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# Fiji Climate Summary July 2019



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## 1. IN BRIEF

A weak El Niño event continued to persist in the tropical Pacific during July. However, ENSO indicators weakened during the month.

Series of troughs of low pressure systems, with moist easterlies and cool southeast trades dominated July weather. Occasional showers were observed on the windward coasts of the larger islands and generally fine weather on the opposite side. However, troughs of low pressure resulted in two widespread heavy rainfall events during the month.

Out of the out of the 27 reporting stations, 4 stations recorded *well above average* rainfall, 8 *above average*, 8 *average* and 7 *below average*

*Above average* maximum air temperatures were recorded during the month. The highest daily maximum air temperature was reported at Keiyasi with 33.7°C on the 10<sup>th</sup>, followed by 33.0°C at Rotuma and Labasa Airport, on the 13<sup>th</sup> and 14<sup>th</sup> respectively. Seaqaqa recorded the highest of 32.6°C on the 6<sup>th</sup> and Ba recorded its highest of 32.5°C on the 11<sup>th</sup>. In contrast, the lowest daily maximum air temperature was recorded at Monasavu with 17.2°C, followed by 20.1°C at Nadarivatu on the 25<sup>th</sup> respectively.

Cool southerly wind flows which prevailed over the country during the 21<sup>st</sup> to the 24<sup>th</sup> resulted in cool night-time temperatures at various parts of the country. During this period, the lowest minimum air temperature was registered at Nadarivatu with 10.5°C, followed by Monasavu with 11.5°C, Labasa Airport with 14.0°C and Keiyasi with 14.4°C, recorded on the 23<sup>rd</sup> respectively.

Evaporation were a bit high in the Western Division, compared to Suva, in the Central Division (Figure 6).

Slightly *above normal* sea surface temperatures and *normal* cloud cover were present within the Fiji region during the month (Figure 9 & 10).

The hourly wind observations recorded at Nadi and Nausori Airport during the month showed easterly, southeasterly and westerly winds were quite prevalent at both stations. (Figure 8). However, for the NOAA surface wind anomalies, variable winds were being reflected within the Fiji region (Figure 12).

## 2. WEATHER PATTERNS

The weather in July was mostly influenced by a series of troughs of low pressure systems together with the moist easterlies and the cool southeast trades.

A weak trough of low pressure lay to the east of Fiji from the 1<sup>st</sup> to the 3<sup>rd</sup> before moving on to the group on the 4<sup>th</sup> bringing some showers over most parts of the country. The moist easterlies prevailed over the country thereafter from the 5<sup>th</sup> to the 9<sup>th</sup> with brief showers experienced especially over the eastern parts and interior of the larger islands.

Another trough lay weak to the north of Vanua Levu from the 10<sup>th</sup> to the 11<sup>th</sup> with the southeast trades becoming dominant over the group during this period till the 18<sup>th</sup>. An active trough of low pressure affected Fiji on the 19<sup>th</sup> and 20<sup>th</sup> bringing periods of rain and thunderstorms over the whole country with the highest 24-hour rainfall of 105.0mm recorded at Koronivia on the 20<sup>th</sup>. A cool southerly wind flow prevailed over Fiji from the

21<sup>st</sup> to the 24<sup>th</sup> with the country experiencing cool nights. During this period, a trough of low pressure affected Rotuma with occasional showers and thunderstorms experienced on the island recording its 24-hour rainfall of 26.4mm on the 23<sup>rd</sup>.

The country was again affected by another trough of low pressure from the 25<sup>th</sup> to the 29<sup>th</sup> with occasional rain and thunderstorms experienced over most parts of the group. The highest 24-hour rainfall of 67.0mm was recorded in Levuka on the 26<sup>th</sup> and 63.5mm at Dobuilevu on the 28<sup>th</sup> with strong winds over Fiji waters. This same trough remained over the group before eventually becoming weak and giving way to the moist easterlies which became dominant again over Fiji from the 30<sup>th</sup> till the 31<sup>st</sup>.

Rotuma's weather was mainly affected by series of troughs and moist easterlies during the month.

### 3. RAINFALL

Below average to well above average rainfall were reported at various stations during the month. It was significantly wetter than usual at most parts of Viti Levu and likewise for the Yasawa Group, which recorded generally above average to well above average rainfall. In contrast, Viwa, Yaqara, Tavua, Udu and parts of the Eastern Division recorded below average rainfall.

Overall, out of the 27 reporting stations, 4 stations recorded well above average rainfall, 8 above average, 8 average and 7 below average (Table 2, Figures 1-5).

There were two widespread heavy rainfall episodes observed during the month, which were during the 19<sup>th</sup> to the 21<sup>st</sup> and during the last week of the month.

During the 1<sup>st</sup> event from the 19<sup>th</sup> to the 21<sup>st</sup>, some significant rainfall were experienced in the Central Division, with Nasinu registering 114mm on the 20<sup>th</sup>, followed by Koronivia with 105mm, Nausori Airport with 86mm, Laucala Bay with 67mm and Tokotoko with 45mm, all recorded on the same day. While rainfall in the Western and Northern Divisions were not as significant, it was still good enough to break extended period of dry condition which persisted in some parts of both the Divisions.

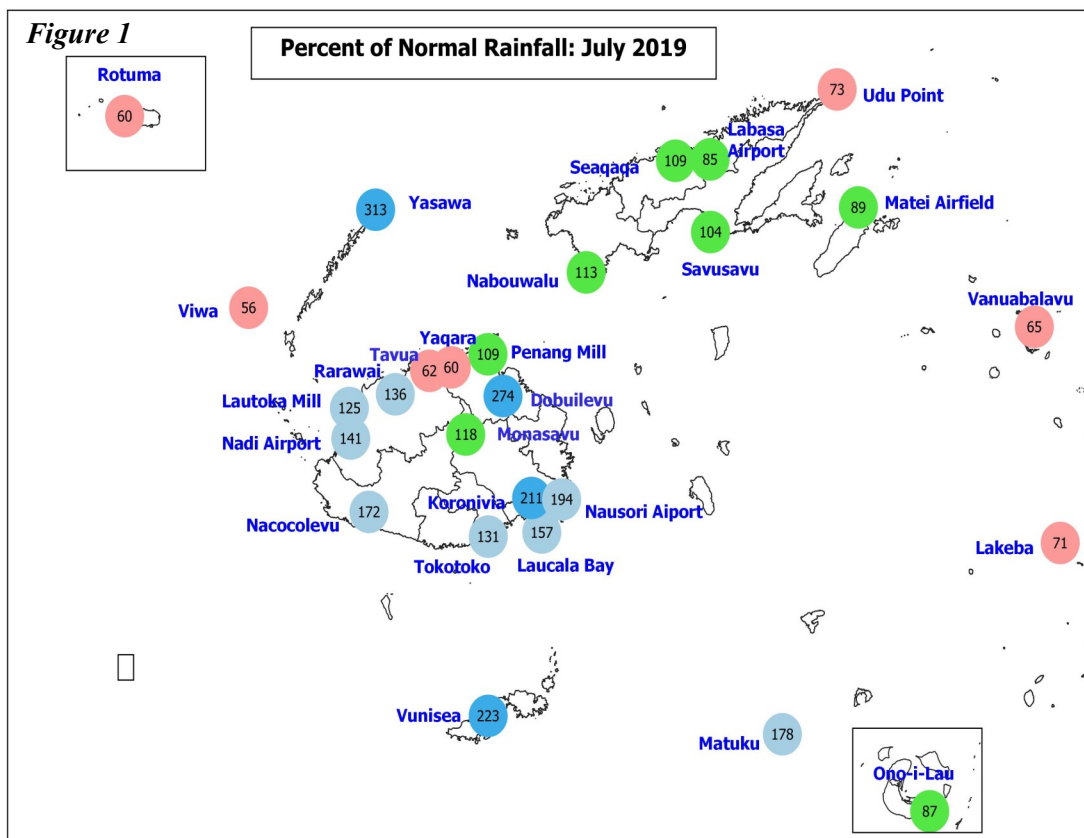
The 2<sup>nd</sup> widespread rainfall event was experienced during the last week, especially from the 26<sup>th</sup> to the 29<sup>th</sup>, with Vunisea registering accumulated rainfall of 126mm in 4

days, followed by Lomaivuna with 119mm, Matuku with 118mm and RKS with 114mm. While the rainfall in the Western Division during this event wasn't as significant as that experienced in the Central and Eastern Divisions, the accumulated rainfall at a number of stations in the Western Division from the 26<sup>th</sup> to 28<sup>th</sup> was close to or more than the normal total monthly rainfall experienced in whole of July

The highest monthly total rainfall of 273.9mm was recorded at Koronivia, followed by 267.0mm at Nasinu, 254.3mm at Vunisea (Kadavu), 244.5mm at Navua and 226.4mm at Nausori Airfield. On the other hand, the lowest monthly total of 19.5mm was recorded at Yaqara, followed by 28.0mm at Tavua.

A new high total monthly rainfall record for July was set at Nasinu during the month with 267mm since observations began in 2008.

On the 24hours rainfall total, the highest of 114.0mm was recorded at Nasinu, followed by 105.0mm at Koronivia, on the 20th respectively. The rest of the stations recorded below 100mm of 24hours rainfall.



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 ≥ 0.1mm

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 *above normal* across the country, with 18 out of the 23 stations recording anomalies  $\geq +0.6^{\circ}\text{C}$ , while the rest recorded anomalies within  $\pm 0.5^{\circ}\text{C}$  (Table 2 & Figures 2-5).

The warmest days on average were recorded at Labasa Airport and Rotuma with  $31.4^{\circ}\text{C}$ , followed by  $30.8^{\circ}\text{C}$  at Seaqaqa,  $30.7^{\circ}\text{C}$  at Keiyasi,  $30.3^{\circ}\text{C}$  at Rarawai Mill (Ba) and  $30.2^{\circ}\text{C}$  at Yaqara. On the other hand, the coolest daytime temperatures on average was at Monasavu with  $22.4^{\circ}\text{C}$ , followed by Nadarivatu with  $23.7^{\circ}\text{C}$  and  $26.7^{\circ}\text{C}$  recorded at Matuku and Koro Island.

The highest daily maximum air temperature during the month was reported from Keiyasi with  $33.7^{\circ}\text{C}$  on the 10<sup>th</sup>, followed by  $33.0^{\circ}\text{C}$  at Rotuma and Labasa Airport, on the 13<sup>th</sup> and 14<sup>th</sup> respectively. Seaqaqa recorded the highest of  $32.6^{\circ}\text{C}$  on the 6<sup>th</sup> and Ba recorded its highest of  $32.5^{\circ}\text{C}$  on the 11<sup>th</sup>. In contrast, the lowest daily maximum air temperature was recorded at Monasavu with  $17.2^{\circ}\text{C}$ , followed by  $20.1^{\circ}\text{C}$  at Nadarivatu on the 25<sup>th</sup> respectively.

A record high mean monthly maximum air temperature for July was established at Labasa Airport and Rotuma with both registering  $31.4^{\circ}\text{C}$  (Table 1). Furthermore, Rotuma recorded its new highest daily maximum air temperature of  $33.0^{\circ}\text{C}$  on the 13<sup>th</sup> (Table 1).

### B. Minimum Night-time Air Temperatures

The mean minimum air temperatures were generally *above normal* with more than 75% of the stations recording anomalies equal to and above  $+0.6^{\circ}\text{C}$ , while 3 stations recorded anomalies within  $\pm 0.5^{\circ}\text{C}$  and 2 had anomalies at below  $-0.6^{\circ}\text{C}$ . (Table 2 & Figures 2-5).

Nadarivatu recorded the coolest average night-time temperature of  $15.7^{\circ}\text{C}$ , followed by Monasavu with  $16.3^{\circ}\text{C}$ ,  $17.5^{\circ}\text{C}$  at Labasa Airfield,  $18.5^{\circ}\text{C}$  at Rarawai (Ba) and  $19.4^{\circ}\text{C}$  at Keiyasi (Sigatoka Valley). Rotuma, on the other hand, reported the warmest average night-time temperatures with  $24.8^{\circ}\text{C}$ , followed by Viwa with  $23.3^{\circ}\text{C}$  and  $23.0^{\circ}\text{C}$  at Nabouwalu.

Occasional episodes of very cool nights were experienced during the month, especially from the 22<sup>nd</sup> to the 25<sup>th</sup>. During this period, the lowest minimum air temperature was registered at Nadarivatu with  $10.5^{\circ}\text{C}$ , followed by Monasavu with  $11.5^{\circ}\text{C}$ , Labasa Airport with  $14.0^{\circ}\text{C}$ , Keiyasi with  $14.4^{\circ}\text{C}$  and  $15.7^{\circ}\text{C}$  at RKS Lodoni, on the 23<sup>rd</sup> respectively.

There were no newly established minimum air temperature records, however, Nausori Airport's highest daily minimum temperature recorded ( $23.6^{\circ}\text{C}$  on the 5<sup>th</sup>), was equivalent to the stations highest minimum recorded in 1999.

**TABLE 1. CLIMATE RECORDS ESTABLISHED IN JULY 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>
Total Monthly Rainfall	Nasinu	267.0mm	-	New High	250.5mm	2013	2008
Mean Monthly Max. Temperature	Rotuma	$31.4^{\circ}\text{C}$	-	New High	$30.5^{\circ}\text{C}$	2002	1933
Mean Monthly Max. Temperature	Labasa Airport	$31.4^{\circ}\text{C}$	-	New High	$30.4^{\circ}\text{C}$	1991	1957
Daily Max. Temperature	Rotuma	$33.0^{\circ}\text{C}$	13 <sup>th</sup>	New High	$32.7^{\circ}\text{C}$	2017	1933

*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 JULY 2019**

	RAINFALL				AIR TEMPERATURES								SUNSHINE TOTAL	
	TOTAL	RAIN	MAX.	MAX.	AVERAGE DAILY				EXTREME				TOTAL	*
	MM	%	+	MM ON	MAX.	#	MIN.	#	MAX.	MIN.	MAX.	MIN.	HRS	%
NADI AIRPORT	65	141	7	35 26	28.9	0.3	20.3	1.9	30.6	11	16.0	23	219	100
SUVA/LAUCALA BAY	214	157	22	67 20	27.4	0.6	22.1	1.4	29.6	16	18.6	16	155	115
NACOCOLEVU	124	172	13	41 26	29.3	1.9	18.8	0.9	31.4	5	14.7	22	178	107
ROTUMA	141	60	26	26 23	31.4	2.3	24.8	0.7	33.0	13	22.9	23	195	98
VIWA	32	56	7	16 19	29.2	1.4	23.3	0.7	31.2	30	20.1	4		
UDU POINT	65	73	12	18 21	27.7	-0.3	21.9	-0.4	30.1	20	18.6	23		
SAVUSAVU AIRFIELD	100	104	12	33 21	27.4	0.4	22.6	1.6	30.1	5	19.0	24		
LABASA AIRFIELD	46	85	7	25 21	31.4	2.2	17.5	-0.6	33.0	14	14.0	23		
NABOUWALU	104	113	21	28 26	28.0	1.7	23.0	1.2	30.9	1	19.4	16		
KORONIVIA	274	211	26	105 20	27.6	1.1	20.7	1.3	30.8	1	16.5	23		
NAUSORI AIRPORT	226	194	20	86 20	27.4	1.1	20.8	1.2	29.8	1	16.4	23		
NAVUA/TOKOTOKO	245	131	21	45 20	INSUFFICIENT DATA									
MONASAVU	225	118	24	31 11	22.4	1.3	16.3	0.8	26.6	1	11.5	23		
LAUTOKA AES	61	125	4	33 28	29.6	1.3	20.5	0.6	31.5	19	17.5	23		
BA/RARAWAI MILL	53	136	7	20 26	30.3	0.7	18.5	1.5	32.5	11	14.0	4		
PENANG MILL	60	109	14	22 19	28.4	1.0	21.4	1.0	31.5	30	16.5	17		
MATEI AIRFIELD	92	89	18	30 27	28.0	0.9	22.2	0.6	29.5	29	18.0	15		
VANUABALAVU	56	65	15	25 26	27.6	0.6	20.1	-1.8	29.1	5	18.4	3		
LAKEBA	58	71	16	24 27	27.2	0.8	22.2	1.2	29.8	1	16.6	23		
YASAWA	165	384	6	61 19	29.7	1.9	22.9	0.6	31.2	20	20.7	31		
VUNISEA	254	223	19	72 28	26.9	1.2	20.7	1.1	30.3	29	17.6	24		
MATUKU	147	178	11	43 27	26.7	0.7	21.8	1.0	28.2	17	18.5	23		
ONO-I-LAU	80	87	12	21 26	27.4	2.4	21.7	1.5	31.2	17	17.5	25		
YAQARA AWS	20	60	5	8 20	30.2		22.0		32.2	10	17.5	15		
LEVUKA AWS	179	182	18	67 26	U/S		U/S							
KEIYASI AWS	68		6	36 26	30.7		19.4		33.7	10	14.4	23		
LOMAIVUNA AWS	216		20	52 29	U/S		U/S							
NADARIVATU AWS	66		11	23 28	23.7		15.7		26.2	19	10.5	23		
RKS LODONI AWS	210		23	68 26	27.7		20.8		30.1	1	15.7	23		
MOMI AWS	51		7	29 26	29.2		21.6		31.5	31	17.0	23		
KOROLEVU AWS	U/S				U/S				U/S					
KORO ISLAND AWS	U/S				26.7		21.7		29.4	29	18.0	23		
SIGATOKA AWS	U/S				27.6		19.8		30.6	5	15.2	24		
RAKIRAKI AWS	52		9	20 28	U/S		U/S							
WAINIKORO AWS	50		10	13 21	U/S		U/S							
SAQANI AWS	72		14	18 4	U/S		U/S							
VATUREKUKA AWS	44		10	26 21	29.3		U/S		31.0	1	U/S			
KUBULAU AWS	U/S				U/S		U/S							
SEAQAQA AWS	58	112	10	23 26	30.8		21.2		32.6	6	15.1	15		
DOBULEVU TB3	154	274	14	64 28										
NASINU TB3	267		17	114 20										
TAVUA TB3	28	62	5	10 20										

	TEMPERATURE (C)		HUMIDITY		WIND	SUN RAD	
	MEAN	DRY WET	RH% VP	% OF MJ/ POS SQ.M			
NADI AIRPORT	24.6	24.9 22.0	76 24.2	6.1	66	13.0	
SUVA/LAUCALA BAY	24.7	25.2 22.6	80 25.5	0.0	47	12.5	
NACOCOLEVU	24.1	24.6 22.1	80 24.7	0.0	54	14	
ROTUMA	28.1	28.5 25.7	79 30.7	3.5	57	16	
VIWA	26.2	25.7	INSUFFICIENT DATA				
UDU POINT	24.8	26.0 23.6	81 27.2	7.8			
SAVUSAVU AIRFIELD	25.0	25.5 23.4	83 27.2				
LABASA AIRFIELD	24.5	26.6 24.6	84 29.4				
NABOUWALU	25.5	25.4 23.1	82 26.5	8.0			
KORONIVIA	24.1	24.8 22.7	84 26.1				
NAUSORI AIRPORT	24.1	24.1 22.3	85 25.6	4.1			
NAVUA/TOKOTOKO	INSUFFICIENT DATA						
MONASAVU	19.3	19.5 18.5	90 20.6				
LAUTOKA AES	25.0	27.2 22.8	67 24.5				
BA/RARAWAI MILL	24.4	24.3 21.8	80 24.4				
PENANG MILL	24.9	25.5 22.5	76 25.0				
MATEI AIRFIELD	25.1	26.1 23.6	80 27.2				
VANUABALAVU	23.8	25.7 23.2	81 26.7	6.2			
LAKEBA	24.7	25.4 23.1	81 26.5	4.3			
YASAWA	26.3	26.6 23.8	78 27.4	10.5			
VUNISEA	23.8	23.7	(AWS DATA)				
MATUKU	24.2	24.9 21.9	76 24.1	5.3			
ONO-I-LAU	24.5	24.1	(AWS DATA)				

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 (July, 2018 - July, 2019)

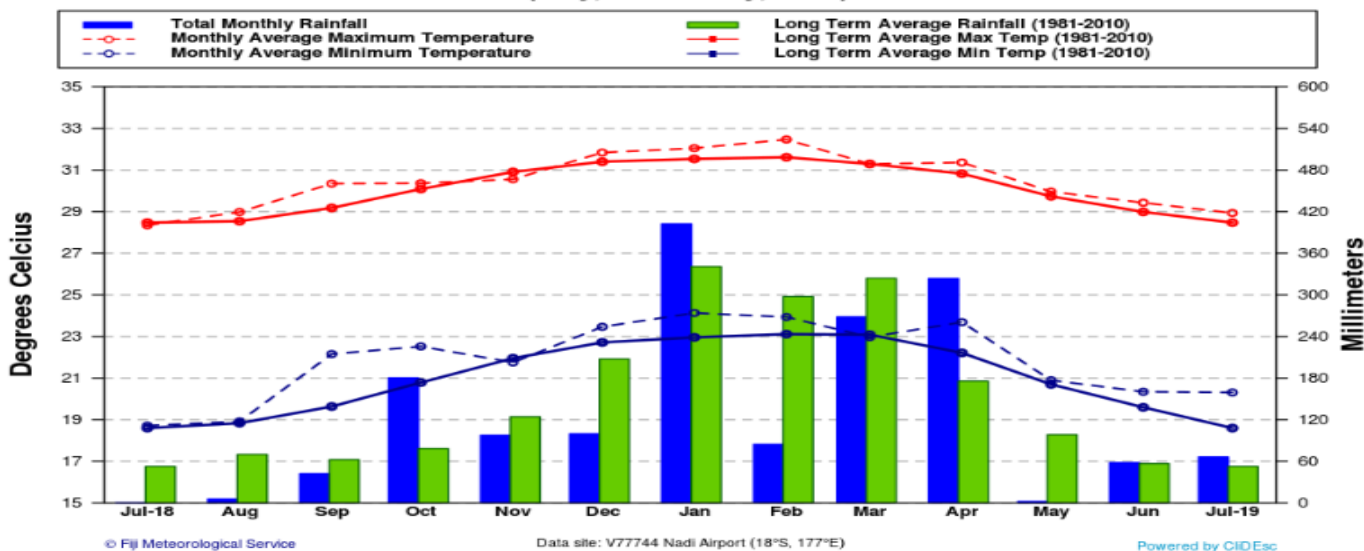


Figure 3 Laucala Bay - Temperature & Rainfall for the last 13 Months (July, 2018 - July, 2019)

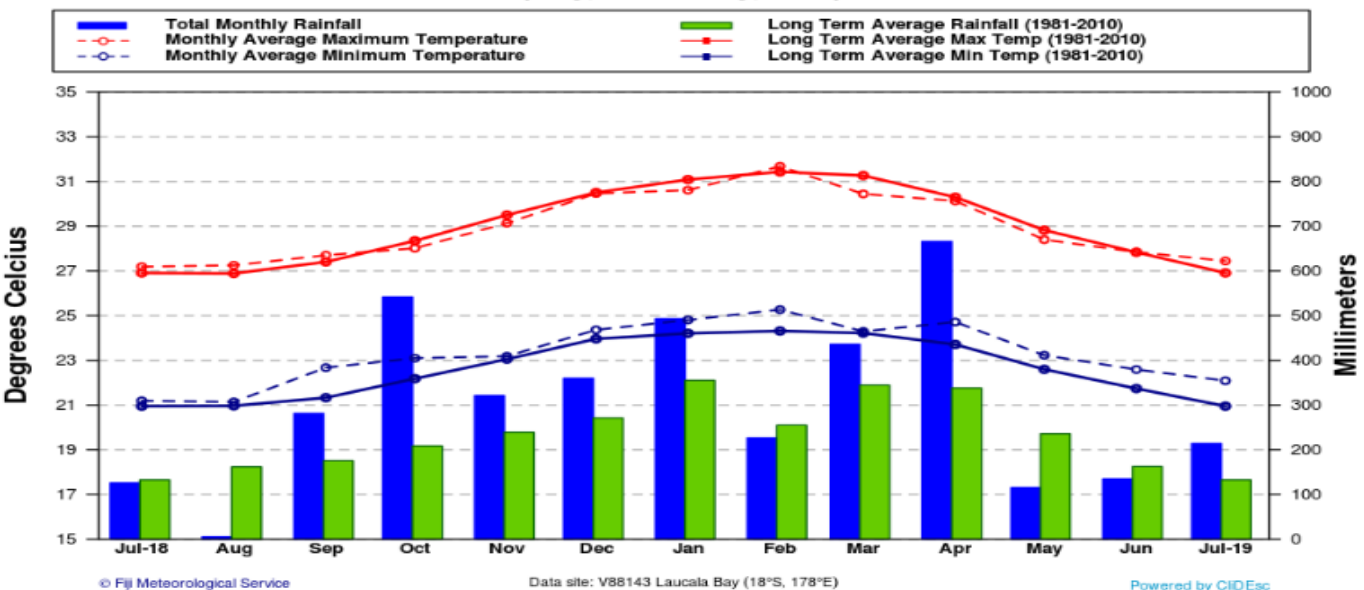
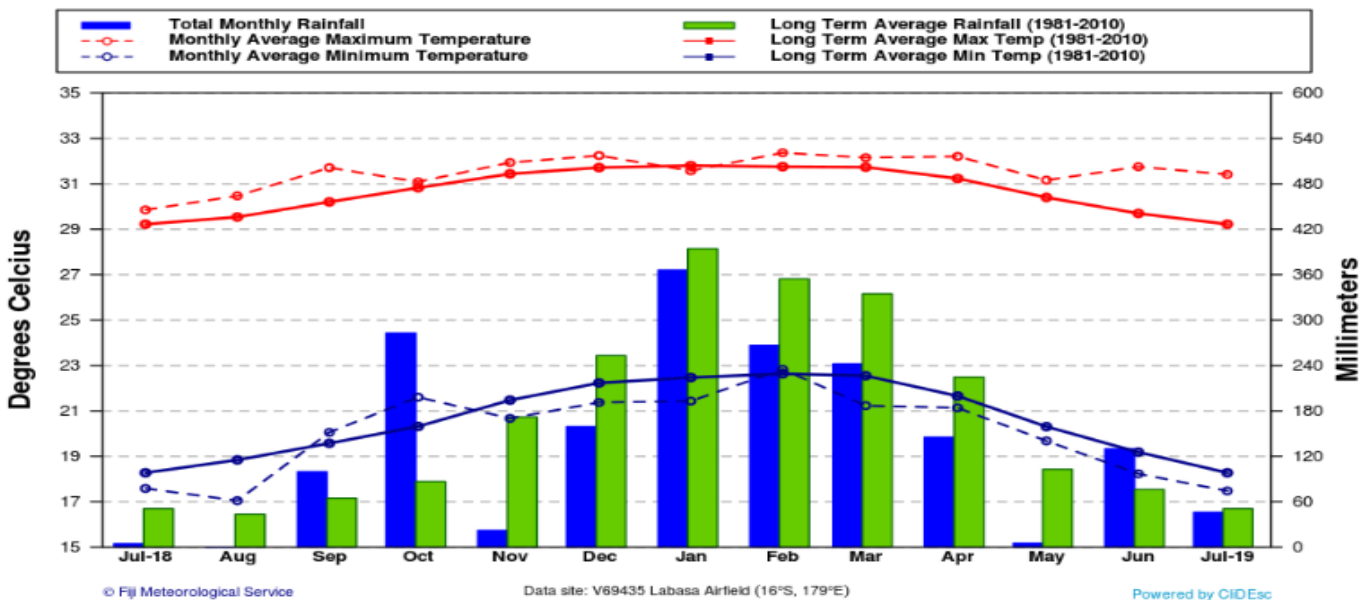
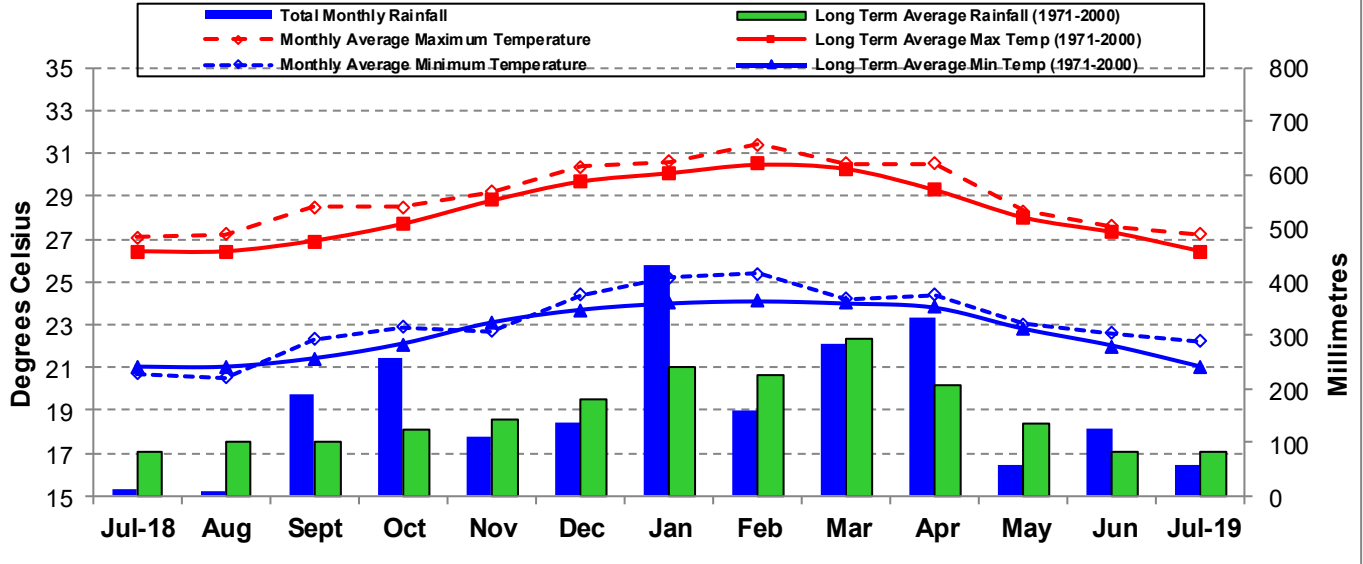


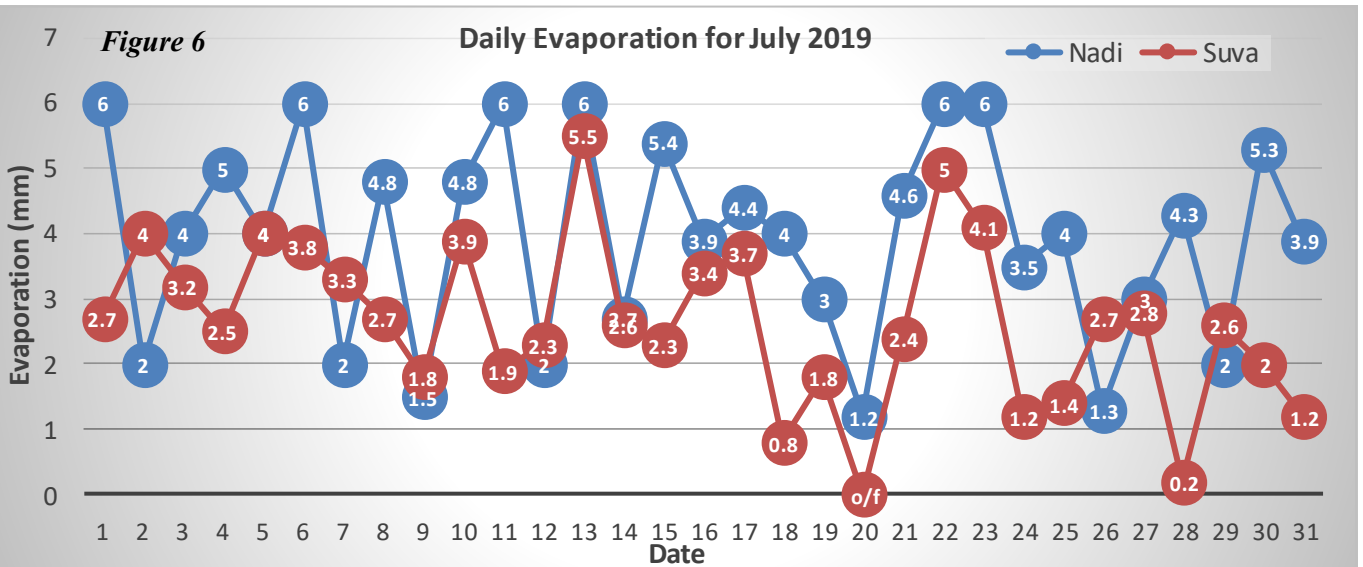
Figure 4 Labasa Airfield - Temperature & Rainfall for the last 13 Months (July, 2018 - July, 2019)



**Figure 5 Lakeba (Eastern Division) - Temperature & Rainfall Records for the last 13 Months (July 2018 - July 2019)**

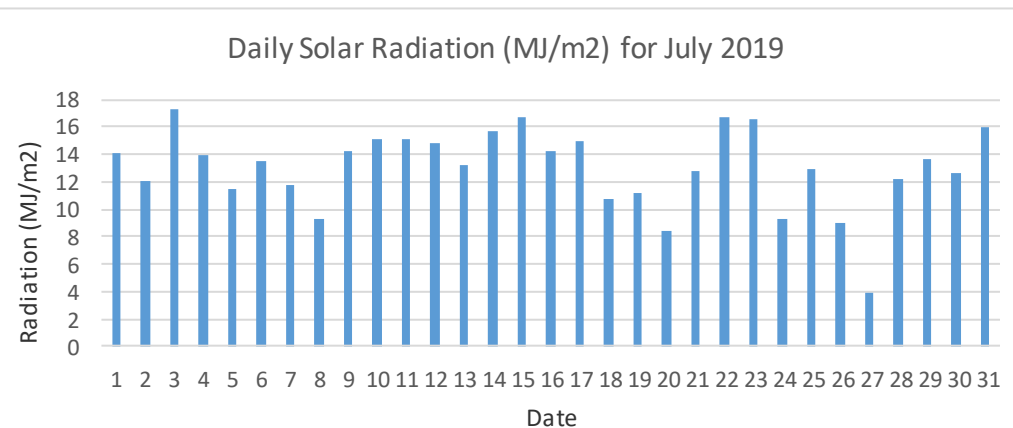


**5. DAILY RAISED PAN EVAPORATION**



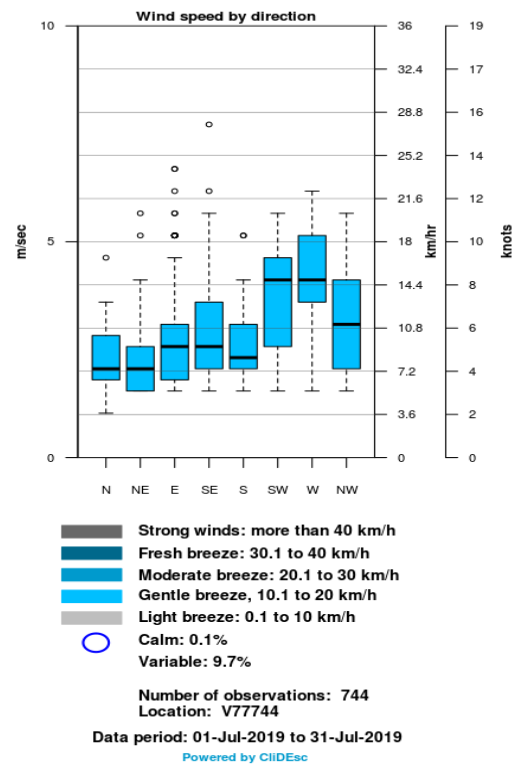
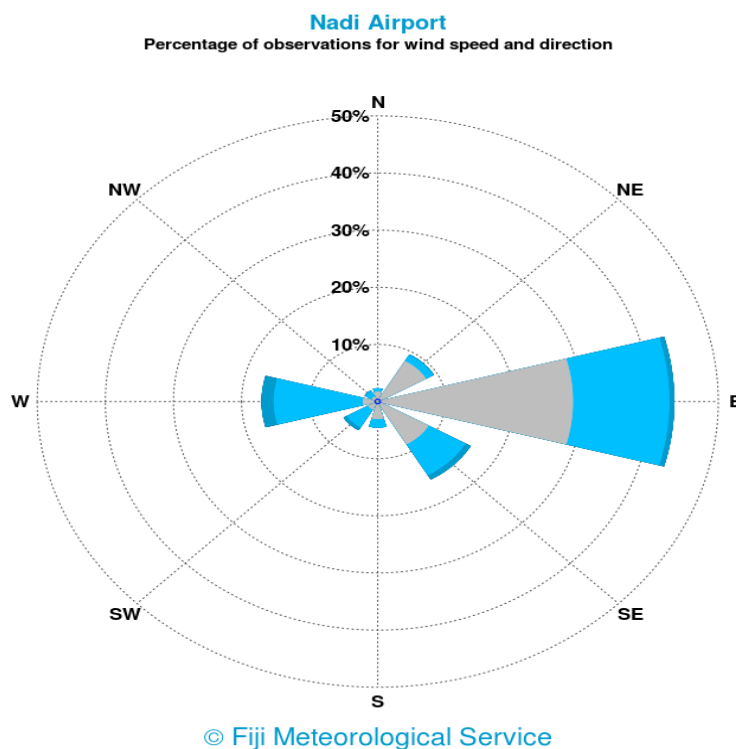
**Figure 6:** The total monthly raised pan evaporation at Nadi Airport was 122.6mm, with the highest daily evaporation of 6.0mm recorded on the 1<sup>st</sup>, 6<sup>th</sup>, 11<sup>th</sup>, 13<sup>th</sup>, 22<sup>nd</sup> and 23<sup>rd</sup>. Laucala Bay recorded total monthly evaporation of 81.8mm, with the highest daily evaporation of 5.5mm on the 13<sup>th</sup>.

**6. SOLAR RADIATION**

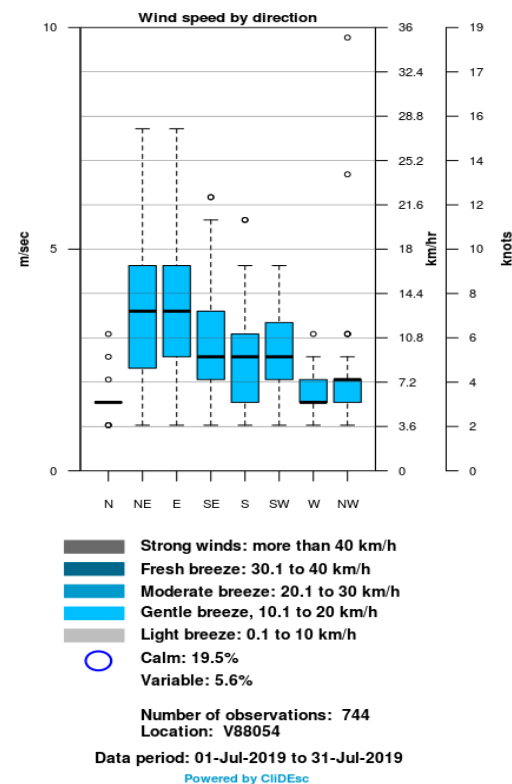
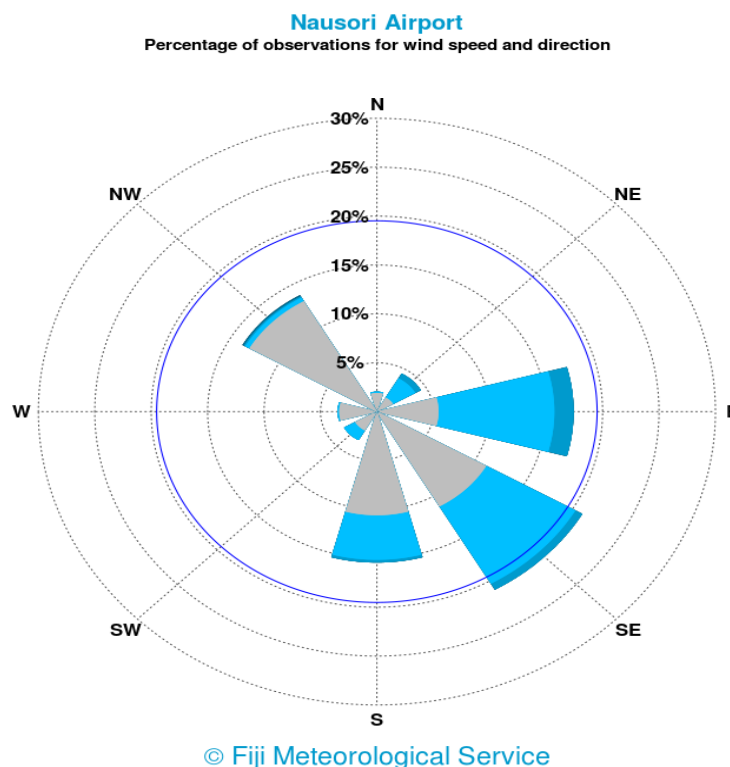


**Figure 7:** The mean daily solar radiation at Nadi Airport during July 2019 was 13.0MJ/m<sup>2</sup> compared to 14.7MJ/m<sup>2</sup> over 30 year average (1971-2000).

## 7. WIND SUMMARY

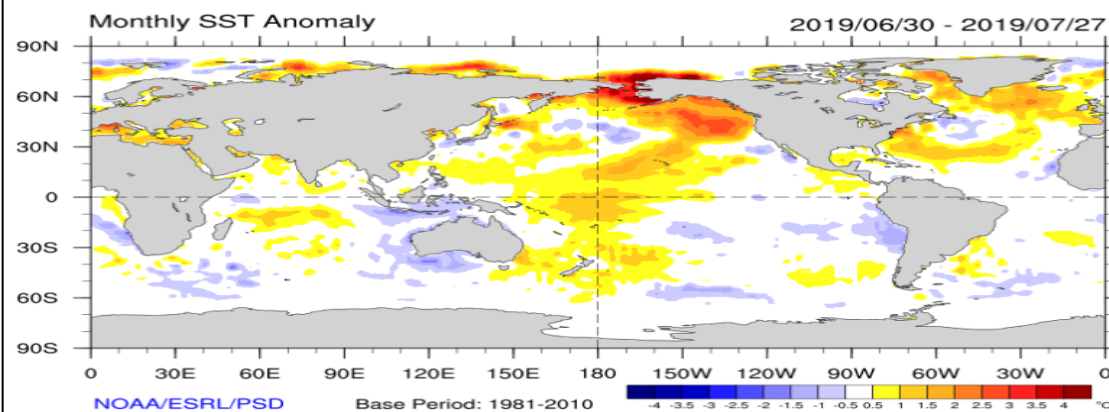


**Figure 8a:** The hourly wind observations at Nadi Airport during the month showed that winds from the east were dominant, followed by west then southeast. Wind speeds were generally light to gentle in strength.



**Figure 8b:** The hourly wind observations at Nausori Airport during the month showed that winds from south east were dominant, followed by south, east and northwest. Wind speeds were generally light to gentle in strength, but occasionally reaching moderate strength.

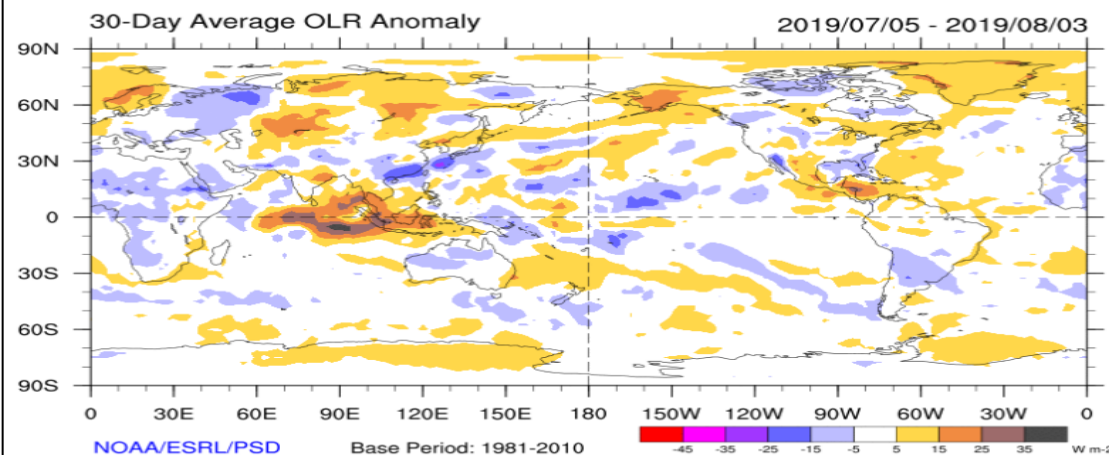
### 8. SEA SURFACE TEMPERATURE (SST)



**Figure 9:** Above normal SSTs were present in the Fiji region during July 2019 (base period: 1981-2010).

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

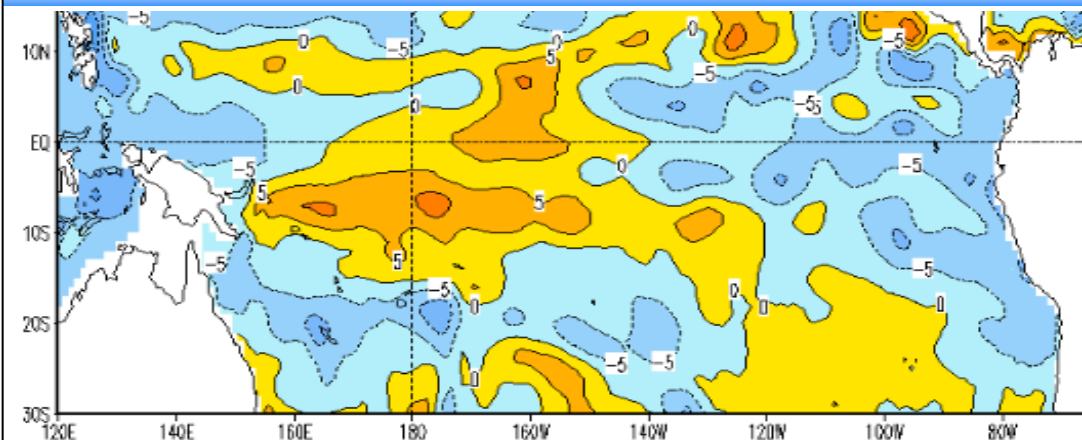
### 9. CLOUD COVER



**Figure 10:** Near normal cloud cover was present over most of the Fiji region (base period: 1981-2010).

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

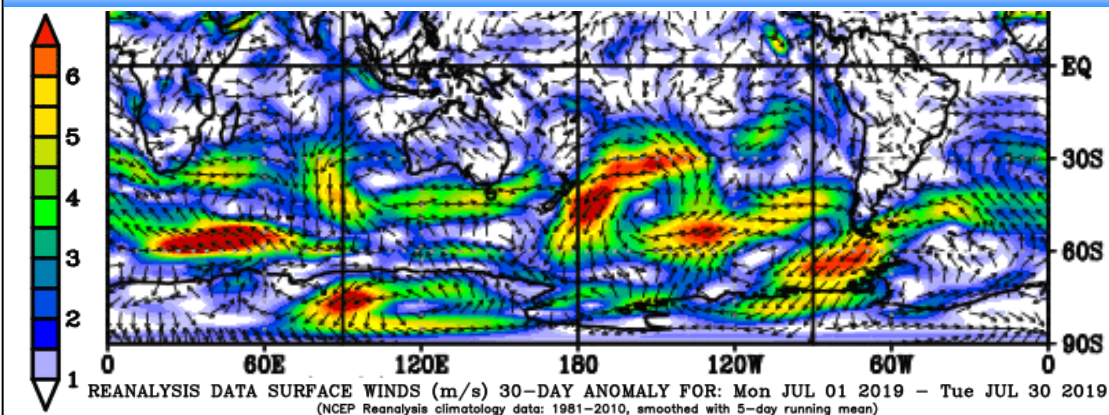
### 10. SEA LEVEL



**Figure 11:** Sea level anomalies of around 0cm to -10cm were observed in most of 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](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ocean/weeklyenso_clim_81-10/wksl_anm.gif)

### 11. WIND ANOMALIES



**Figure 12:** Variable wind anomalies of around 1-2m/s were recorded in the Fiji region (base period: 1981-2010).

Source: [https://www.esrl.noaa.gov/psd/map/images/rnl/sfcwnd\\_30b.rnl.html](https://www.esrl.noaa.gov/psd/map/images/rnl/sfcwnd_30b.rnl.html)