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**Fiji Climate Summary
July 2017**



**ISO 9001:2008
certified Climate
Services**



Winner - Fiji Business Excellence Prize
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1. IN BRIEF

The Pacific Ocean remains warmer than average and has been lingering around borderline El Niño conditions since April 2017.

Even though it has not reached the El Niño levels, its influence on Fiji's climate in the past months and during July 2017 is evident with drier than *normal* conditions experienced over majority of the country.

This is the fourth consecutive month when Fiji did not get its *normal* rainfall, especially over the Western Division, with its effects expanding to the Northern and parts of the Eastern Divisions.

While the windward sides of the larger islands experienced occasional Trade showers, it was still significantly drier than the *normal*. In contrast, Rotuma experienced wet conditions due to the displacement of the South Pacific Convergence Zone close to the island.

The dryness was quite notable over the northwestern Viti Levu and Yasawa-i-rara, with Tavua, Penang Mill, Yaqara, Rarawai Mill and Yasawa-i-rara receiving less than 5mm of rainfall during July 2017.

Extended periods of dry days were experienced over the

Western Division with less than 5 rain days recorded at Nacocolevu, Momi, Nadi Airport, Lautoka Mill, Rarawai Mill, Tavua, Yaqara, Penang Mill, Viwa, Yasawa-i-rara and Labasa Airport. Notably, Yasawa-i-rara and Momi experienced 50 and 49 consecutive days of dryness from June 2017, respectively, until some relieving rainfall was received in the last week of the month.

The rainfall over the Western Division on the 29th and 30th was very welcoming, but it was not sufficient to overcome the rainfall deficiencies from April 2017. Consequently, majority of the Western Division continue to be in meteorological drought state as at end of July 2017.

A very notable period of hot daytime conditions were experienced between 20th and 23rd with all the observing stations recording their highest daily maximum temperature for the month during this period. New daily high maximum temperature record for July were established at Nacocolevu, Viwa, Lakeba and Ono-i-lau during this period (Table 1).

Significantly cool conditions were experienced at night on occasions, with the lowest daily night-time temperature registered at Nadarivatu with 9.8°C on the 1st, followed by Monasavu with 10.5°C on the 27th and Keiyasi with 11.6°C

2. WEATHER PATTERNS

July's weather was dominated by broad southeast trade winds, frontal system and troughs of low pressure.

From 1st to 13th, a broad southeasterly wind flow dominated the Fiji Group and fine weather prevailed apart from trade showers experienced over the interior and eastern parts of the country.

On the 14th, a weak frontal system moved over the group as the high pressure system to the south intensified. The front affected parts of the group with cloud and showers till the 15th before moving north and weakening further. Following the passage of the trough, a broad southeasterly wind flow once again covered the group with fine weather prevailing apart from trade showers over the interior and eastern parts of Fiji.

On the 21st, winds turned easterly and a weak trough of low pressure moved over the group from the west and affected parts of the country till the 24th before moving east, weakening further and dissipating. The southeast winds re-established itself later on the 24th and prevailed till 28th. Fine weather was experienced apart from trade showers over the interior and eastern parts of the country.

On the 29th, a weak trough of low pressure moved over the group from the west and showers was experienced in most parts of the county. The trough moved eastwards on the 30th and the southeast winds re-established on the 31st.

Cool nights were experienced on most days of July.

Rotuma's weather was largely influenced by the South Pacific Convergence Zone producing rain on most of the days.

*Previously known as the Fiji Islands Weather Summary and Monthly Weather Summary

3. RAINFALL

Suppressed rainfall was experienced over most parts of the country during July 2017. While the windward sides of the larger islands experienced occasional Trade showers, it was still significantly drier than the *normal*. In contrast, Rotuma was wet due to the displacement of the South Pacific Convergence Zone close to the island.

Out of the 23 rainfall monitoring stations, 13 registered *well below average* rainfall during the month, 8 *below average*, 1 *average* (Matuku), while Rotuma was the lone station to record *above average* rainfall (Table 2 & Figures 1-5).

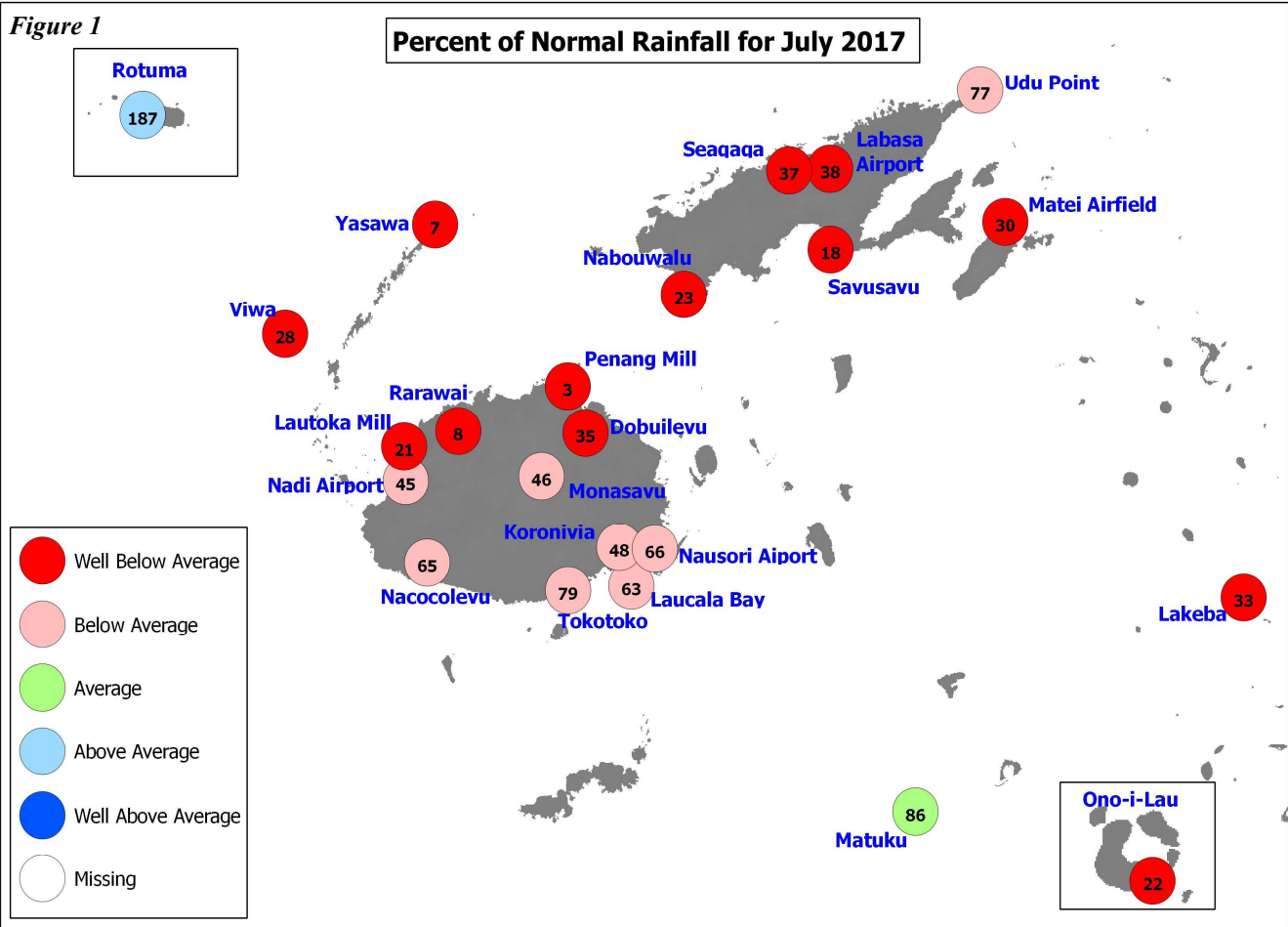
The dryness was quite notable over the northwestern Viti Levu and Yasawa-i-rara, with Tavua, Penang Mill, Yaqara, Rarawai Mill and Yasawa-i-rara receiving less than 5mm of rainfall during the month. Furthermore, rest of the Western Division, parts of the Northern Division and Lakeba and Ono-i-lau in the Lau Group recorded less than 25mm of total monthly rainfall. In contrast, Rotuma recorded highest rainfall of 435mm, followed by Tokotoko with 147mm, Korolevu with 101mm and Nasinu with 89mm.

Extended periods of dry days were experienced over the Western Division with less than 5 rain days recorded at Nacocolevu, Momi, Nadi Airport, Lautoka Mill, Rarawai Mill, Tavua, Yaqara, Penang Mill, Viwa, Yasawa-i-rara and Labasa Airport. Notably, Yasawa-i-rara and Momi experienced 50 and 49 consecutive dry days from June 2017, respectively, until some relieving rainfall was received in the last week of the month. On the other hand, Monasavu recorded 29 rain days followed by Rotuma with 24, and Nausori Airport, Koronivia and RKS with all 18.

A weak trough of low pressure produced much needed rainfall over the Western Division from 29th to the 30th but was not sufficient to overcome the rainfall deficiencies from April 2017. Consequently, majority of the Western Division continue to be in meteorological drought state as at end of July 2017.

The highest 24 hour rainfall of 88.8mm was recorded at Rotuma on the 6th, followed by Tokotoko with 48.5mm on the 24th and Korolevu with 36.7mm on the 29th.

No new rainfall record was established during July 2017.



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 maximum air temperatures were *above normal* at most of the stations during the month, with 12 out of the 20 stations recording anomalies $\geq 0.5^{\circ}\text{C}$, 6 within $\pm 0.5^{\circ}\text{C}$, while Navua and Udu Point were the only stations with *below normal* temperatures (Table 2 & Figures 2-5).

The warmest days on average was experienced at Rarawai Mill with 30.5°C , followed by 30.1°C at Labasa Airport and 30.0°C at Yaqara. On the other hand, Monasavu recorded the coolest maximum temperature on average of 21.3°C , followed by Nadarivatu with 22.5°C and Ono-i-lau with 25.8°C .

A very notable period of hot daytime conditions were experienced from the 20th to the 23rd with all the observing stations recording their highest daily maximum temperature for the month during this period. The highest of this was recorded at Keiyasi with 34.7°C on the 21st, followed by Yaqara with 34.0°C on the 21st and Nadi Airport with 33.8°C on the 20th. Extraordinarily, new daily high maximum temperature record for July was established at Nacocolevu, Viwa, Lakeba and Ono-i-lau during this period (Table 1).

On the other hand, most of the stations recorded their lowest daily maximum between 15th and 16th. Monasavu recorded the lowest daytime temperature of 16.0°C on the 15th, followed by Nadarivatu with 18.3°C on the 16th and Tokotoko with 23.0°C on the 15th.

B. Minimum Night-time Air Temperatures

The minimum air temperatures were *normal to above normal* across the country, with 10 out of the 19 stations registering anomalies within $\pm 0.5^{\circ}\text{C}$ and 9 $\geq 0.5^{\circ}\text{C}$ (Table 2 & Figures 2-5).

The coolest nights on average was experienced at Nadarivatu with 14.5°C , followed by Monasavu with 15.4°C , Keiyasi with 16.2°C and Nacocolevu with 17.6°C . On the other hand, Rotuma registered warmest nights on average with 25.1°C , followed by Viwa with 22.8°C and Nabouwalu with 22.7°C .

Significantly cool conditions were experienced at night on occasions, with the lowest daily night-time temperature of 9.8°C was recorded at Nadarivatu on the 1st, followed by Monasavu with 10.5°C on the 27th and Keiyasi with 11.6°C on the 1st. On the other hand, the warmest night was at Rotuma with 26.8°C on the 23rd, followed by Udu Point with 25.3°C on the 21st, and Matei Airfield and Lakeba with both 25.2°C on the 21st and 22nd, respectively.

The greatest positive mean monthly night-time air temperature departure from the *normal* of $+1.4^{\circ}\text{C}$ was recorded at Savusavu Airfield followed by $+1.3^{\circ}\text{C}$ at Tokotoko.

No new night-time temperature record was established during the month (Table 1).

TABLE 1. CLIMATE RECORDS ESTABLISHED IN JULY 2017

<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>
Daily Maximum Temperature	Nacocolevu	33.1°C	20 th	New High	33.1°C	1959	1938
Daily Maximum Temperature	Rotuma	32.7°C	23 rd	New High	32.5°C	1986	1933
Daily Maximum Temperature	Lautoka	33.5°C	20 th	New High	33.3°C	1952	1930
Daily Maximum Temperature	Lakeba	30.6°C	23 rd	New High	30.2°C	1996	1955
Daily Maximum Temperature	Ono-i-lau	30.6°C	22 nd	New High	29.7°C	1977	1943

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 2017

	RAINFALL					AIR TEMPERATURES								SUNSHINE	
	TOTAL	RAIN		MAX.		AVERAGE DAILY				EXTREME				TOTAL	*
	MM	%	DAYS +	MM	ON	MAX. C	# C	MIN. C	# C	MAX. C	ON	MIN. C	ON	HRS	%
NADI AIRPORT	21	45	1	21	29	29.3	0.7	19.5	1.1	33.8	20	17.5	3	240	110
SUVA/LAUCALA BAY	85	63	15	32	29	26.5	-0.3	21.2	0.5	28.7	23	17.9	1	117	86
NACOCOLEVU	47	65	5	33	29	27.9	0.5	17.6	-0.3	33.4	20	13.3	1	191	115
ROTUMA	435	187	24	89	6	30.1	1.0	25.1	1.0	32.7	23	22.7	5	161	81
VIWA	16	28	3	14	29	29.3	1.5	22.8	0.2	32.9	21	20.4	4		
UDU POINT	68	77	14	20	3	27.2	-0.8	22.3	0.0	29.9	22	19.8	16		
SAVUSAVU AIRFIELD	17	18	8	5	8	26.6	-0.4	22.4	1.4	29.5	20	20.4	31		
LABASA AIRFIELD	20	38	1	20	5	29.9	0.7	18.8	0.7	33.0	21	14.5	3		
NABOUWALU	21	23	13	7	22	26.9	0.6	22.7	0.9	30.3	21	20.7	16		
KORONIVIA	63	48	18	28	24	26.7	0.2	19.5	0.1	30.7	22	15.6	3		
NAUSORI AIRPORT	77	66	18	24	24	26.4	0.1	19.7	0.1	30.4	21	14.7	1		
NAVUA/TOKOTOKO	147	79	14	49	24	26.2	-1.0	19.4	1.3	30.0	20	16.3	28		
MONASAVU	87	46	29	12	18	21.3	0.2	15.4	-0.1	26.6	21	10.5	27		
LAUTOKA AES	10	21	2	10	29	29.6	1.3	19.9	0.0	33.5	20	16.8	1		
BA/RARAWAI MILL	3	8	2	3	29	30.5	0.9	U/S		33.0	21	U/S			
PENANG MILL	1	3	3	1	29	28.4	1.0	20.9	0.5	32.0	21	17.0	31		
MATEI AIRFIELD	31	30	17	16	18	27.7	0.6	22.2	0.6	30.4	21	18.6	1		
VANUABALAVU	STATION TEMPORARILY CLOSED														
LAKEBA	27	33	7	10	7	27.1	0.7	20.7	-0.3	30.6	23	16.9	27		
LEVUKA	U/S														
VUNISEA	MISSING OBSERVATIONS														
MATUKU	71	86	10	32	23	25.9	-0.1	21.0	0.2	29.9	21	16.5	12		
ONO-I-LAU	20	22	10	6	26	25.8	0.8	20.1	-0.1	30.6	22	18.2	12		
SEAQAQA	19	37	3	17	5										
YASAWA-I-RARA	4	7	2	4	31										
DOBUILEVU	20	35	6	13	31										

TEMPERATURE(C) HUMIDITY WIND SUN RAD
 DRY WET RH% VP %OF MJ/
 MEAN (AVERAGE AT 9AM) KT POS SQ.M

NADI AIRPORT	24.4	24.5	20.7	70	21.5	6.2	72	14.0	
SUVA/LAUCALA BAY	23.9	24.6	21.6	76	23.7		35	11.8	
NACOCOLEVU	22.7	22.9	20.8	82	22.9		57	14	
ROTUMA	27.6	27.8	25.3	81	30.2		47	14	
VIWA	26.1	27.3							
UDU POINT	24.8	25.3	23.1	82	26.5				
SAVUSAVU AIRFIELD	24.5	24.8	22.0	78	24.5				
LABASA AIRFIELD	24.4	26.6	22.7	70	24.6				
NABOUWALU	24.8	24.7	21.9	77	24.2				
KORONIVIA	23.1	24.1	21.6	79	23.8				
NAUSORI AIRPORT	23.0	23.1	21.3	85	24.0	2.8			
NAVUA/TOKOTOKO	22.8	22.2	20.6	87	23.1				
MONASAVU	18.3	18.1	17.0	89	18.6				
LAUTOKA AES	24.8	25.9	21.4	66	22.1				
BA/RARAWAI MILL		24.9	21.1	70	22.1				
PENANG MILL	24.6	24.8	20.9	70	21.9				
MATEI AIRFIELD	25.0	25.3	22.3	76	24.6				
VANUABALAVU	STATION TEMPORARILY CLOSED								
LAKEBA	23.9	25.1	21.8	74	23.7				
LEVUKA	U/S								
VUNISEA	MISSING OBSERVATIONS								
MATUKU	23.4	23.8	20.4	73	21.5				
ONO-I-LAU	22.9	23.7	19.5	66	19.4				

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.

Figure 2

**Nadi Airport - Temperature & Rainfall for the last 13 Months
(July, 2016 - July, 2017)**

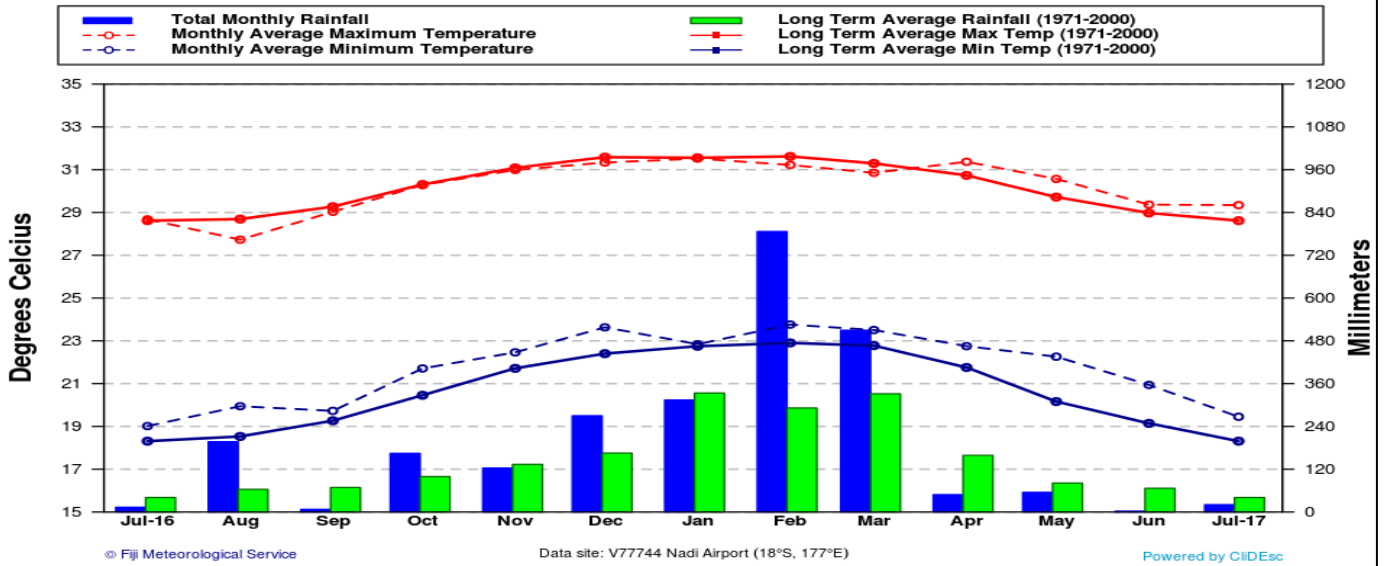


Figure 3

**Laucala Bay - Temperature & Rainfall for the last 13 Months
(July, 2016 - July, 2017)**

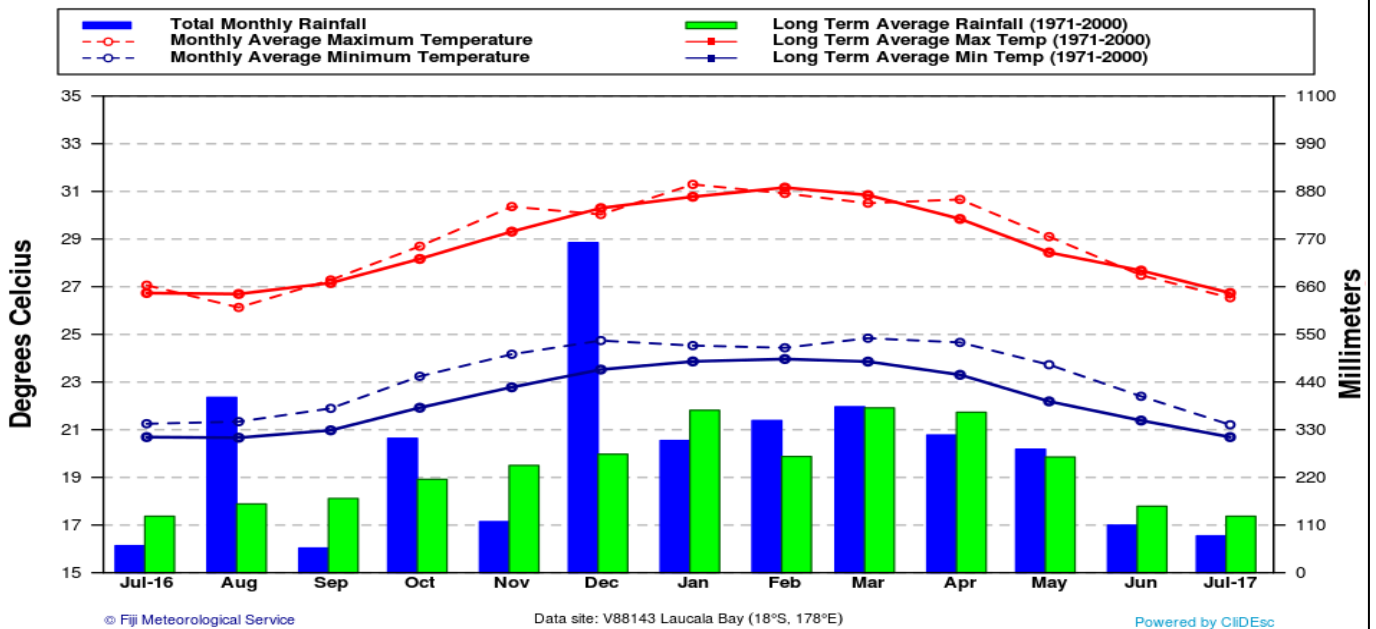


Figure 4

**Laucala Bay - Temperature & Rainfall for the last 13 Months
(July, 2016 - July, 2017)**

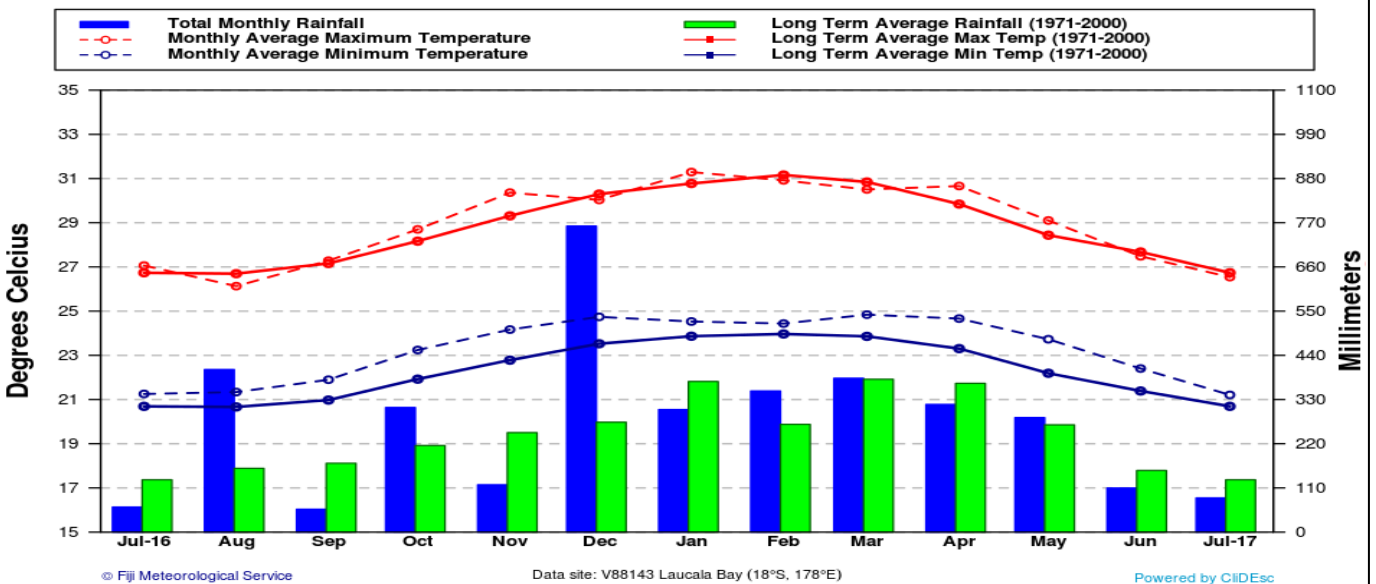
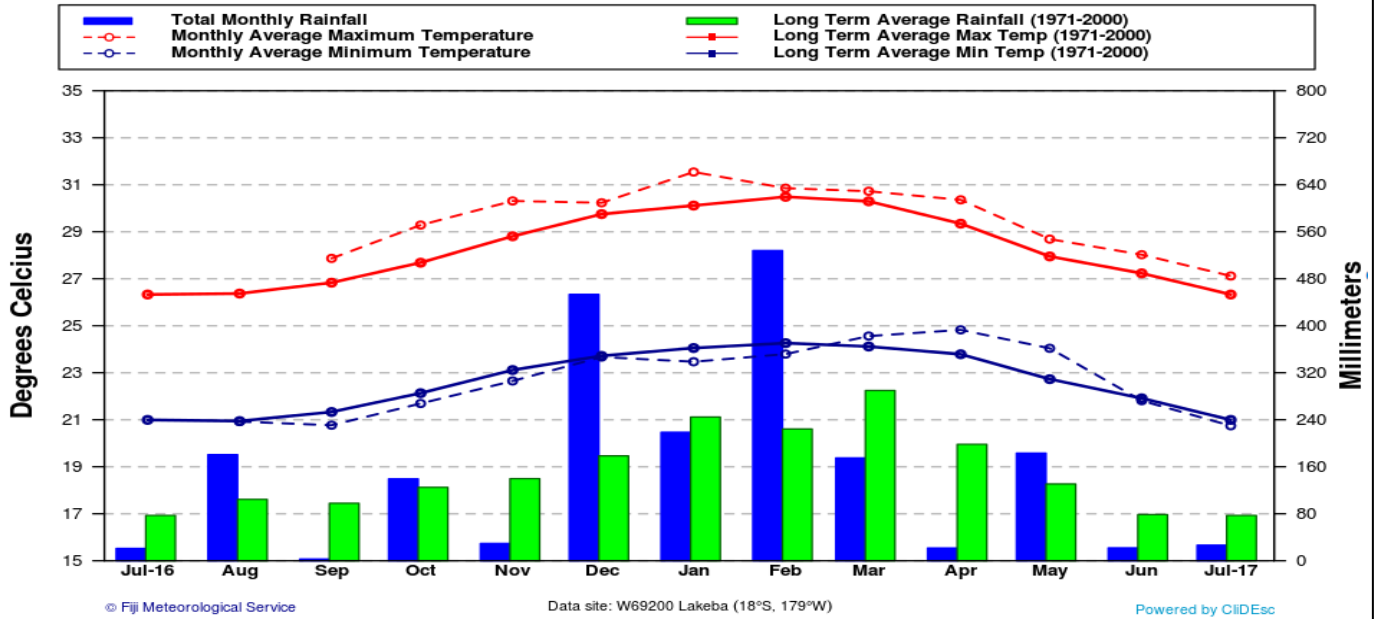


Figure 5

Lakeba - Temperature & Rainfall for the last 13 Months
(July, 2016 - July, 2017)



6. RELATIVE HUMIDITY AT 0900HOURS

The 9am average relative humidity (RH) ranged from 66% to 89% during the month (Table 2).

The monthly average RH in the **Western Division** ranged between 66% and 89%, while the daily values were between 43% to 98%. The mean monthly RH anomalies were generally *below normal*, with the highest departure from the *normal* of -13% was recorded at Penang Mill, followed by -8% at Rarawai Mill (Ba) and -6% at Lautoka Mill, while the rest of the stations were *normal*.

The monthly average RH in the **Central Division** ranged between 76% and 87% while the daily values were between 62% to 98%. The mean monthly RH anomalies from ranged from -4% at Laucala Bay and Koronivia to +3% at Tokotoko.

The monthly average RH in the **Northern Division** ranged from 70% to 82%, with daily values from 54% to 98%. Significant negative mean monthly RH anomaly from the *normal* of -9% was recorded at Labasa Airport, while the notable positive anomaly of +6% was recorded at Udu Point.

The mean monthly RH in the **Eastern Division** ranged from 66% to 74% while the daily values were between 43% to 96%. Ono-i-lau recorded mean monthly RH anomaly from the *normal* of -6% while Lakeba and Matuku both recorded -1% anomaly.

The mean monthly RH at **Rotuma** was 81%, with an anomaly of +2%.

7. SUNSHINE

Nacocolevu, Nadi Airport, Laucala Bay and Rotuma recorded 115%, 110%, 86% and 81% of the normal bright sunshine hours during the month, respectively (Table 2).

Nadi Airport recorded 239.9 hours of total bright sunshine, with a mean of 7.7 hours/day. The station recorded more than 10 hours of bright sunshine on the 1st, 6th to the 10th, 18th to 20th and on the 26th. On the other hand, the lowest of 0.1 hours was recorded on the 15th.

Laucala Bay (Suva) recorded 116.6 hours of total monthly bright sunshine, with a mean of 3.8 hours/day. The longest duration of bright sunshine of 9.6 hours was recorded on the 31st. In contrast, cloudy and overcast conditions were experienced from the 14th to 16th and also on the 29th.

The total monthly bright sunshine at Nacocolevu was 190.5 hours, with a daily mean of 6.1 hours. The station's highest daily bright sunshine hours of 10.0 hours was on the 24th, followed by 9.0 hours from the 4th to 6th and also on the 20th. On the other hand, generally overcast conditions were experienced on the 29th and 30th with only 1 hour of bright sunshine.

Rotuma recorded 161.1 hours of the total monthly bright sunshine, with a mean of 5.2 hours/day. The longest duration of bright sunshine of 9.4 hours was recorded on the 25th, followed by 9.2 hours on the 24th while nil hours of bright sunshine recorded on 5th, 13th and 17th.

8. WIND SUMMARY

The 10-minute average wind statistics recorded every three hours at Nadi Airport during July 2017 showed that easterly winds were predominant, accounting for 47.6% of the total observations, followed by south-easterly winds with 18.1% and north-easterly with 7.3% (Figure 6(a)). Calm conditions were recorded on 5.6% of the occasions. Generally, wind speeds were light to gentle in strength (Figure 6a & 6b).

strength on most of the occasions, but moderate strength winds were observed on instances (Figure 7a & 7b).

The wind anomalies map on the NOAA website show persistence of near normal winds in the Fiji region (Figure 13).

At Nausori Airport, calm conditions accounted for 52.8% of the total three hourly observations. Southeasterly winds were predominant with 15.3% of the observations, followed by easterly winds with 13.3% and southerly winds with 12.5%. The wind speeds were light to gentle in

Note:
 light air: 1-3 knots, light breeze: 4-6 knots, gentle breeze: 7-10 knots, moderate breeze: 11-16 knots, fresh breeze: 17-21 knots, strong breeze: 22-27 knots, near gale: 28-33 knots; gale: 34-40 knots; strong gale: 41-47 knots

Figure 6(a) Surface Wind Direction for Nadi Airport, Fiji. (WMO 91680 Lat 17°45'35"South Long 177°26'42"East Height above MSL 22m)

Figure 6(b) Surface Wind Speed for Nadi Airport, Fiji. (WMO 91680 Lat 17°45'35"South Long 177°26'42"East Height above MSL 22m)

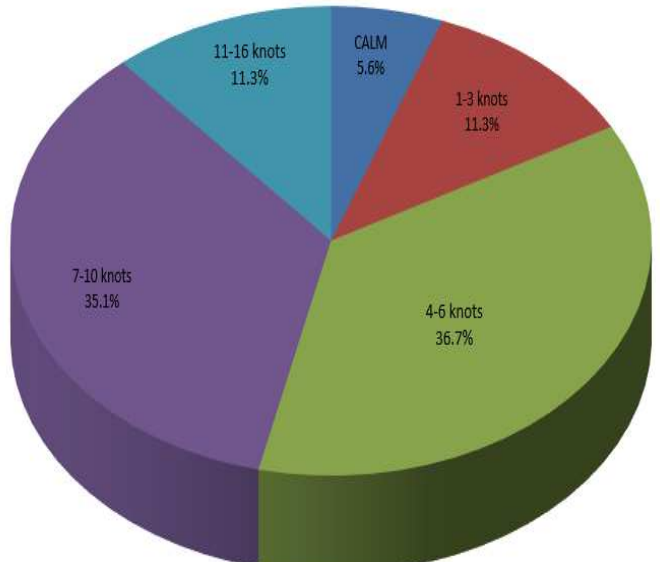
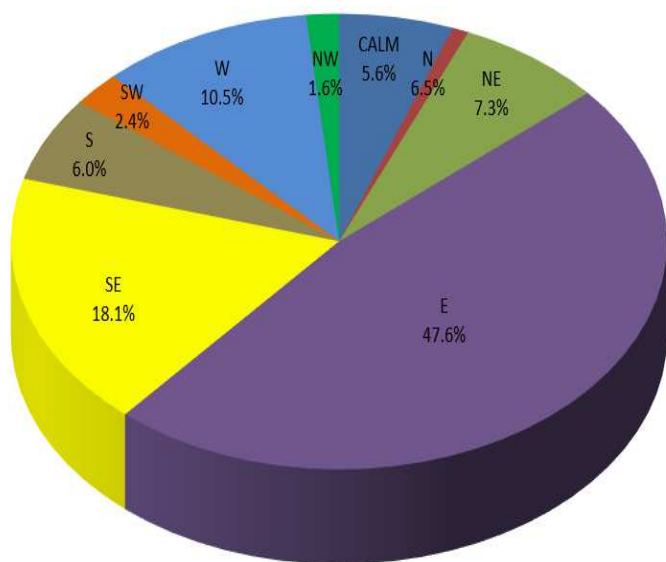
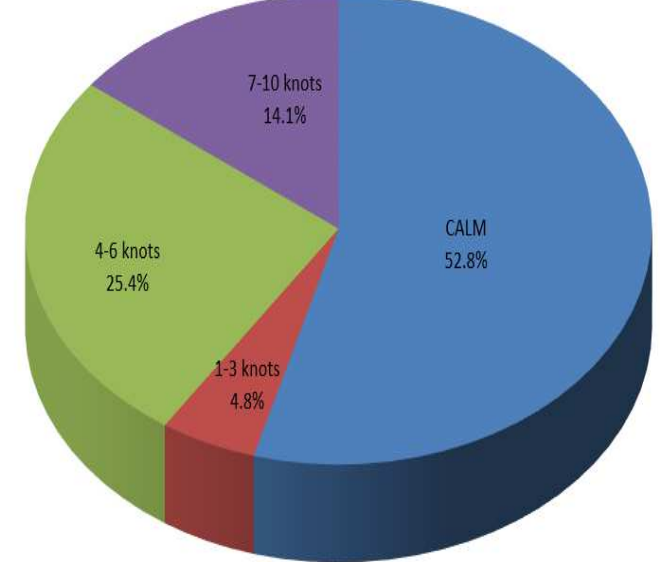
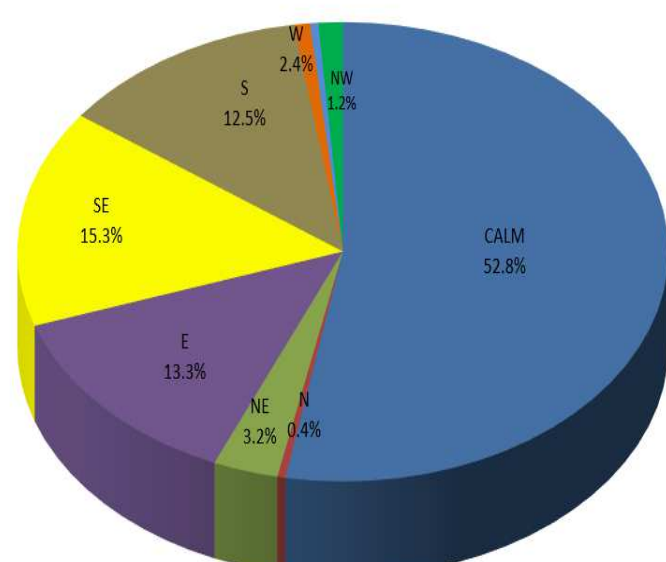


Figure 7(a) Surface Wind Direction for Nausori Airport, Fiji. (WMO 91683 Lat 18°02'47"South Long 178°33'33"East Height above MSL 3m)

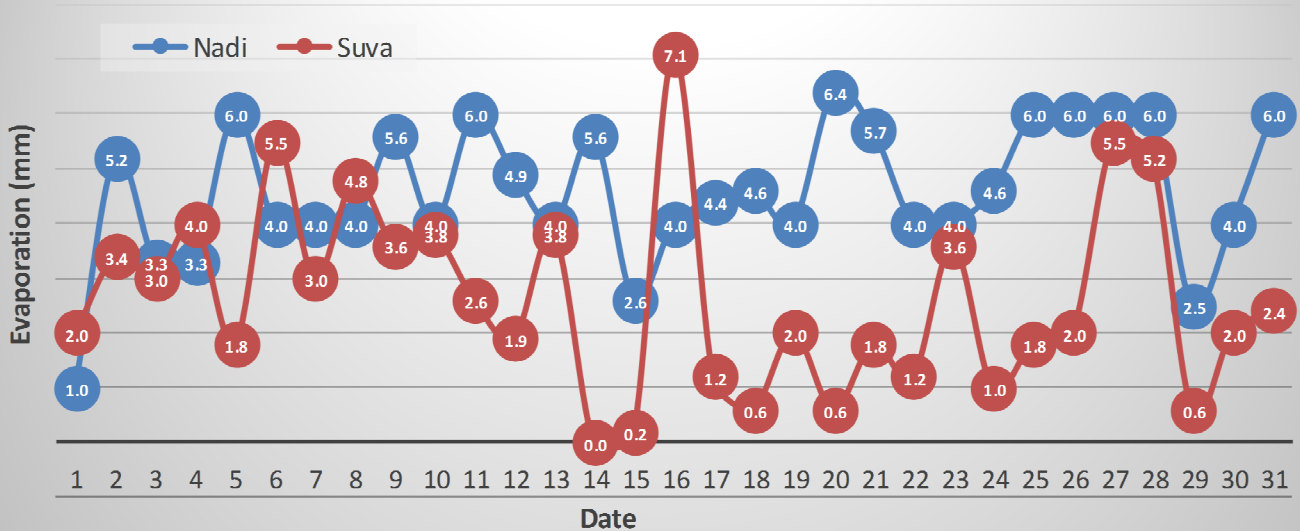
Figure 7(b) Surface Wind Speed for Nausori Airport, Fiji. (WMO 91683 Lat 18°02'47"South Long 178°33'33"East Height above MSL 3m)



9. EVAPORATION

Figure 8

Daily Evaporation for July 2017



The total monthly raised pan evaporation at Nadi Airport during July 2017 was 141.7mm while Laucala Bay recorded 82.0mm. Nadi Airport recorded the highest daily evaporation of 6.4mm on the 20th, while Laucala Bay registered the highest of 7.1mm on the 16th (Figure 8).

10. RADIATION

Daily Radiation at Nadi Airport for July 2017

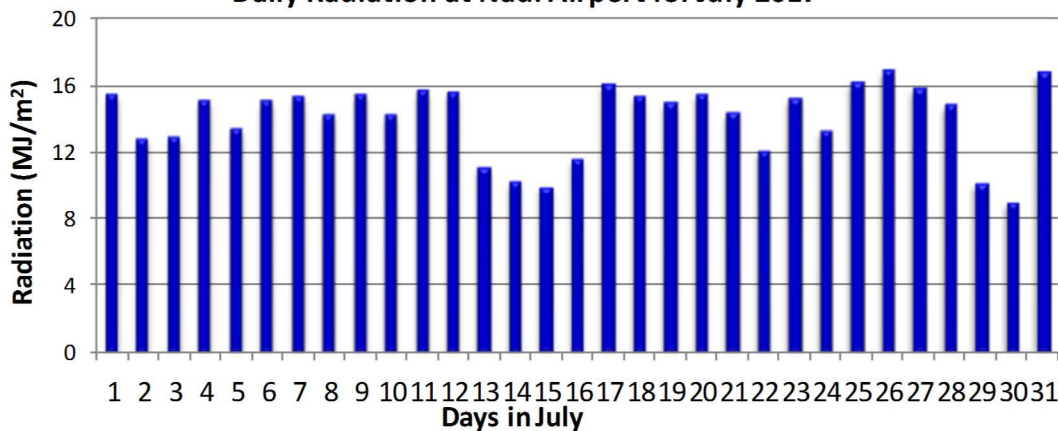


Figure 9:

The mean daily solar radiation at Nadi Airport during July 2017 was 14.0MJ/m², compared to 14.7MJ/m² over 30 year average (1971-2000).

11. SEA SURFACE TEMPERATURE (SST)

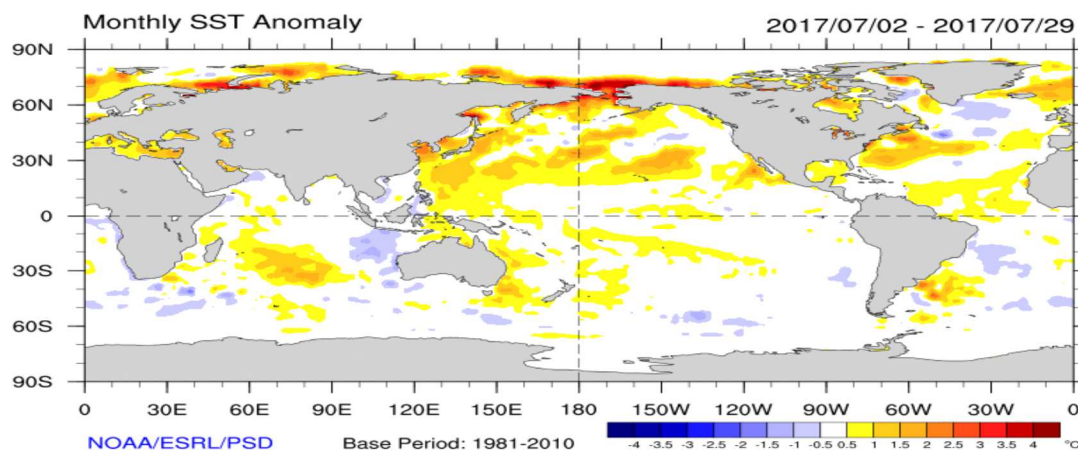


Figure 10:

SSTs were near normal in the Fiji region during July 2017 (base period: 1981-2010).

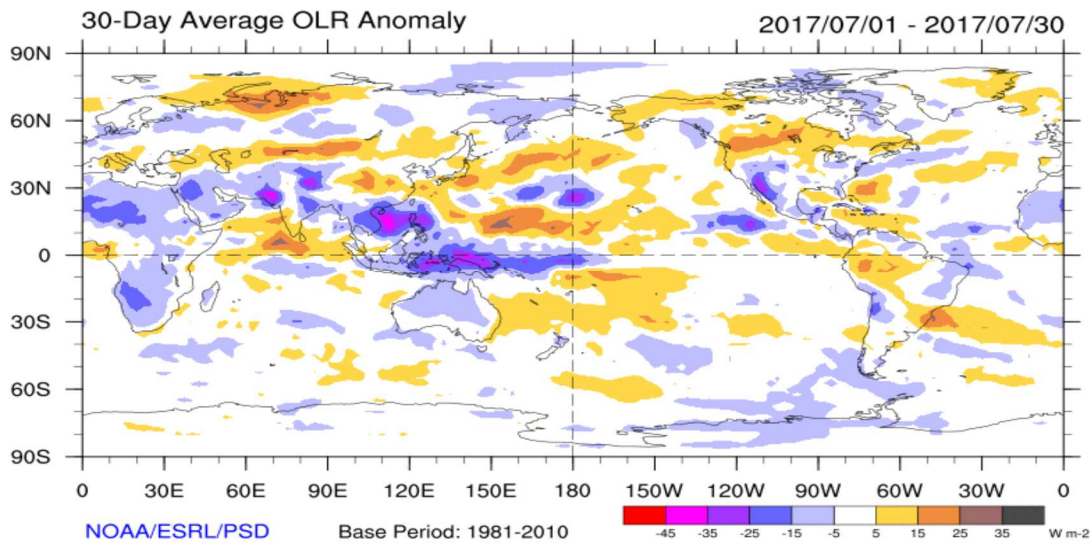
<http://www.esrl.noaa.gov/psd/map/clim/sst.shtml>

12. CLOUD COVER

Figure 11:

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

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

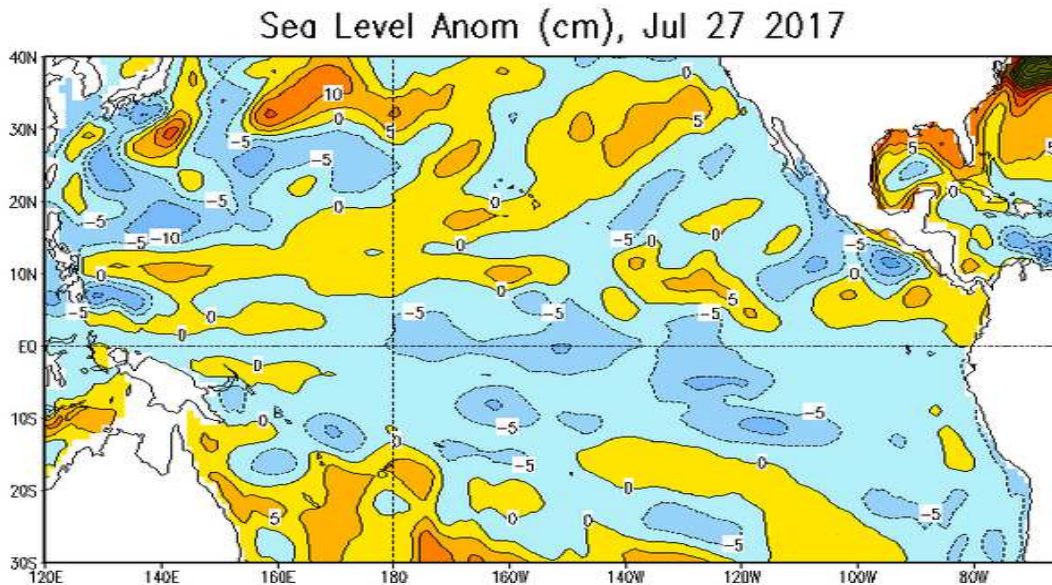


13. SEA LEVEL

Figure 12:

Sea level anomalies of 0 to +10mm persisted in the Fiji Waters during July 2017 (base period: 1981-2010).

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

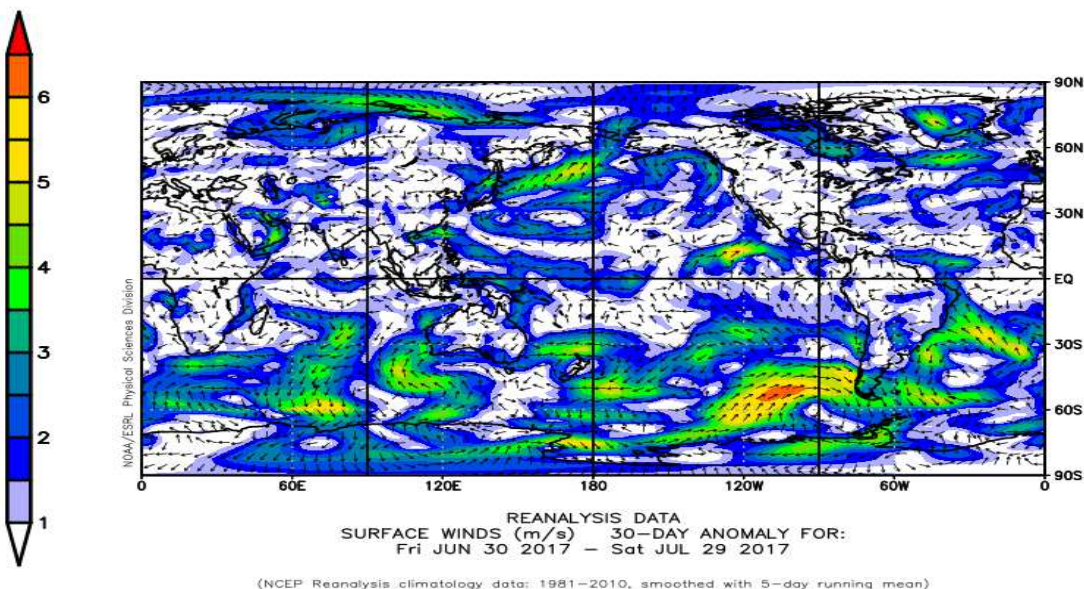


14. WIND ANOMALIES

Figure 13:

Reanalysis data show presence of near normal wind anomalies in the Fiji region during July 2017 (Fiji: ~17°S, 180°) (base period: 1981-2010).

Source: http://www.esrl.noaa.gov/psd/map/images/rnl/sfcwnd_30a.rnl.gif



(NCEP Reanalysis climatology data: 1981-2010, smoothed with 5-day running mean)