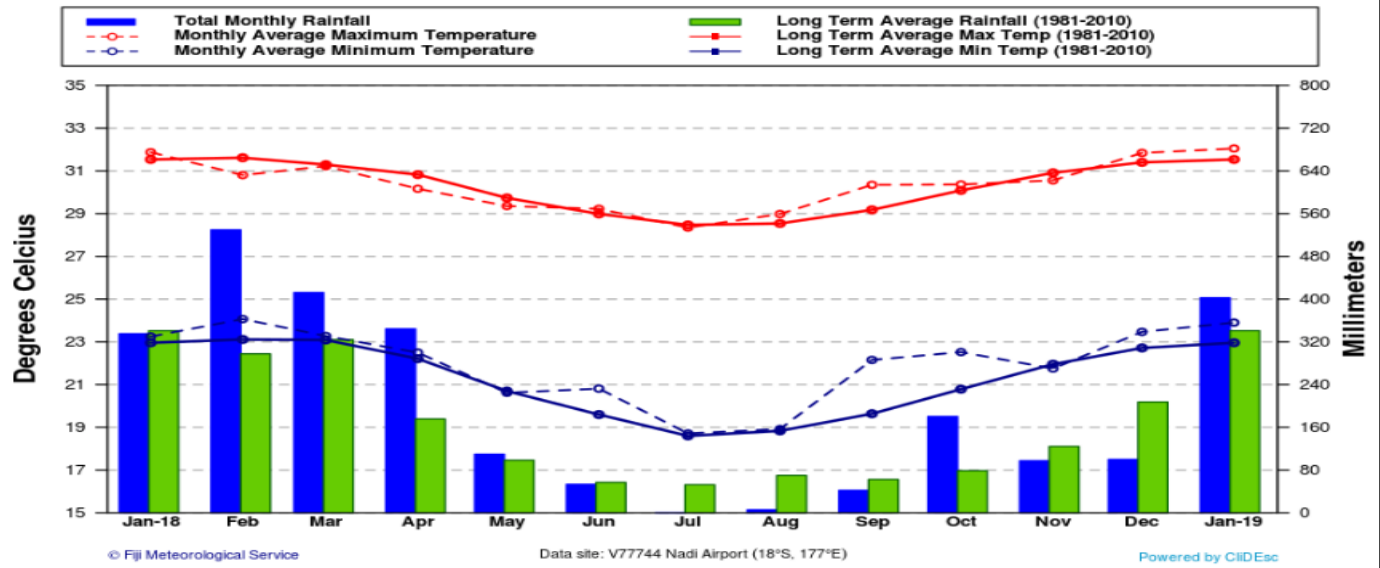


Figure 3

**Laucala Bay - Temperature & Rainfall for the last 13 Months
(January, 2018 - January, 2019)**

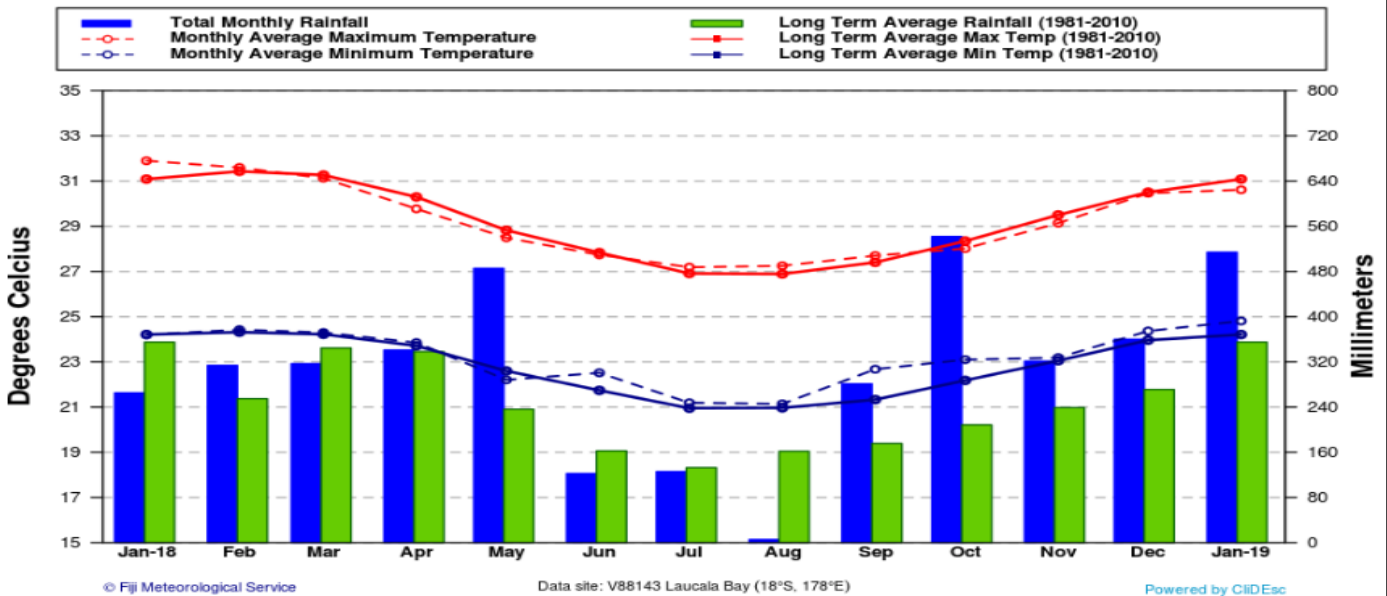


Figure 4

**Labasa Airfield - Temperature & Rainfall for the last 13 Months
(January, 2018 - January, 2019)**

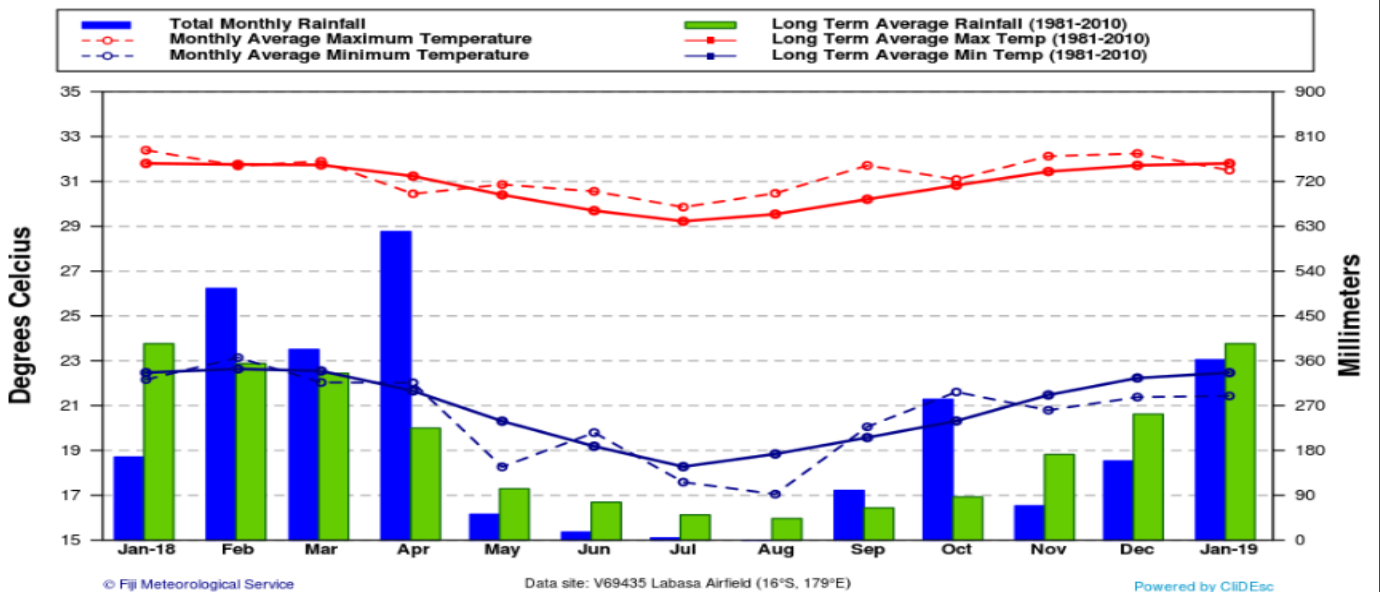
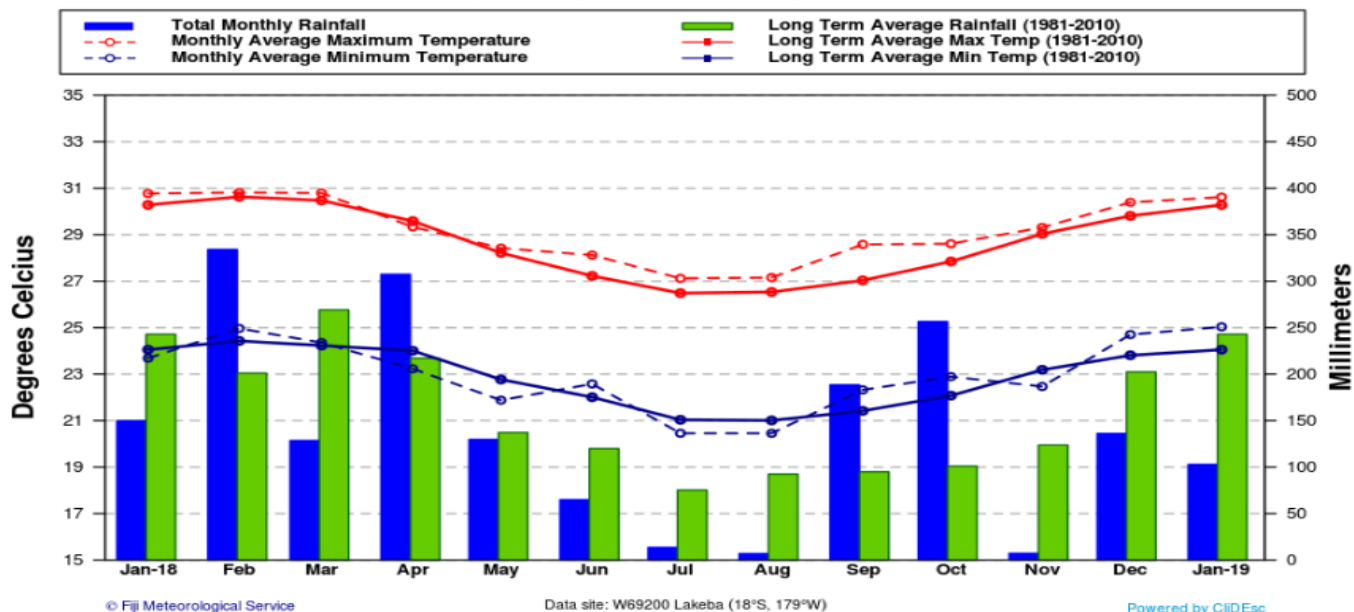


Figure 5

Lakeba - Temperature & Rainfall for the last 13 Months
(January, 2018 - January, 2019)



5. DAILY RAISED PAN EVAPORATION

Figure 6

Daily Evaporation for January 2019

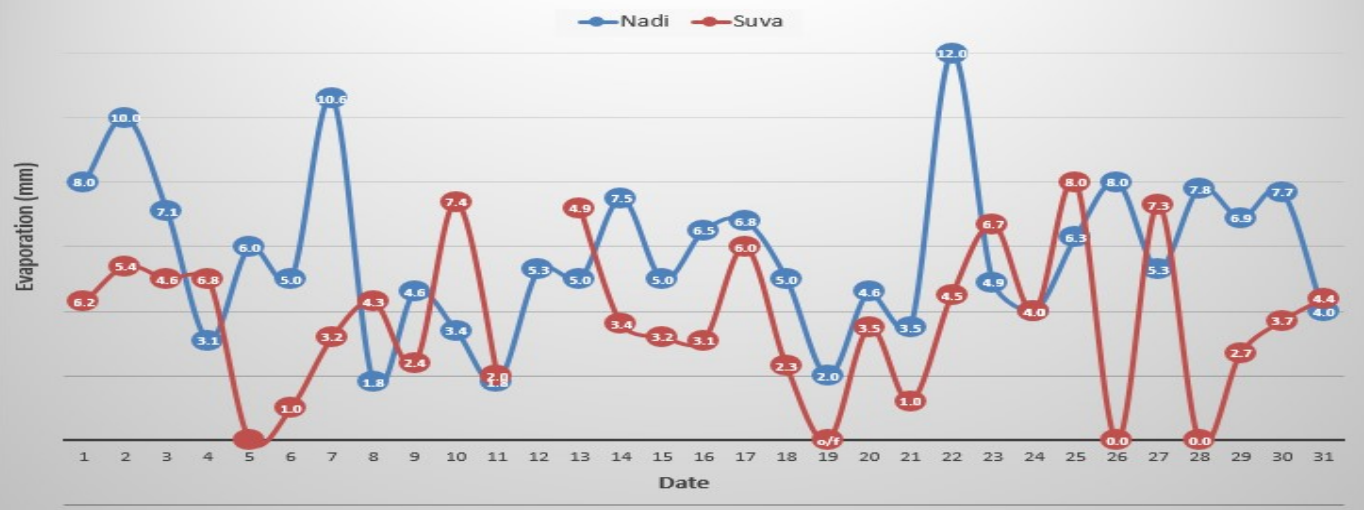


Figure 6: The total monthly raised pan evaporation at Nadi Airport was 179.5mm, with the highest of 12.0mm recorded on the 22nd. Laucala Bay recorded total monthly evaporation of 111.4mm, with the highest daily evaporation of 8.0mm on the 25th.

6. SOLAR RADIATION

Figure 7

Daily Solar Radiation (MJ/m²)- January 2019

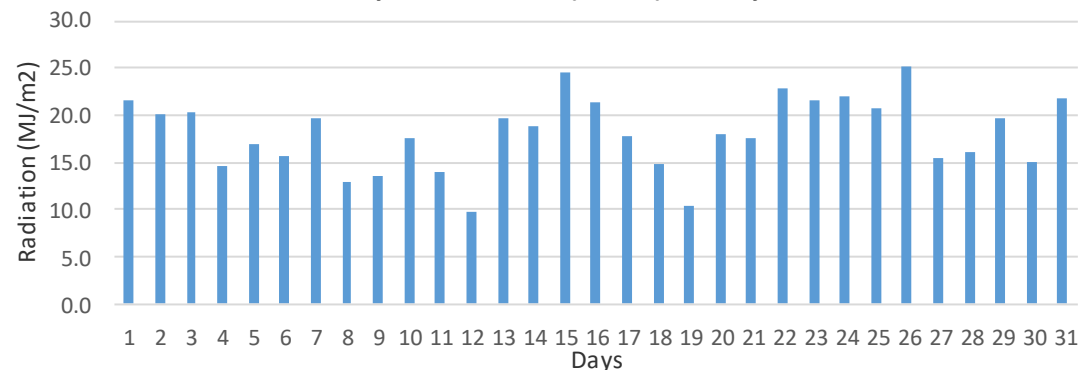


Figure 7:

The mean daily solar radiation at Nadi Airport during January 2019 was 18.1MJ/m² compared to 21.2MJ/m² over 30 year average (1971-2000).

7. WIND SUMMARY

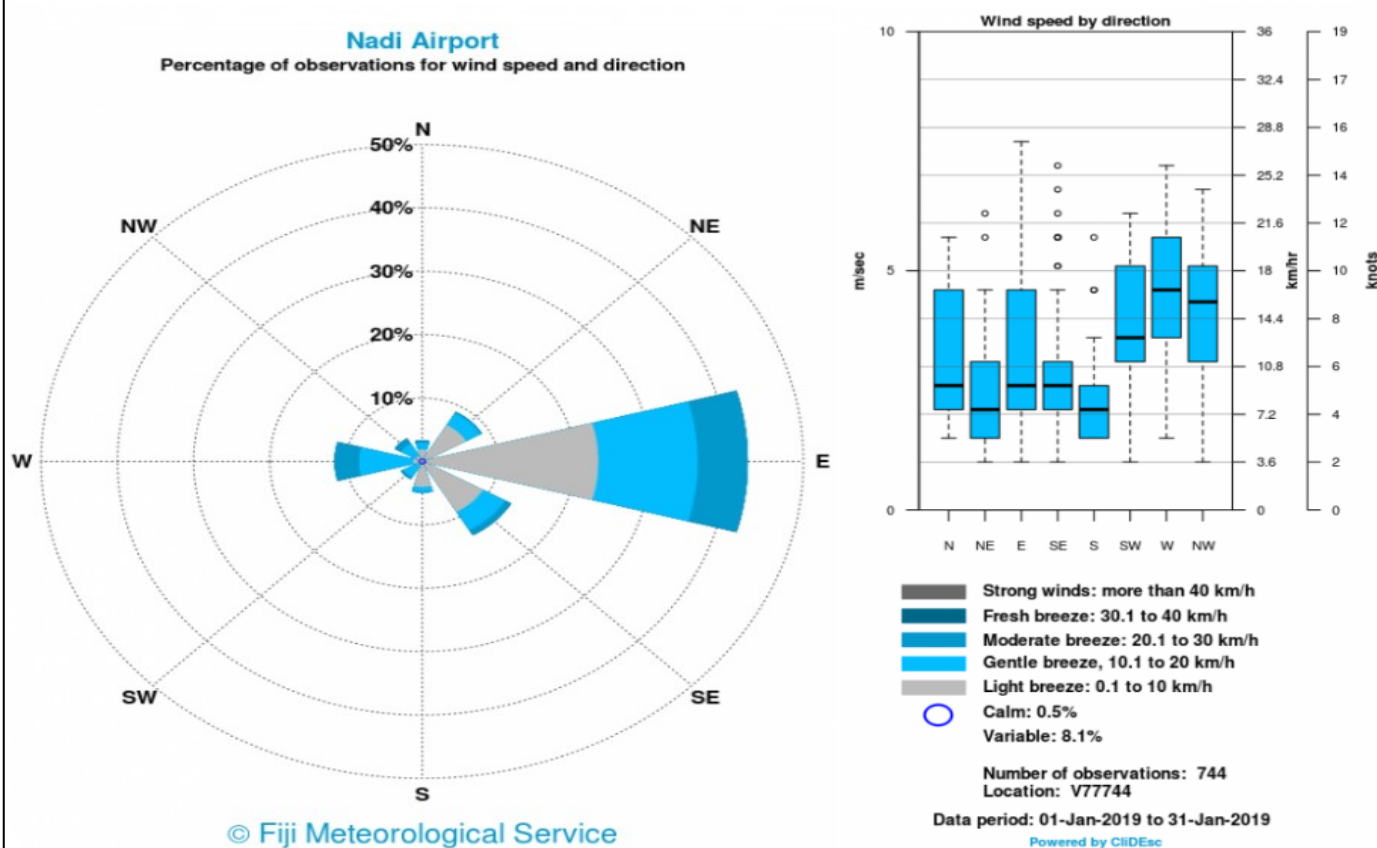


Figure 8a: The hourly wind observations at Nadi Airport during the month shows easterly winds as the most dominant, followed by westerly and south-easterly winds. Wind strengths varied from light to moderate.

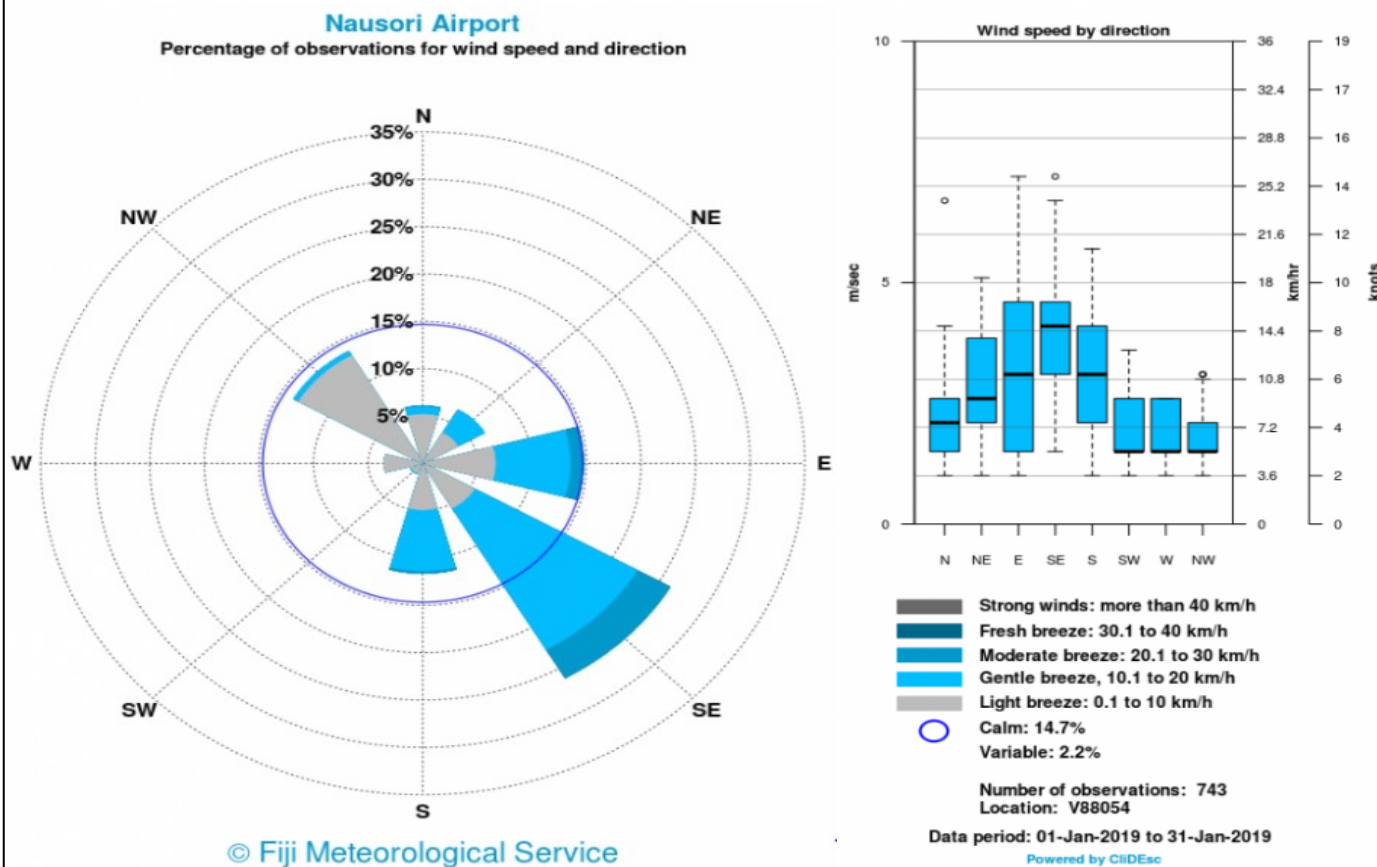


Figure 8b: The hourly wind observations at Nausori Airport during the month shows that south-easterly winds were dominant, followed by easterly and north-westerly winds. Wind speeds ranged from light to moderate in strength.

8. SEA SURFACE TEMPERATURE (SST)

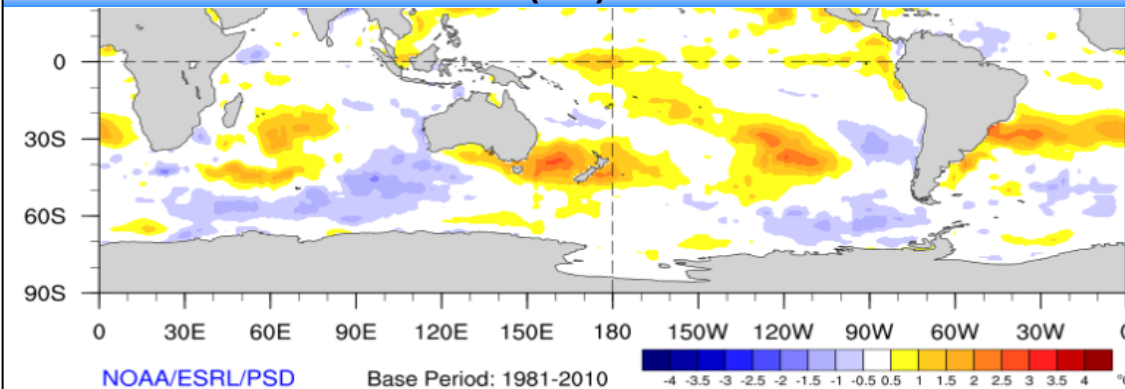


Figure 9: Above normal sea surface temperature anomalies was present in the northern parts of Fiji Waters (base period: 1981-2010).

Source: <http://www.esrl.noaa.gov/psd/map/clim/sst.shtml>

9. SEA LEVEL

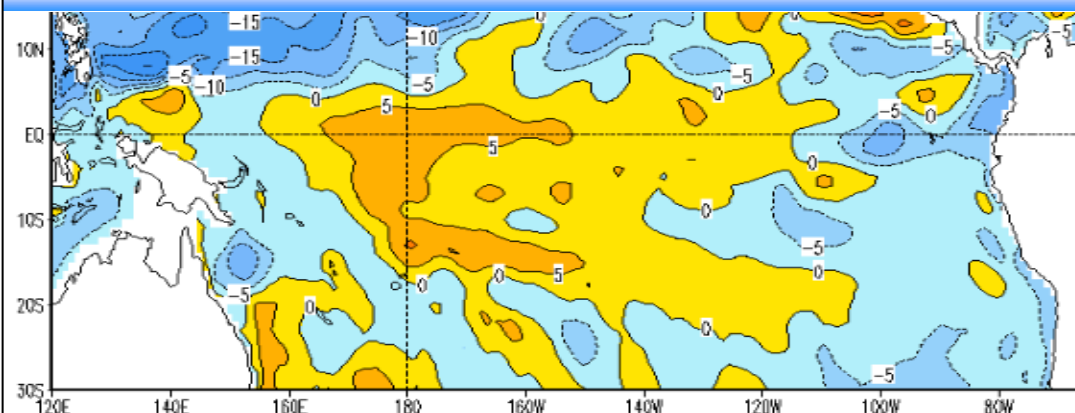


Figure 10: Sea level anomalies of -5cm to +5cm were present in the Fiji Waters (base period: 1981-2010).

Source: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ocean/weeklyenso_clim_81-10/wksl_anm.gif

10. CLOUD COVER

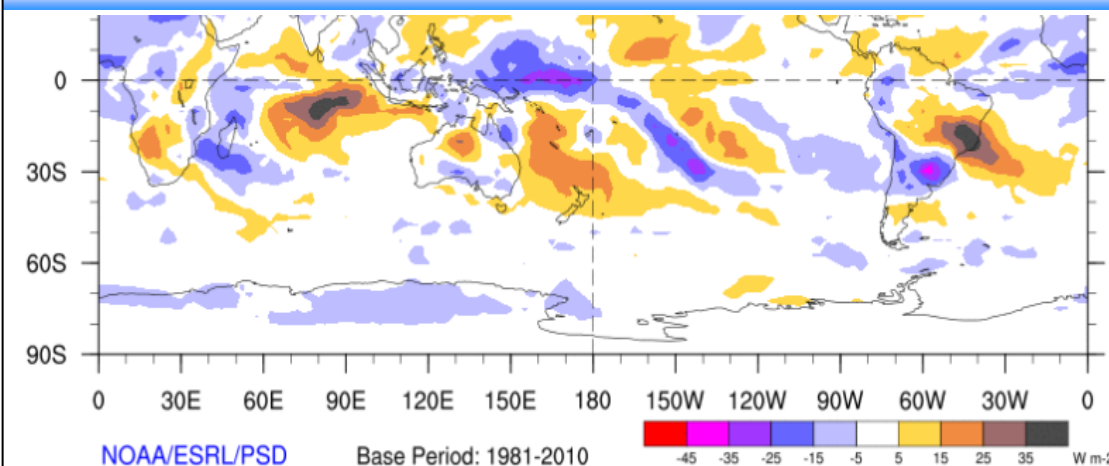


Figure 11: OLR anomalies indicate presence of above normal cloud cover in the Fiji region (Fiji: ~17°S, 180°) (base period: 1981-2010).

<http://www.bom.gov.au/climate/mjo/#tabs=Cloudiness>

11. WIND ANOMALIES

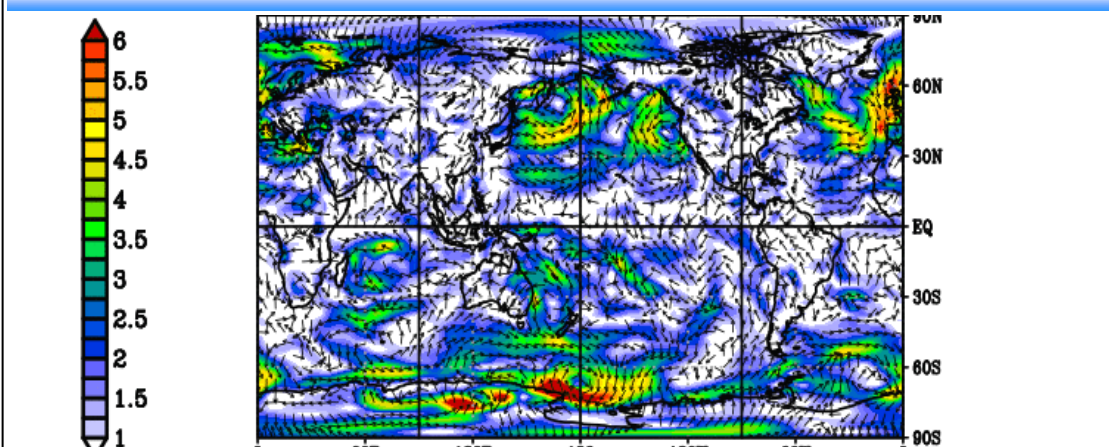


Figure 12: South-easterly wind anomalies of 1-2m/s were present in the Fiji region (Fiji: ~17°S, 180°) (base period: 1981-2010).

Source: https://www.esrl.noaa.gov/psd/map/images/rnl/sfcwnd_30b.rnl.html

REANALYSIS DATA SURFACE WINDS (m/s) 30-DAY ANOMALY FOR: Sat JAN 05 2019 - Sun FEB 03 2019
(NCEP Reanalysis climatology data: 1981-2010, smoothed with 5-day running mean)

12. TROPICAL CYCLONE MONA

Tropical Cyclone (TC) Mona was the first cyclone to pass through the Fiji Group during the 2018-19 TC season. TC Mona reached maximum intensity of category 2 system with sustained winds estimated to 50 knots and gusts to 70 knots.

Mona originated from a low pressure over the Solomon Islands and travelled eastwards where it became a tropical disturbance, TD04F, at 2100UTC on the 31st December 2018 to the east of the Solomon Islands and north of Vanuatu. TD04F became a tropical depression at midday on the 1st January 2019.

TD04F merged with a weakening tropical disturbance, TD05F, while heading east-southeast north of Rotuma. With persistent deep convection, good organisation, good outflow and cyclonic circulation in a low sheared environment, TD04F intensified and was subsequently named TC Mona at 2100UTC on the 2nd with a mean wind speed of 35 knots whilst moving south-southeast near Rotuma.

Mona continued to track south-southeast until 1500UTC on the 3rd when it began to move south-southwest. Mona got upgraded to Category 2 around 2100UTC on the 3rd with maximum 10-minute average wind near the center estimated at about 50 knots.

Mona made a complete loop to the far north of Fiji in a clockwise direction before it moved southeast at 2100UTC on the 4th. Mona got downgraded to Category 1 at midday on the 5th whilst continuing to track southeast north of Fiji later tracking east-southeast at 1200UTC on the 5th till

1200UTC on the 6th when it moved southeast (east of Vanua Levu).

At 1500 UTC on the 6th, Mona began to track south-southeast (east of the Lau group) before turning south-southwest at 0300UTC on the 7th. Mona continued to track south-southwest (east of southern Lau) into an area of high shear before it weakened and lost its tropical cyclone status at 1800UTC on the 7th. It continued to track south as a low pressure thereafter.

The wind related damage due to Mona was limited. While strong breeze were recorded at a number of places during the passage of Mona, only Vanuabalavu and Ono-i-Lau reported near-gale force winds. Vanuabalavu recorded maximum sustained wind of 53km/h and gust of 81km/h on the 6th, while Ono-i-Lau registered maximum sustained wind of 59km/h and gust of 90km/h in the early morning of 8th.

The associated trough with Mona and its predecessors, tropical depressions, TD04F and TD05F, resulted in widespread rainfall across the country between the 1st and the 7th. The highest 24-hour rainfall during this period was registered at Lakeba with 159mm on the 4th, followed by Udu Point with 146mm on the 2nd, Korolevu with 146mm on the 4th and Savusavu with 146mm on the 6th.

During the approach and height of Mona, several roads and crossings were flooded or damaged, especially in the Northern and Central Divisions. Other than this, there was very limited damages reported as a result of Mona.

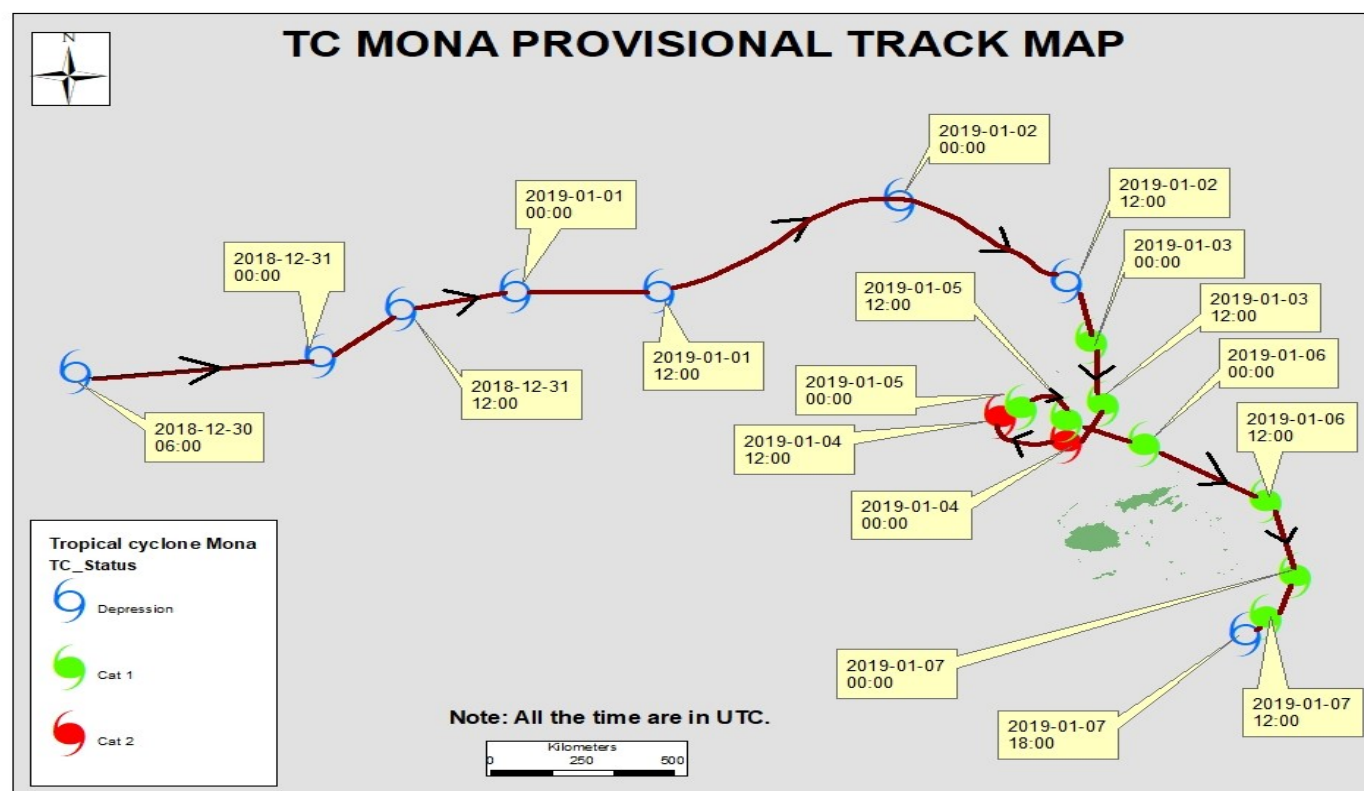


Figure 13: Provisional track map of tropical cyclone Mona.