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Fiji Climate Summary January 2016

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1.0 IN BRIEF

Tropical cyclone Ula was the main weather feature during the month. It passed through the southern Lau Group on the 3rd, with Ono-i-lau recording sustained winds of 51 knots and gusts of up to 74 knots. The station recorded mean sea level pressure as low as 984 hPa and received a maximum 24-hr rainfall of 73.0mm on the 3rd.

Very hot conditions were experienced at a number of places during the month, with a large number of stations recording daily maximum temperature greater than 32°C on several occasions. The maximum temperatures in the Yasawa and Mamanuca groups were quite noticeable with a couple of new high temperature records set. A new daily high maximum temperature for January was established at Yasawa-i-rara with 37.8°C on the 28th, while Viwa recorded a new daily high maximum temperature of 36.6°C on the 29th. Other new temperature records for January included a new high mean monthly maximum temperature at Levuka and a new daily high minimum temperature at Monasavu (Table 1).

Tropical depression (TD07F), tropical cyclone Ula and couple of other troughs provided some relieving rainfall from the dry conditions of 2015. However, it was still significantly drier than the *normal* over most places in the country, with more than half of the stations receiving less than half the *normal* January rainfall (Figure 1).

The total monthly rainfall at both Savusavu Airfield and Matei Airfield ranked lowest January rainfall in 57 years of historical record. Furthermore, the total rainfall at Rotuma ranked 2nd driest in its 104 years of history, while it was 5th driest at Navua in its 72 years of record.

Consequently, rainfall deficiencies affecting large water bodies, such as, wells, bore holes, rivers and water reservoirs, continue over majority of the country. However, deficiencies affecting shallow rooted crops and small water tanks have eased in parts of the country due to rainfall during the month.

2.0 WEATHER PATTERNS

January's weather was influenced by Severe (Category 3) Tropical Cyclone Ula, Tropical Depression TD07F, moist easterly wind flow and trough of low pressure.

From the 1st to 2nd, TD07F affected most parts of the group with fresh to strong and gusty winds and occasional heavy rain before weakening and moving south later on the 2nd.

On the 3rd, Severe Tropical Cyclone Ula moved over the Southern Lau group from the east and affected the group with damaging gale force to destructive storm force winds till the early morning on the 4th. Ono-i-Lau reported sustained winds of 94 km/hr and gusts to 128 km/hr on the evening of the 3rd. Fresh to strong winds were reported over the rest of Fiji. Occasional heavy rain was experienced over most parts of the group. On the 4th, TC Ula moved south, away from the group and took a northwest turn on the 5th. From the 5th till the 8th, outer cloud bands of TC Ula affected most parts of the group with occasional showers.

A moist north to northeast wind flow prevailed over the Fiji group from the 9th to the 10th.

Fiji was dominated by moist southeast wind flow from the 11th to the 21st resulting in some showers over the eastern parts of the larger islands with isolated afternoon or evening showers and thunderstorms elsewhere.

A south to southwest wind flow prevailed over Fiji from the 22nd to 24th. Some showers were observed over the interior of the larger islands during this period. On the 25th, a weak trough of low pressure moved over the country from the west and cleared the group on the 28th. Some showers and isolated thunderstorms were observed over the central and northern parts of the country. An easterly wind flow prevailed over the group from the 29th till the end of the month. Some showers were experienced over the eastern parts of the larger islands with isolated afternoon and evening thunderstorms elsewhere.

Rotuma's weather was dominated by the South Pacific Convergence Zone.

3.0 RAINFALL

Tropical depression (TD07F), tropical cyclone Ula and couple of other troughs provided some relieving rainfall from the dry conditions of 2015. However, it was still significantly drier than the *normal* over most places in the country, with more than half of the stations receiving less than half the *normal* January rainfall (Figure 1).

Out of the 28 rainfall recording stations, 10 received *well below average* rainfall, 17 *below average*, and Monasavu was the only station to register *average* amount of rainfall (Table 2 and Figures 1-5).

The total monthly rainfall at both Savusavu Airfield and Matei Airfield ranked lowest January rainfall in 57 years of historical record. Furthermore, the total rainfall at Rotuma ranked 2nd driest in its 104 years of history, while it was 5th driest at Navua in its 72 years of record.

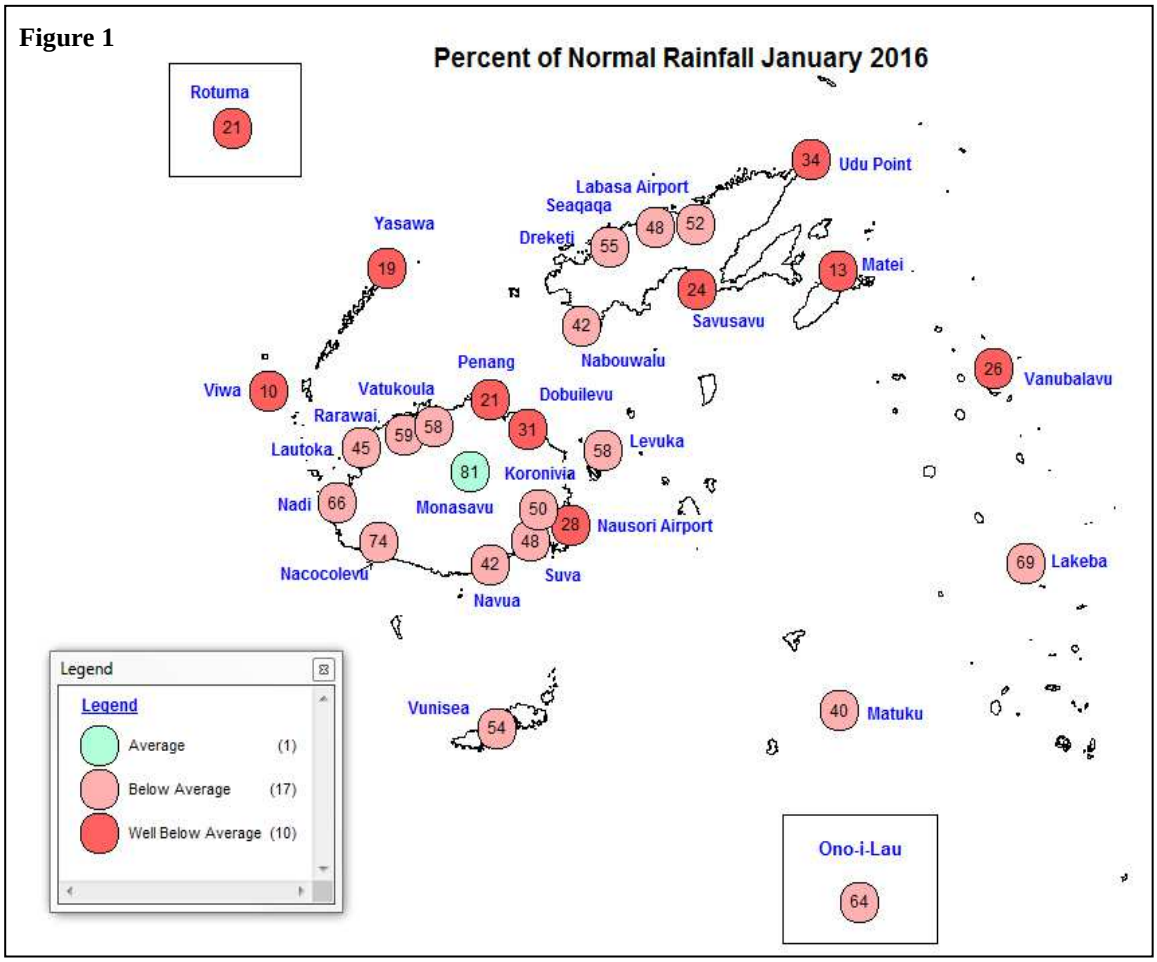
Consequently, rainfall deficiencies affecting large water bodies, such as, wells, bore holes, rivers and water reservoirs, continue over majority of the country. Nevertheless, rainfall deficiencies affecting shallow rooted crops and small water tanks have eased in parts of the country due to rainfall received during the month.

The highest daily rainfall was received at Monasavu with 91.0mm on the 7th, followed by Rarawai Mill with 80.0mm on the same day and 73.0mm of rainfall at Ono-i-lau on the 3rd as a result of tropical cyclone Ula.

The station in Viwa was the driest during the month with 26.0mm of rainfall recorded, followed by Yasawa-i-rara with 46.0mm, Matei Airfield with 47.0mm and Vanuabalavu with 58.0mm. On the other hand, Monasavu was the wettest with 492.0mm of rainfall, followed by Vatukoula with 252.0mm, Rarawai Mill with 236.0mm and Nadi Airport with 227.0mm.

The least number of rain days was recorded at Savusavu Airfield with 6 rain days (rainfall ≥0.1mm), followed by Viwa with 7 and Udu Point with 11. On the other hand, Monasavu registered the highest number of rain days (27), followed by Koronivia with 25 and Matei Airfield and Laucala Bay with both 23.

Figure 1



***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*

4.0 AIR TEMPERATURES

A. Maximum Daytime Air Temperatures

The average maximum temperature was *above normal* at majority of the stations, with 18 out of the 24 stations recorded anomalies ≥ 0.5˚C and 6 within ±0.5˚C (Table 2 & Figures 2-5).

The warmest days on average was at Yasawa-i-rara with 33.8˚C, followed by Viwa with 32.7˚C and Penang Mill with 32.2˚C. On the other hand, Nadarivatu was the coolest with 26.1˚C followed by Monasavu with 26.9˚C.

Very hot conditions persisted during the last two weeks of the month, with a number of stations registering daily maximum temperatures greater than 33.0°C. The highest daily maximum temperature of 37.8°C was recorded at Yasawa-i-rara on the 28th, followed by Viwa with 36.6°C on the 29th. On the contrary, Monasavu recorded maximum temperature as low as 22.4˚C on the 21st, followed by Nadarivatu with 23.1˚C on the 7th.

The mean monthly maximum temperature was significantly warmer than *normal* at majority of the stations, with the greatest departure from the *normal* at Yasawa-i-rara (+3.3˚C), followed by Viwa (+2.3˚C) and Penang Mill (+1.9˚C).

Couple of new high temperature records for January were established during the month. New daily high maximum temperature records were set at Yasawa-i-rara and Viwa, while a new mean monthly maximum temperature was established at Levuka (Table 1).

B. Minimum Night-time Air Temperatures

The night-time temperatures were *above normal* at most of the stations, with 17 out of the 23 stations recording average minimum temperatures ≥ 0.5˚C, 5 within ±0.5˚C, and Labasa Airport was the only station to record anomaly of ≤ -0.5˚C (Table 2 & Figures 2-5).

The coolest nights on average was at Nadarivatu with 19.1˚C, followed by Monasavu with 19.3˚C and Labasa Airport with 21.6˚C. Conversely, the warmest night on average was experienced at Rotuma with 25.7˚C, followed by Viwa with 25.6˚C.

Very warm nights were experienced on occasions during the month, with the highest daily minimum temperature of 27.7˚C recorded at Viwa on the 31st, followed by Rotuma with 27.6˚C on the 2nd and Udu Point with 27.0˚C on the 29th. On the other hand, Nadarivatu recorded the lowest daily minimum temperature of 16.1˚C on the 20th, followed by Monasavu with 16.5˚C on the 20th.

The most notable positive mean monthly minimum air temperature departure from the *normal* of +2.5˚C was recorded at Tokotoko, followed by +1.4˚C at Laucala Bay and +1.3˚C at Rarawai Mill.

A new daily high minimum temperature record for January was set during the month, with Monasavu recording 23.5˚C on the 7th (Table 1).

TABLE 1. CLIMATE RECORDS ESTABLISHED IN JANUARY 2016

Element	Station	Observed (record)	On	Rank	Previous (record)	Year	Records Began
Total Monthly Rainfall	Savusavu Airfield	65.2mm	-	New Low	69.0mm	1964	1957
Total Monthly Rainfall	Matei Airfield	47.1mm	-	New Low	82.1mm	2010	1956
Daily Max Temp	Yasawa-i-rara	37.8°C	28th	New High	36.0°C	1985	1950
Daily Max Temp	Viwa	36.6°C	29th	New High	36.0°C	1997	1979
Mean Monthly Max Temp	Levuka	31.6°C	-	New High	31.5°C	2000	1985
Daily Min Temp	Monasavu	23.5°C	7th	New High	23.4°C	2015	1980

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 2016

	RAINFALL				AIR TEMPERATURES								SUNSHINE	
	TOTAL	*	RAIN DAYS	MAX. FALL	AVERAGE DAILY MAX.	#	AVERAGE DAILY MIN.	#	EXTREME MAX.	ON	EXTREME MIN.	ON	TOTAL	*
	MM	%	+	MM ON	C	C	C	C	C		C		HRS	%
NADI AIRPORT	227	66	15	47 15	31.2	-0.3	23.9	1.1	33.0	21	22.4	21	239	113
SUVA/LAUCALA BAY	178	48	23	42 1	31.6	0.8	25.3	1.4	32.9	30	23.8	28	237	123
NACOCOLEVU	212	74	17	50 1	31.6	0.4	23.5	1.2	34.0	9	21.0	21	237	133
ROTUMA	74	21	15	19 22	31.6	1.0	25.7	1.0	33.0	25	24.1	25	253	149
VIWA	26	10	7	10 6	33.4	2.3	25.6	0.6	36.6	29	24.2	14		
UDU POINT	106	34	11	50 14	31.8	1.3	25.4	1.1	33.8	29	23.4	4		
SAVUSAVU AIRFIELD	65	24	6	36 26	31.8	1.2	24.1	0.6	34.4	6	22.2	27		
LABASA AIRFIELD	201	52	14	27 17	32.7	1.0	21.6	-0.6	34.5	11	18.0	4		
NABOUWALU	132	42	20	40 26	31.9	1.7	25.0	0.8	34.7	7	22.0	30		
KORONIVIA	193	50	25	33 1	30.5	0.1			31.5	2				
NAUSORI AIRPORT	104	28	15	17 26	31.4	1.0	23.8	0.6	33.0	30	21.5	20		
NAVUA/TOKOTOKO	167	42	21	44 17	30.8	0.3	23.9	2.5	33.5	7	21.8	29		
MONASAVU	492	81	27	91 7	26.9	1.4	19.3	0.3	29.4	23	16.5	20		
LAUTOKA AES	168	45	12	36 6	31.4	0.4	24.3	0.6	33.5	31	21.5	28		
BA/RARAWAI MILL	236	59	16	80 7	32.2	0.1	23.4	1.3	34.1	29	19.0	15		
PENANG MILL	85	21	18	16 5	32.2	1.9	23.9	-0.1	34.2	29	20.9	26		
MATEI AIRFIELD	47	13	23	12 24	31.5	1.4	24.8	0.7	32.7	29	23.0	21		
VANUABALAVU	58	26	12	14 1	31.1	1.0	25.1	0.7	32.9	25	23.3	25		
LAKEBA	167	69	19	45 29	31.6	1.5	24.7	0.7	32.7	7	22.1	20		
LEVUKA	150	58	17	30 14	31.6	1.3	24.6	0.4	33.4	31	23.2	15		
VUNISEA	156	54	18	35 1	31.1	1.2	24.6	1.2	33.5	23	23.0	15		
MATUKU	109	40	17	29 1	31.0	0.8	24.2	-0.2	32.8	28	21.5	13		
ONO-I-LAU	112	64	15	73 3	30.9	1.7	24.6	0.4	33.5	28	22.9	25		
DREKETI	210	55	17	57 29										
SEAQAQA	199	48	16	40 15										
DOBUILEVU	123	31	19	30 7										
YASAWA-I-RARA	46	19	13	13 17										
VATUKOULA	252	58	16	60 17										

	TEMPERATURE(C)			HUMIDITY		WIND	SUN	RAD
	MEAN	DRY (AVERAGE AT 9AM)	WET (AVERAGE AT 9AM)	RH% (AVERAGE AT 9AM)	VP (AVERAGE AT 9AM)	KT	%OF POS	MJ/ SQ.M
NADI AIRPORT	27.6	28.8	25.2	74	29.3	6.8	61	22.4
SUVA/LAUCALA BAY	28.4	29.2	26.2	78	31.5		61	23$
NACOCOLEVU	27.5	28.7	25.8	79	31.1		61	23$
ROTUMA	28.6	29.7	26.4	76	31.8		66	24$
VIWA	29.5	30.6	26.9	74	32.5			
UDU POINT	28.6	29.5	25.9	75	30.7			
SAVUSAVU AIRFIELD	28.0	29.2	25.8	76	30.6			
LABASA AIRFIELD	27.1	28.8	25.5	76	29.9			
NABOUWALU	28.4	29.2	26.4	79	32.1			
KORONIVIA		29.4	26.1	76	31.2			
NAUSORI AIRPORT	27.6	28.7	25.8	79	30.9	3.9		
NAVUA/TOKOTOKO	27.4	27.4	25.4	85	31.0			
MONASAVU	23.1	23.8	21.6	82	24.1			
LAUTOKA AES	27.9	29.2	25.9	76	30.8			
BA/RARAWAI MILL	27.8	28.7	25.6	78	30.3			
PENANG MILL	28.0	29.2	25.9	76	30.7			
MATEI AIRFIELD	28.1	29.2	25.8	76	30.6			
VANUABALAVU	28.1	29.1	25.9	77	31.0			
LAKEBA	28.2	29.0	26.4	81	32.4			
LEVUKA	28.1	28.9						
VUNISEA	27.9	28.8						
MATUKU	27.6	28.6						
ONO-I-LAU	27.7	28.7	25.8	78	30.7			

MEAN TEMPERATURE IS (MAX+MIN)/2; WIND IS MEAN SPEED AT 06,12,18,24HOURS; $: 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; U/S: UNSERVICEABLE; MISSING DATA WITH LESS THAN FIVE DAYS.

Figure 2

Nadi Airport (Western Division) - Temperature & Rainfall Records for the last 13 Months
(January 2015 - January 2016)

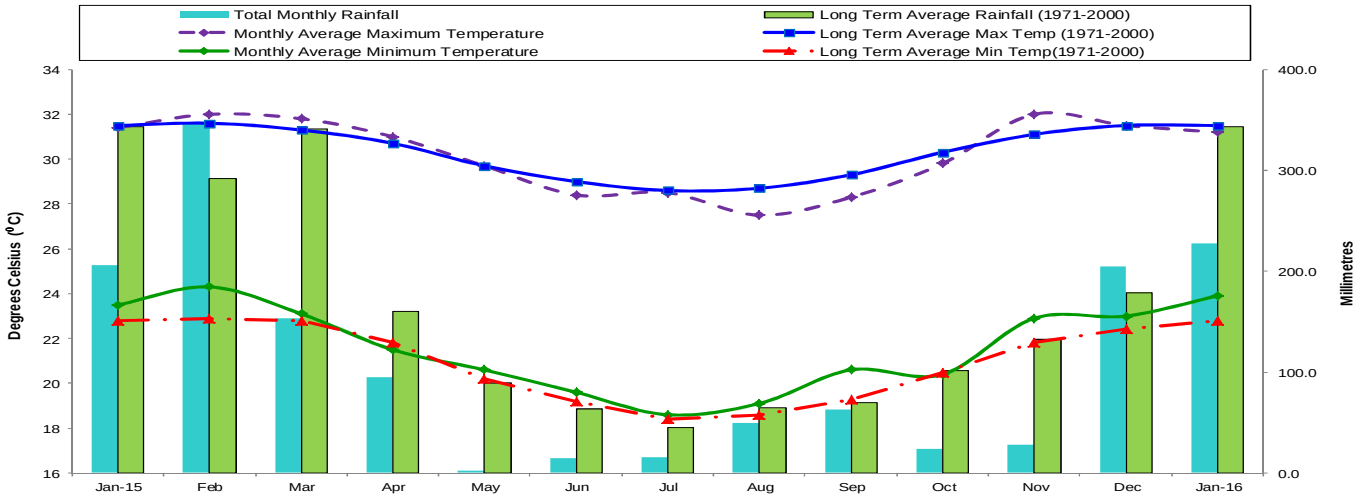


Figure 3

Laucala Bay - (Suva) (Central Division) - Temperature & Rainfall Records for the last 13 Months
(January 2015 - January 2016)

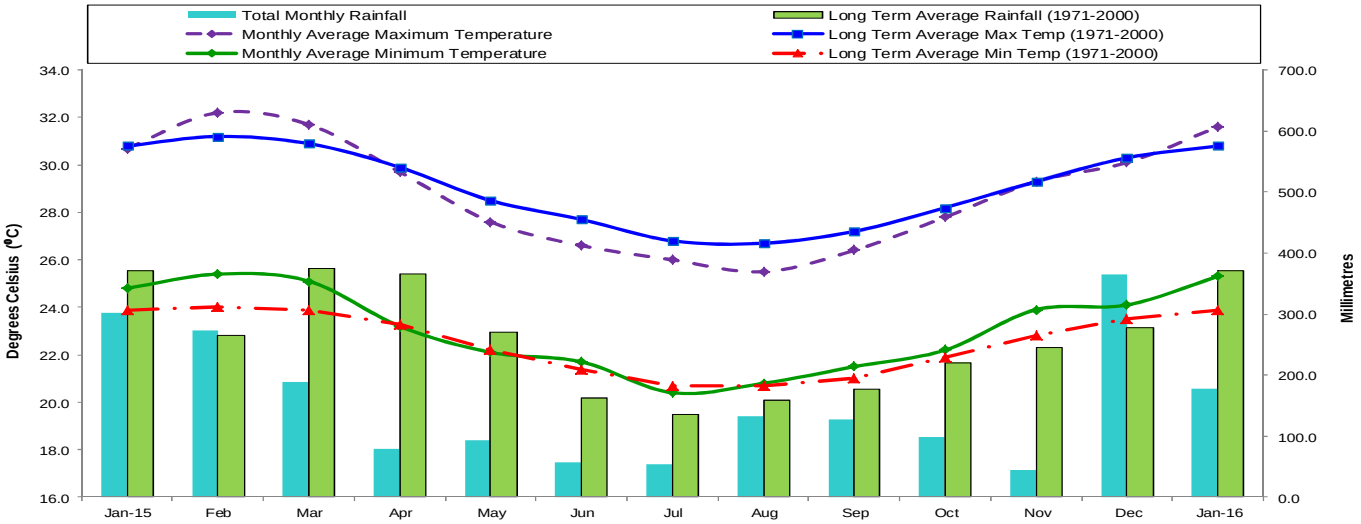


Figure 4

Labasa Airport (Northen Division) - Temperature & Rainfall Records for the last 13 Months
(January 2015 - January 2016)

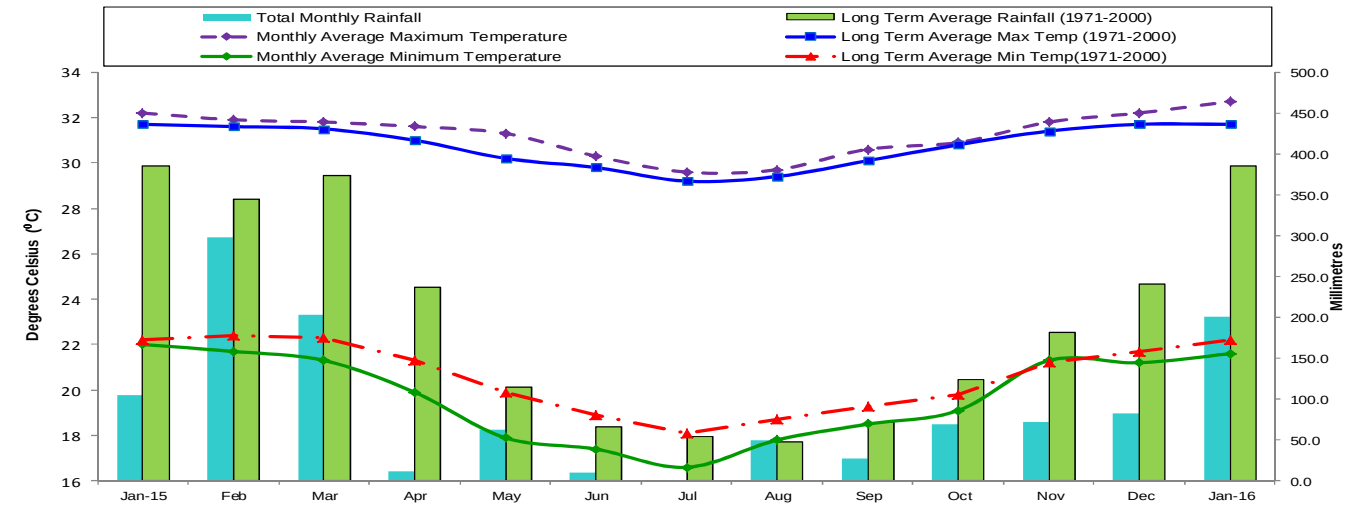
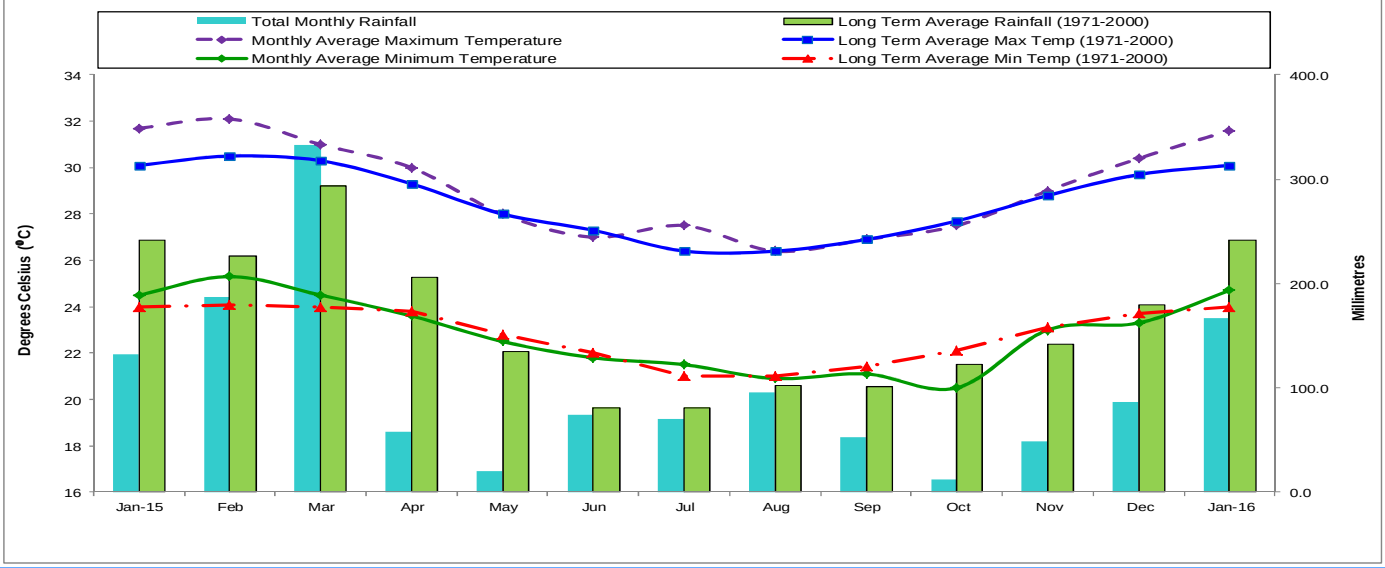


Figure 5



5.0 RELATIVE HUMIDITY AT 0900HOURS

The 9am average relative humidity (RH) ranged from 74% to 85% during the month (Table 2); with the daily values extended from 56% to 99%.

The Western Division stations recorded daily average RH values between 74% and 79%. The most significant negative mean monthly RH anomaly from the *normal* was observed at Viwa with –3.3%, while the greatest positive departure was at Nadi Airport with +2.2%.

The Central Division stations recorded daily average RH values between 76% and 85%. Majority of these stations registered negative mean monthly RH departures from the *normal*, with the most significant anomaly of –5.5% at Koronivia. Tokotoko was the only station to record positive departure from the *normal* (+2.2%).

The stations in the Northern Division registered daily average RH between 75% and 79%. Negative mean monthly RH departures from the *normal* were recorded at majority of the stations, with the greatest departure of –5.5% observed at Udu Point. In contrast, Nabouwalu was the only station with recorded positive anomaly (+0.4%).

Vanuabalavu and Ono-i-lau in the Eastern Division recorded daily average RH of 77% and 78%, respectively. Both these stations recorded negative mean monthly RH departures from the *normal*, with anomaly of –1.0 at Vanuabalavu and –0.5% at Ono-i-lau. The mean monthly RH at Lakeba was 81%, which departed by +3.2% from the *normal*.

The daily average RH at Monasavu was 82%, while 76% was at Rotuma.

6.0 SUNSHINE

Rotuma, Nacocolevu, Laucala Bay and Nadi Airport recorded 149%, 133%, 123% and 113% of the *normal* bright sunshine hours during the month, respectively (Table 2).

Nadi Airport recorded 239.0 hours of the total bright sunshine, with a mean of 7.7 hours/day. The longest duration of bright sunshine at the station was 12.5 hours on the 13th. On the other hand, overcast conditions persisted on the 3rd and 4th with no bright sunshine recorded.

Laucala Bay recorded 237.0 hours of the total monthly bright sunshine, with a mean of 7.6 hours/day. The highest daily sunshine of 11.7 hours was recorded on the 19th, while overcast conditions persisted on the 1st with no bright sunshine recorded.

The total monthly bright sunshine at Nacocolevu was 236.6 hours, with a daily mean of 7.6 hours. The station's highest daily bright sunshine of 11.5 hours was recorded on both 20th and 31st. On the contrary, overcast conditions persisted on the 3rd, with no bright sunshine recorded.

Rotuma recorded 253.0 hours of the total bright sunshine, with a mean of 8.2 hours/day. The longest duration of bright sunshine at the station was 11.4 hours on the 25th. On the other hand, overcast conditions persisted on the 12th with no bright sunshine recorded.

7.0 WIND SUMMARY

The 10-minute average wind statistics recorded every three hours at Nadi Airport in January showed that westerly winds were predominant, accounting for 23.0% of the total observations, followed by easterly winds with 19.4% and southeast winds, 14.5% (Figure 6(a)). Calm conditions were recorded on 5.2% of the occasions. The 10-minute average wind speeds were generally light to moderate in strength (Figure 6(b)).

At Nausori Airport, easterly winds were dominant with 13.7% of the records, followed closely by northeast winds with 13.4%. Calm conditions accounted for 41.5% of the observations (Figure 7(a)). The wind speeds generally ranged from light to moderate in strength, however, near gale force winds of up to 30 knots was recorded on the 1st due to tropical depression, TD07F (Figure 7(b)).

Tropical cyclone Ula and tropical depression TD07F passed through the country during the 1st week of the month, resulting in damaging gale force winds. The strongest winds were recorded at Ono-i-lau with sustained winds of 51 knots and gusts of up to 74 knots on the 3rd, followed by Levuka with sustained winds of 35 knots and gusts of up to 56 knots on the 1st .

Incidentally, the wind anomalies map on the NOAA website show persistence of south westerly wind anomalies of 1.5 - 3.5 m/s in the Fiji region.

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 -27knots, 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)

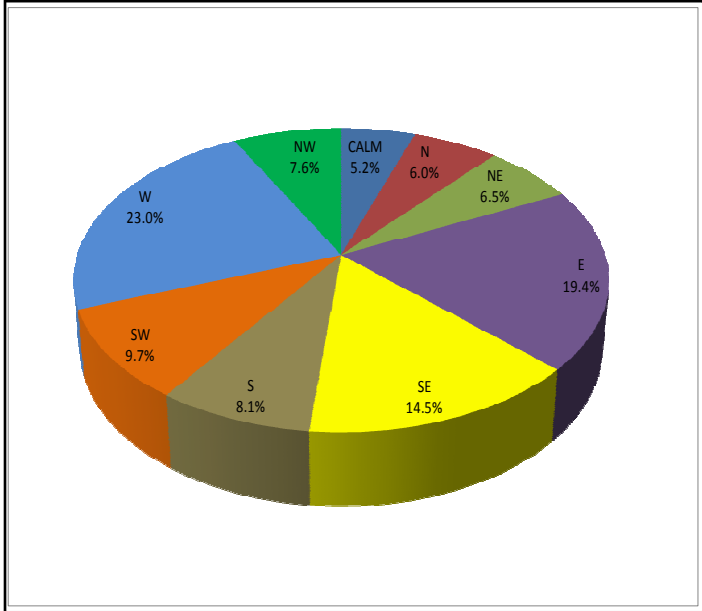


Figure 6(b) Surface Wind Speed for Nadi Airport, Fiji. (WMO 91680 Lat 17°45'35"South Long 177°26'42"East Height above MSL 22m)

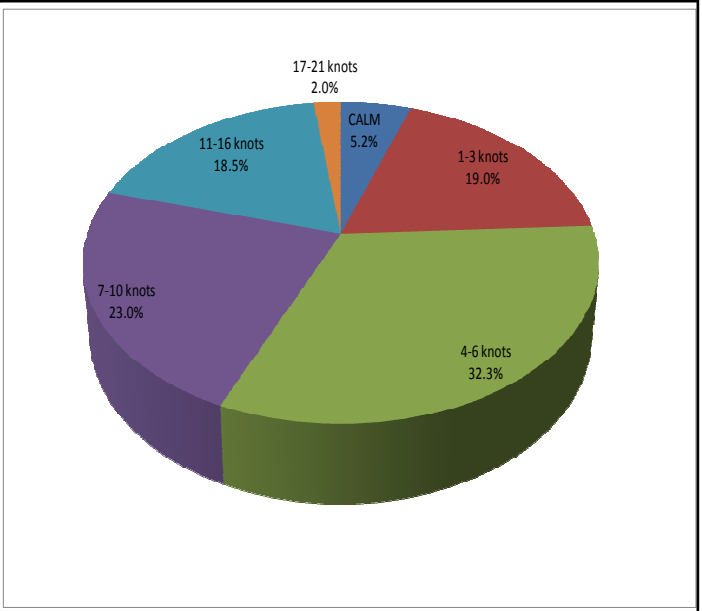


Figure 7(a) Surface Wind Direction for Nausori Airport, Fiji. (WMO 91683 Lat 18°02'47"South Long 178°33'33"East Height above MSL 3m)

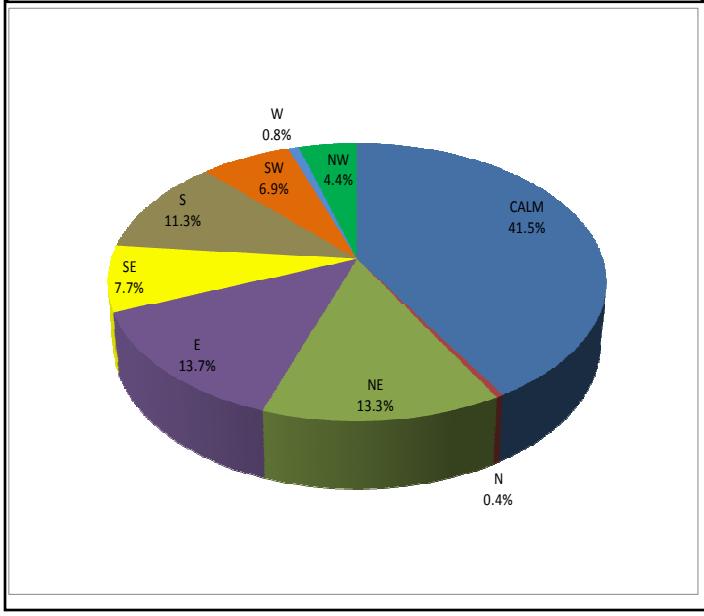
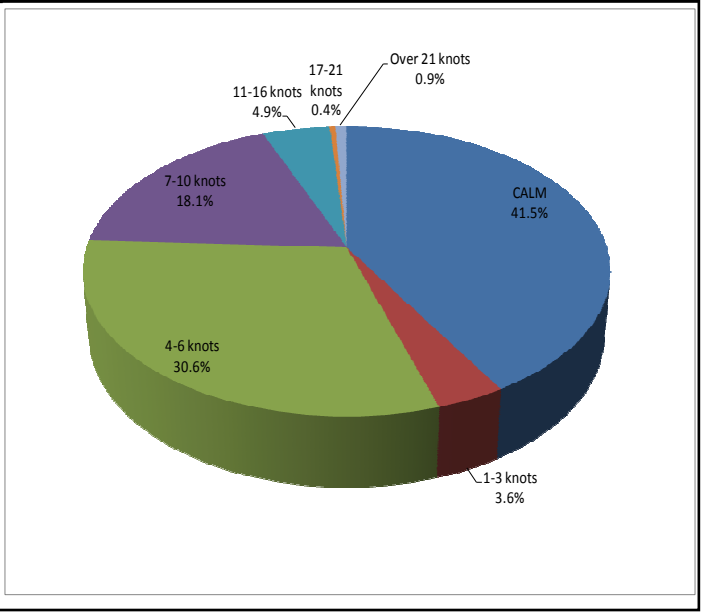
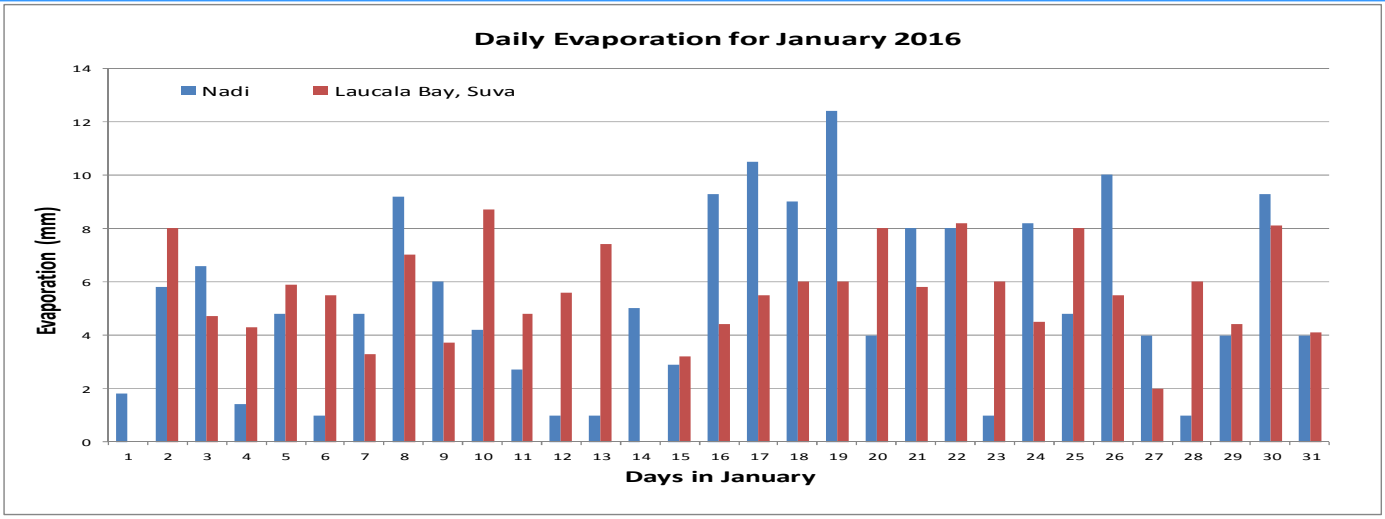


Figure 7(b) Surface Wind Speed for Nausori Airport, Fiji. (WMO 91683 Lat 18°02'47"South Long 178°33'33"East Height above MSL 3m)



8.0 EVAPORATION



The total monthly raised pan evaporation at Nadi Airport was 167.5mm, while Laucala Bay recorded 164.6mm. Nadi Airport's highest daily evaporation was 12.4mm on the 19th, while Laucala Bay recorded the highest of 8.7mm on the 10th.

9.0 RADIATION

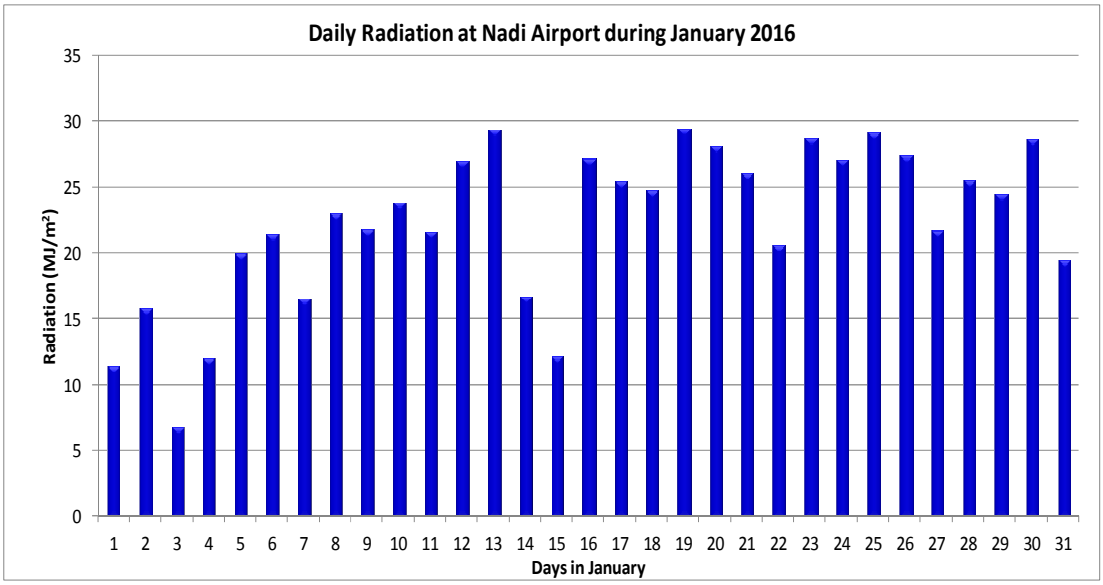


Figure 9:

The mean daily solar radiation at Nadi Airport during January 2016 was 22.4MJ/m^2, while the normal during January is 21.2MJ/m^2.

SEA SURFACE TEMPERATURE (SST)

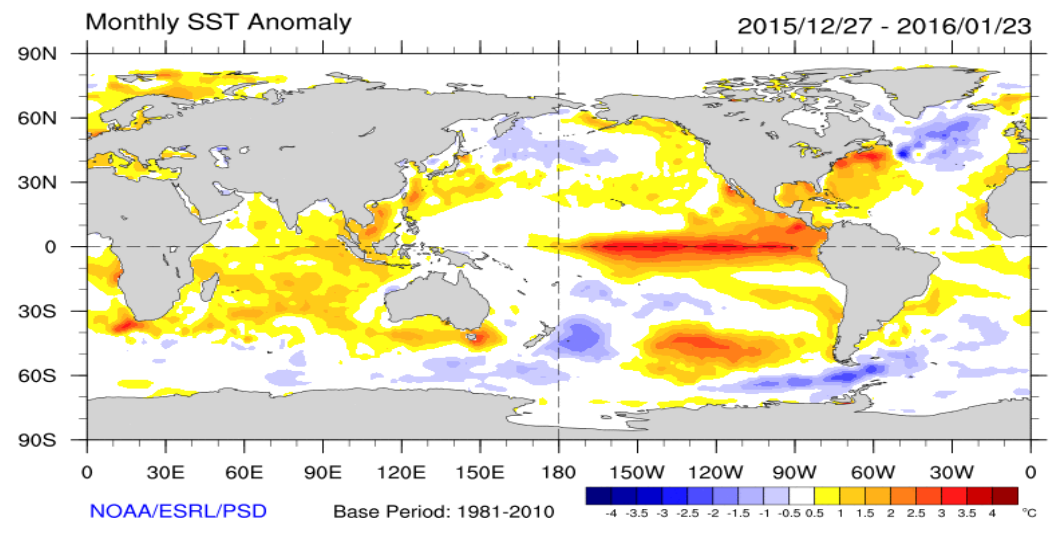


Figure 10:

The SST patterns are still reflective of strong El Niño conditions, however, the anomalies in the central and eastern equatorial Pacific have weakened during the past month. SST in the Fiji region was normal (base period: 1981-2010).

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

CLOUD COVER

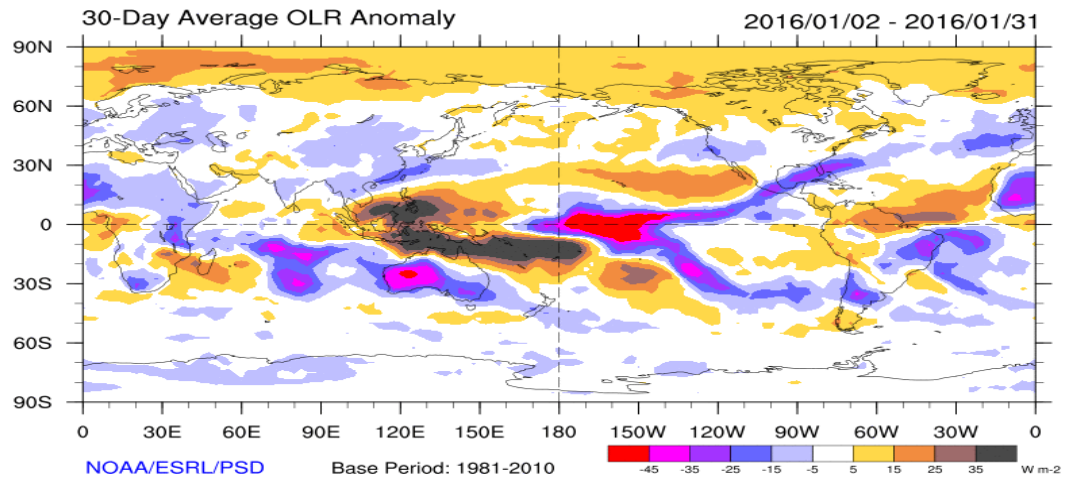


Figure 11:

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

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

SEA LEVEL

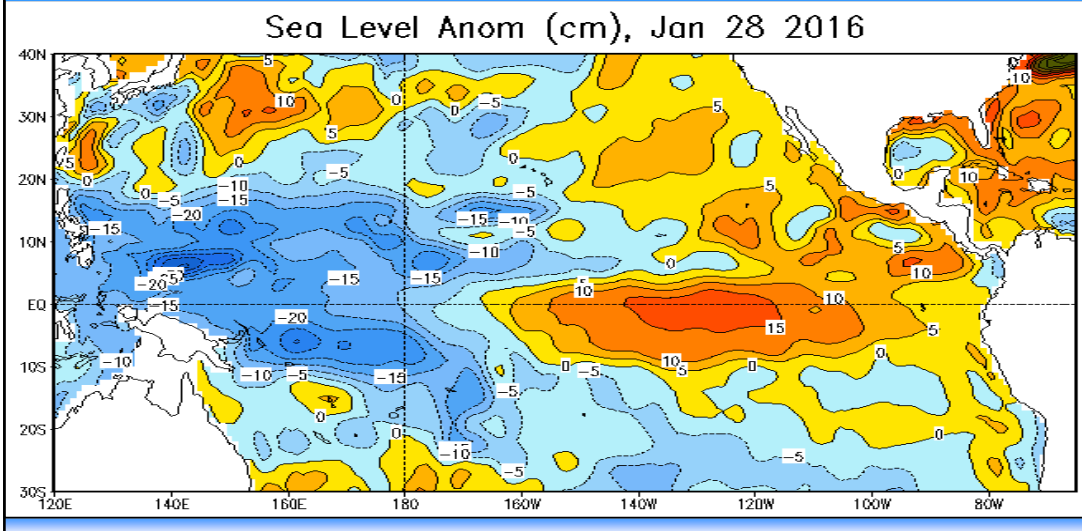


Figure 12:

Negative sea level anomalies persisted in the Fiji waters, ranging from –5 to –10cm (base period: 1981-2010).

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

WIND ANOMALIES

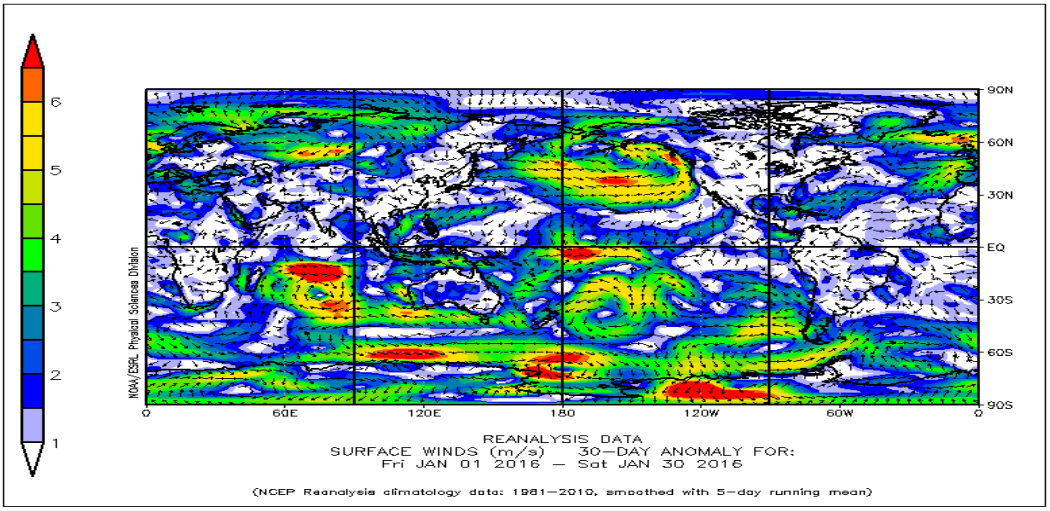


Figure 13:

South westerly wind anomalies of 1.5 - 3.5m/s persisted in Fiji waters (Fiji: ~17ºS, 180º) (base period: 1981-2010).

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

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