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Fiji Climate Summary

July 2014

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1.0 IN BRIEF

Typical dry weather pattern persisted in Fiji throughout July with transient ridges of high pressure directing cool and dry southerly winds, interspersed by weak frontal systems.

The South Pacific Convergence Zone (SPCZ) was weaker than *normal* and displaced to the north of the country.

This resulted in considerably drier than *normal* conditions, with the western Viti Levu, the driest, for the second consecutive month.

Rainfall ranged from *well below average* to *average* across the country. Out of the 27 rainfall monitoring stations, 14 received *well below average* rainfall, 10 *below average* and 3 *average*.

Dry spells of 15 to 25 consecutive days were experienced at most sites in the Western, Northern and the Eastern Divisions.

Currently, Koronivia, Labasa Airfield, Lakeba, Matei Airfield, Matuku, Monasavu, Nadi Airport, Nausori Airport, Navua, Savusavu Airfield, Vanuabalavu, Viwa and Dobeilevu are under meteorological drought.

The day-time temperatures were generally *normal to below normal* at most sites while the minimum temperatures were generally *below normal*.

Notably, the country experienced *cooler than usual* spells between the 13th and 14th and 24th and 28th.

The mean maximum temperatures were *normal to below normal* and ranged from 26.1°C to 30.4°C, with daily maximum temperatures rising as high as 32.5°C.

The mean minimum temperatures were *below normal* and ranged from 16.2°C to 23.9°C, with the overnight temperatures falling as low as 9.1°C at Nadarivatu on the 5th.

New low average temperature records were established at Nabouwalu and Tokotoko (Table 1). No new rainfall record was set, however, the total monthly rainfall at Monasavu ranked the 3rd lowest for the month of July in its historical record.

The current El Niño-Southern Oscillation (ENSO) conditions remain at neutral levels, though the sea surface temperatures (SST's) are still generally warm across the equatorial Pacific Ocean. A general lack of atmospheric response to the warm ocean has slowed down the El Niño development in the Pacific.

2.0 WEATHER PATTERNS

The weather in July was influenced mostly by weak frontal systems and semi-permanent ridges of high pressure.

On the 1st, a weak frontal system approached Fiji from the southwest and moved over the group on the 3rd with brief showers over most parts of the country. A ridge behind this front directed a cool and dry southeast wind flow over the group till the 6th.

From 7th to 9th, a relatively moist northeast wind flow prevailed over Fiji with light showers over most places. On the 10th, another ridge to the south directed a cool and dry south to southeast wind flow over Fiji till the 19th.

On the 20th, another frontal system approached the country from the west and cleared the group on the 23rd, aided by an intense area of high pressure behind it. Showers were

recorded over most places during the passage of the front. Cool and dry south to southeast winds prevailed over the country from the 23rd till the 27th.

Till the end of the month, an easterly wind flow prevailed over the group with showers especially over the eastern parts and interior of the larger islands.

Rotuma's weather in July was influenced by the SPCZ and moist easterly winds. The lowest minimum temperature recorded this month was 20.4°C.

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

3.0 RAINFALL

Following from June, considerably drier than *normal* conditions continued in July with the driest region being the western Viti Levu, for the second consecutive month.

Rainfall was *well below average to below average* in the Western and Northern Divisions, *well below average to average* in the Eastern Division and *below average to average* in the Central Division. Monasavu received well below average, ranking 3rd lowest for July in its historical record. Rotuma received *below average* rainfall.

It is noted that the drier than *normal* conditions have expanded to the Northern and parts of the Eastern Divisions this month. Periods of 15 to 25 consecutive dry days were experienced in most parts of the country. Out of the 27 rainfall monitoring stations, 14 received *well below average*, 10 *below average* and 3 *average*.

Rainfall ranged from 8% to 49% of the *normal* in the Western Division, 8% to 62% in the Northern Division, 70% to 101% in the Central Division and 37% to 99% in the Eastern Division. Rotuma and Monasavu recorded 62% and 32% of *normal*, respectively, while Lautoka received less than 5% . (Figure 1).

The highest 24-hour rainfall was at Nausori Airport with 65.2mm on the 28th, followed by Tokotoko (Navua),

55.2mm on the 28th, Rotuma, 46.2mm on the 3rd and Suva, 37.7mm on the 28th.

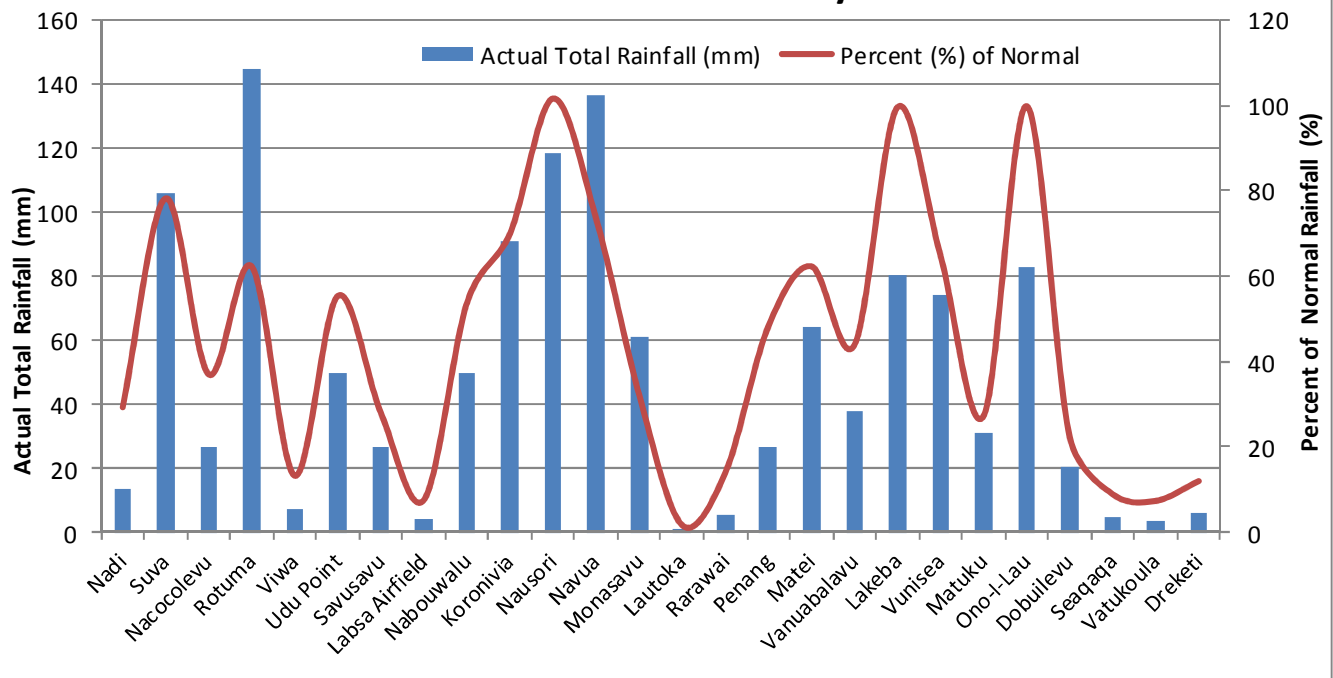
Rotuma recorded the highest total monthly rainfall of 144.7mm, followed by Navua, 136.4mm, Nausori Airport, 118.5mm and Laucala Bay (Suva), 105.9mm. On the other hand, the lowest total monthly rainfall was recorded at Vatukoula with 3.8mm, followed by Labasa Airfield, 4.1mm, Seaqaqa, 5.0mm and Dreketi, 6.0mm (Figure 1).

Matei Airfield recorded the highest number of rain days (rainfall ≥ 0.1 mm) with 17, followed by Ono-i-lau and Laucala Bay, with 16. In contrast, the least number of rain days of 2 were observed at Viwa, Labasa Airfield and Lautoka, followed by 3, at Dreketi, Vatukoula, Nacocolevu and Rarawai Mill.

Using the 3-month Standardised Precipitation Index (SPI) method of drought monitoring, Koronivia, Labasa Airfield, Lakeba, Matei Airfield, Matuku, Monasavu, Nadi Airport, Nausori Airport, Navua, Savusavu Airfield, Vanuabalavu, Viwa and Dobuilevu are under meteorological drought, while Dreketi, Seaqaqa, Lautoka, Rarawai, Udu Point and Yasawa-I-Rara are at warning stage for meteorological drought.

Figure 1

Rainfall Distribution in July 2014



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 ≥ 0.1 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.

4.0 AIR TEMPERATURES

A. Maximum Daytime Air Temperatures

The maximum air temperatures were generally *normal to below normal* during the month, with 11 out of the 22 stations recording anomalies within $\pm 0.5^{\circ}\text{C}$, 6 within $\geq 0.5^{\circ}\text{C}$ and 5 $\leq 0.5^{\circ}\text{C}$ (Table 2 & Figures 2-5).

Labasa Airfield recorded the highest monthly average maximum air temperature of 30.3°C , followed by Rotuma, 29.3°C , and Rarawai Mill, 29.0°C . On the other hand, Monasavu registered the lowest of 22.0°C , followed by Ono-i-lau, 25.2°C , and Matuku, 25.7°C .

The highest daily maximum air temperature of 32.5°C was observed at Labasa Airfield, followed by 32.4°C at Udu Point, both on the 9th, and 32.0°C at Lautoka and Rarawai Mills, both on the 8th, respectively.

In contrast, the lowest daily maximum temperature was recorded at Monasavu with 18.5°C on the 23rd, followed by Nausori Airport, 21.5°C on the 23rd and Koronivia, 21.7°C , on the 23rd.

The positive anomalies of 1.4°C was recorded at Viwa, followed by 1.2°C at Vanuabalavu and 1.1°C at Labasa Airfield.

On the other hand, negative anomalies of -1.0°C was recorded at Nadi Airport, followed by -0.9°C at Navua.

There were no new maximum air temperature record established this month.

B. Minimum Night-time Air Temperatures

The minimum air temperatures were generally *below normal*, with 14 out of the 22 stations recording anomalies $\leq 0.5^{\circ}\text{C}$ and 7 within $\pm 0.5^{\circ}\text{C}$ (Table 2 & Figures 2-5).

The lowest monthly average minimum air temperature of 14.1°C was recorded at Monasavu, followed by 16.2°C at Rarawai Mill and 17.7°C at Nadi Airport & Labasa Airfield. On the other hand, the highest average minimum temperature 25.5°C , 24.9°C and 21.9°C . was recorded at Rotuma, Udu Point and Vanuabalavu respectively.

Cold nights, by Fiji standards, were experienced between the 13th and 14th as well as 24th and 28th country-wide. The daily lowest minimum air temperature of 9.1°C was recorded at Nadarivatu on the 5th, followed by 11.0°C at Monasavu on the 26th, 11.4°C at Rarawai Mill and Monasavu on the 27th and 28th and 12.0°C at Labasa Airport on the 28th.

On the other hand, the warmest daily minimum temperature was observed at Rotuma with 25.5°C on the 9th, followed by Udu Point with 24.9°C on the 20th and 24.5°C at Matei Airfield, Lakeba and Matuku on the 20th and 9th respectively.

The minimum air temperature departed from normal by -1.6°C at Nabouwalu, Nausori Airport and Penang, followed by -1.4°C at Monasavu and Viwa and -1.1°C at Savusavu Airfield and Lautoka Mill.

Nabouwalu and Navua recorded their new average minimum air temperature lows for the month, while Nabouwalu recorded its second lowest daily minimum air temperature for the month (Table 1).

TABLE 1. CLIMATE RECORDS ESTABLISHED IN JULY 2014

<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 Temperature	Nabouwalu	20.2°C	-	New Low	20.6	1986	1956
Mean monthly Min Temperature	Navua	18.3°C	-	New Low	18.4	1998	1992

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

TABLE 2. DAILY CLIMATE REPORTING SITES: SUMMARY FOR JULY 2014

	RAINFALL					AIR TEMPERATURES								SUNSHINE	
	TOTAL	RAIN		MAX.		AVERAGE DAILY				EXTREME				TOTAL	
		* DAYS		FALL		MAX.	#	MIN.		#	MAX.	MIN.		HRS	*
	MM	%	+	MM	ON	C	C	C	C	C	C	ON	C	ON	
NADI AIRPORT	13	29	10	5	22	27.6	-1.0	17.7	-0.7	31.4	10	13.4	27	224	102
SUVA/LAUCALA BAY	106	78	16	38	28	26.4	-0.4	20.3	-0.4	28.5	2	17.8	28	156	116
NACOCOLEVU	27	37	3	20	22	26.6	-0.8			30.3	8			165	99
ROTUMA	145	62	13	46	3	29.3	0.2	23.9	-0.2	31.4	20	20.4	14	80	40
VIWA	7	13	2	6	22	29.2	1.4	21.2	-1.4	31.0	2	19.8	21		
UDU POINT	49	56	15	11	23	28.0	0.0	22.0	-0.3	32.4	9	19.0	16		
SAVUSAVU AIRFIELD	27	28	9	12	22	26.7	-0.3	19.9	-1.1	29.5	19	16.5	28		
LABASA AIRFIELD	4	8	2	3	22	30.3	1.1	17.7	-0.4	32.5	9	12.0	28		
NABOUWALU	49	54	11	15	19	26.8	0.5	20.2	-1.6	29.7	20	16.5	14		
KORONIVIA	91	70	10	33	28	26.5	0.0	18.7	-0.7	30.6	9	14.2	25		
NAUSORI AIRPORT	119	101	11	65	28	25.9	-0.4	18.0	-1.6	28.8	9	13.5	25		
NAVUA/TOKOTOKO	136	73	12	55	28	26.3	-0.9	18.3	0.2	29.0	8	15.0	25		
MONASAVU	61	32	13	14	22	22.0	0.9	14.1	-1.4	26.0	9	11.0	26		
LAUTOKA AES	1	2	2	1	22	27.7	-0.6	18.8	-1.1	32.0	8	16.0	26		
BA/RARAWAI MILL	5	14	3	3	22	29.0	-0.6	16.2	-0.8	32.0	8	11.4	27		
PENANG MILL	27	49	7	16	22	27.3	-0.1	18.8	-1.6	29.1	2	12.8	15		
MATEI AIRFIELD	64	62	17	18	22	27.3	0.2	20.8	-0.8	30.5	9	17.9	13		
VANUABALAVU	38	44	7	16	22	28.2	1.2	21.9	-0.0	31.9	8	19.0	24		
LAKEBA	80	99	11	31	22	26.1	-0.3	20.0	-1.0	30.5	9	15.5	14		
ST. JOHNS COLLEGE				CLOSED STATION											
VUNISEA	74	65	14	36	27	26.4	0.7	19.4	-0.2	29.3	20	16.8	16		
MATUKU	31	37	15	13	22	25.7	-0.3	20.1	-0.7	29.3	24	16.6	25		
ONO-I-LAU	83	90	16	33	12	25.2	0.2	19.2	-1.0	28.6	2	16.5	23		
SEAQAQA	5	10	5	3	22										
DREKETI	6	16	3	5	22										
DOBUILEVU	21	37	8	10	22										
YASAWA-I-RARA	10	18	5	5	2										
VATUKOULA	4	8	3	2	22										

	TEMPERATURE (C)		HUMIDITY		WIND	SUN RAD
	MEAN	DRY WET	RH%	VP		
	(AVERAGE AT 9AM)	KT	POS	SQ.M		
NADI AIRPORT	22.6	22.4 19.5	76	20.6	5.8	67 19.2
SUVA/LAUCALA BAY	23.4	23.3 20.4	76	21.8		47 15.0
NACOCOLEVU		22.4 20.3	82	22.2		53 14
ROTUMA	26.6	27.0 24.5	79	28.7	5.4	52 15
VIWA	25.2	25.9 22.1	71	23.7		
UDU POINT	25.0	25.3 21.0	70	22.1	11.3	
SAVUSAVU AIRFIELD	23.3	24.0 21.1	76	22.7		
LABASA AIRFIELD	24.0	25.9 23.5	81	27.1		
NABOUWALU	23.5	24.5 21.4	75	23.2	8.1	
KORONIVIA	22.6	22.6 20.5	82	22.6		
NAUSORI AIRPORT	22.0	21.8 19.8	83	21.7	2.0	
NAVUA/TOKOTOKO	22.3	21.1 19.3	85	21.2		
MONASAVU	18.0	17.5 16.0	86	17.2		
LAUTOKA AES	23.2	24.5 20.2	67	20.5		
BA/RARAWAI MILL	22.6	22.7 19.7	75	20.8	0.1	
PENANG MILL	23.0	24.1 20.4	70	21.2		
MATEI AIRFIELD	24.0	25.0 21.3	71	22.6		
VANUABALAVU	25.0	24.6				
LAKEBA	23.1	24.4 20.9	72	22.1	10.4	
ST. JOHNS COLLEGE		CLOSED STATION				
VUNISEA	22.9	22.9 19.7	73	20.5	2.8	
MATUKU	22.9	23.5 19.6	68	19.9	8.7	
ONO-I-LAU	22.2	23.0 19.4	71	19.9	8.5	

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. DATA MISSING ON ONE OR MORE DAYS.

Figure 2 Nadi Airport (Western Division) - Temperature & Rainfall Records for the last 13 Months (July 2013 - July 2014)

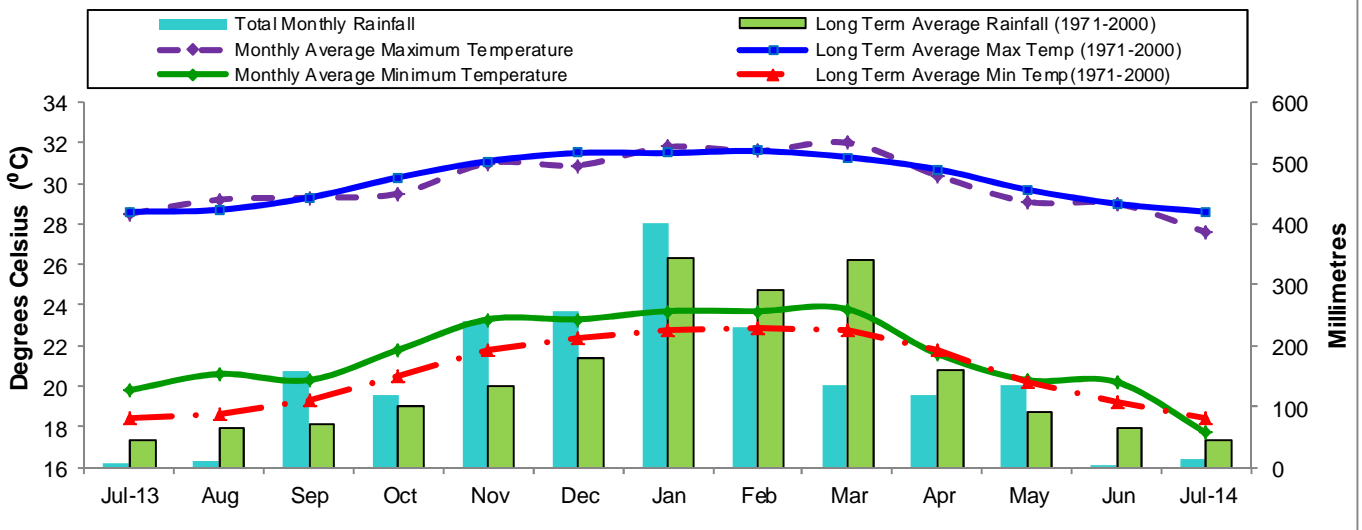


Figure 3 Laucala Bay - (Suva) (Central Division) - Temperature & Rainfall Records for the last 13 Months (July 2013 to July 2014)

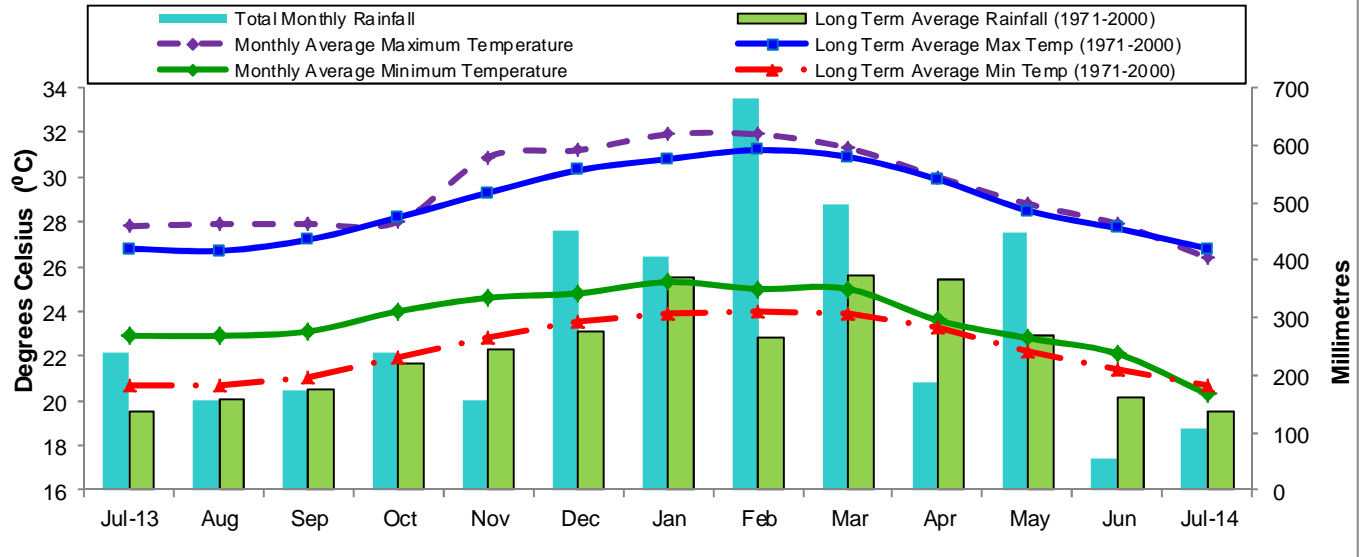


Figure 4 Labasa Airport (Northern Division) - Temperature & Rainfall Records for the last 13 Months (July 2013 - July 2014)

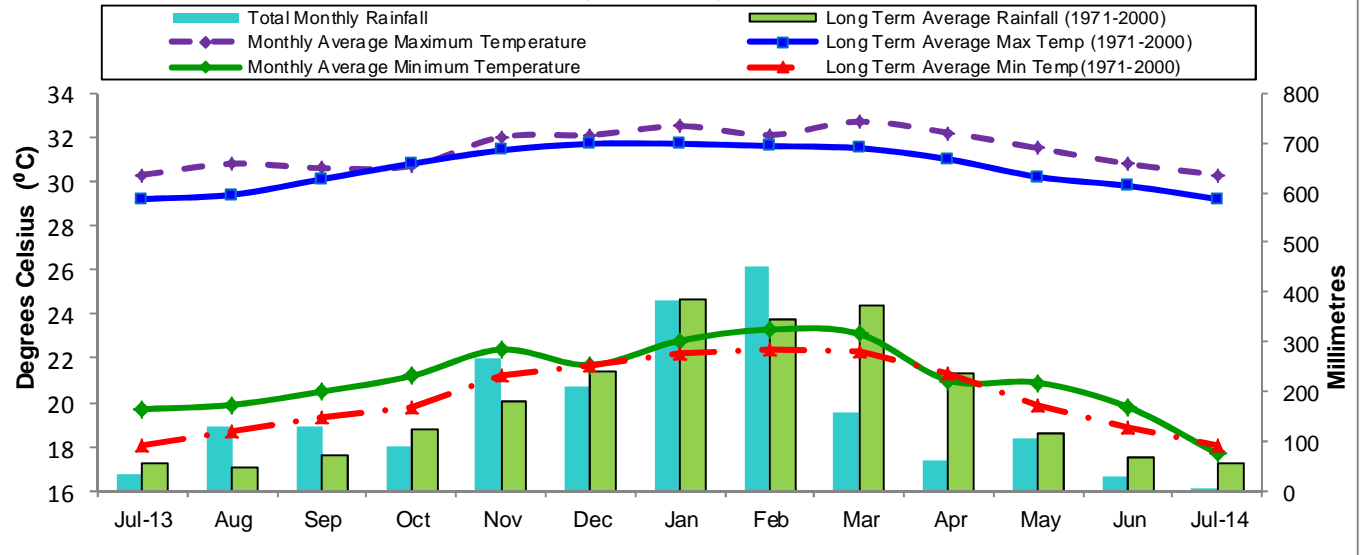
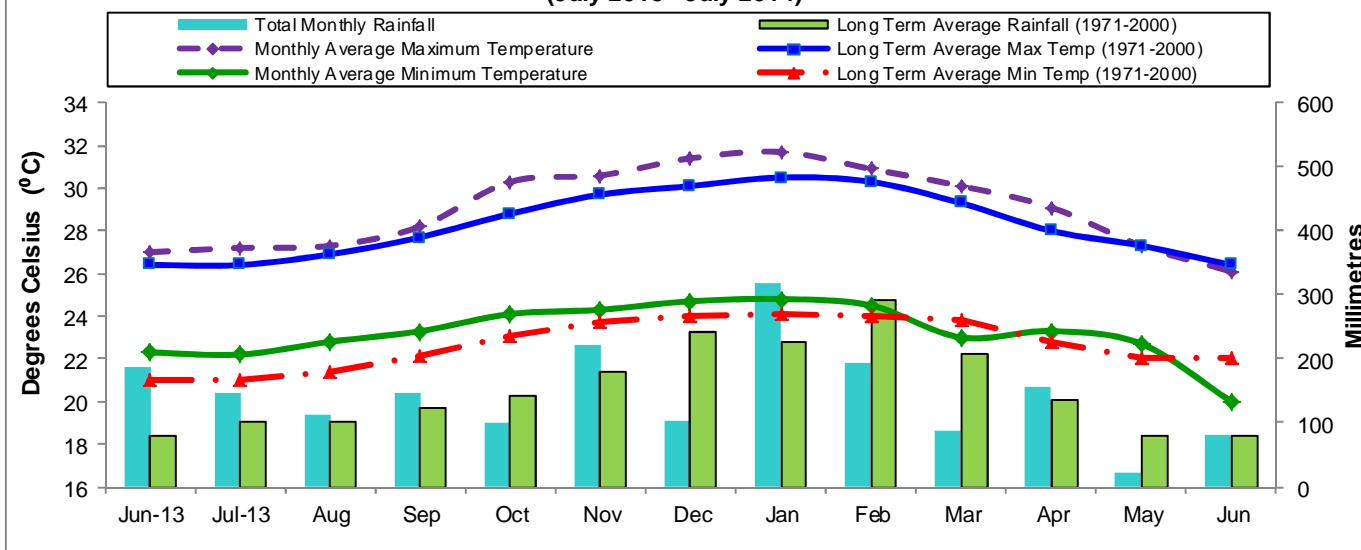


Figure 5

Lakeba (Eastern Division) - Temperature & Rainfall Records for the last 13 Months (July 2013 - July 2014)



5.0 RELATIVE HUMIDITY AT 0900HOURS

The 9am average relative humidity (RH) in July varied between 67% to 86% (Table 2), with the daily values ranging from 39% to 99%.

The Western Division stations recorded daily average RH values between 67% and 86%. The lowest negative RH departure from the *normal* was registered at Penang Mill with -13.0%. On the other hand, Nadi recorded positive anomalies of +3.7%.

The Central Division stations recorded daily average RH between 76% and 85%. Laucala Bay and Koronivia recorded negative departures of -4.3% and -0.9%, while Tokotoko (Navua) registered a positive anomaly of +0.7%.

The daily average RH in the Northern Division ranged from 71% to 81%. Negative departures were recorded at the majority of the stations, with the most notable departure of -6.8% observed at Matei Airfield, followed by -3.8% at Savusavu Airfield and -2.5% at Nabouwalu. On the other hand, Labasa Airfield was the lone station that registered a positive anomaly of +2.0%.

The stations in the Eastern Division recorded daily average RH values between 68% and 73%. Negative anomalies were recorded across the division, with the greatest departure of -6.0% recorded at Matuku, followed by -5.0% at Vunisea, -3.4% at Lakeba and -1.4% at Ono-I-Lau.

The daily average RH at Monasavu was 86%, while at Rotuma, 79%.

6.0 SUNSHINE

Laucala Bay, Nadi Airport and Nacocolevu recorded 116%, 102% and 99% of their *normal* bright sunshine hours, respectively, during the month (Table 2).

Nadi Airport recorded 223.5 hours of bright sunshine, with a mean of 7.2 hours/day. More than 10 hours of bright sunshine was recorded on a number of days, with the highest of 10.6 hours recorded on the 30th. On the other hand, the 3rd and 22nd were overcast days with no sunshine hours recorded.

Laucala Bay recorded 156.3 hours of bright sunshine during the month, with a mean of 5.0 hours/day. Its highest daily sunshine of 9.1 hours was recorded on the 30th, while the 22nd was an overcast day at the station, with zero hours of bright sunshine recorded.

Nacocolevu recorded 164.6 hours of bright sunshine, with a mean of 5.7 hours/day. The station's longest duration of bright sunshine of 9.7 hours was recorded on the 30th, followed by 9.5 hours on the 5th. In contrast, overcast conditions prevailed on the 22nd and 27th. No data was available for the 11th and 12th.

Note:
Due to insufficient observation data from Rotuma in July, no analysis is done for the station.

7.0 WIND SUMMARY

The 10-minute average wind statistics recorded at three hourly intervals at Nadi Airport in July showed that easterly winds were dominant, accounting for 32.3% of the total observations, followed by south-easterlies with 25% and southerly, 12.9% (Figure 6(a)). Calm conditions accounted for 6.0% of the occasions. The 10-minute average wind speeds were light to moderate in strength (Figure 6(b)). The three-hourly mean wind speed at the station was 5.8 knots.

wind speed at Nausori Airport was 2.0 knots. The wind anomalies map on the NOAA website suggests *near normal* winds persisted in the Fiji region during the month (Figure 12).

At Nausori Airport, calm conditions prevailed at most of the occasions, corresponding to 70% of the total three-hourly observations. South-easterly winds accounted for 8.9%, while southerly winds, 8.5% of the total observations. The 10-minute average wind speeds were light to moderate in strength (Figure 7(b)). The three-hourly mean

light breeze: 1-3 knots, slight 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

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)

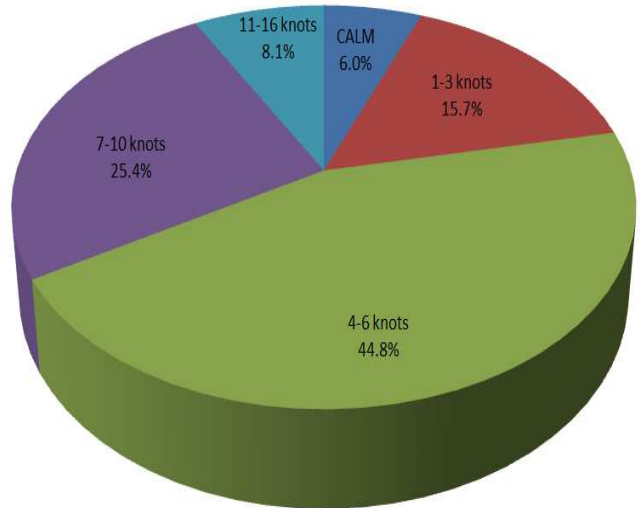
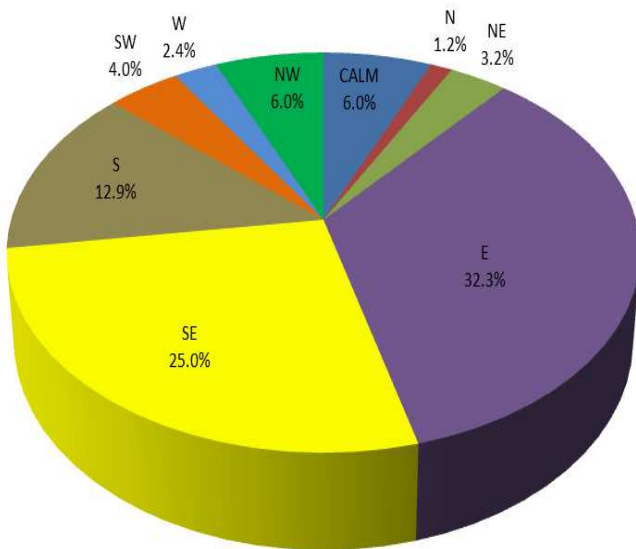
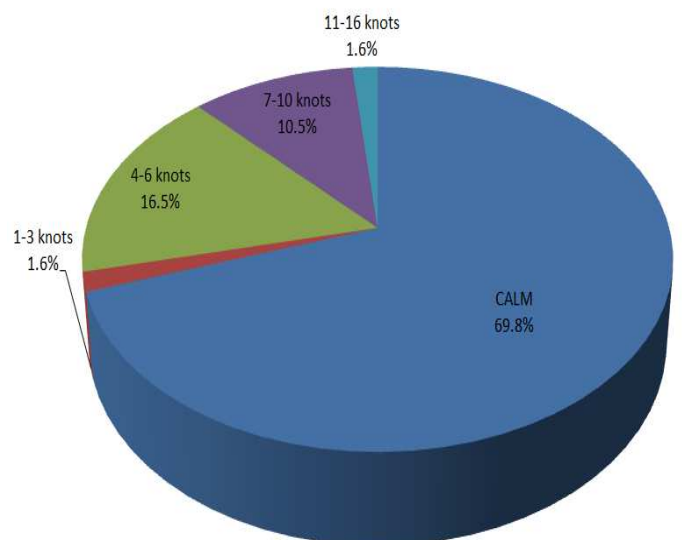
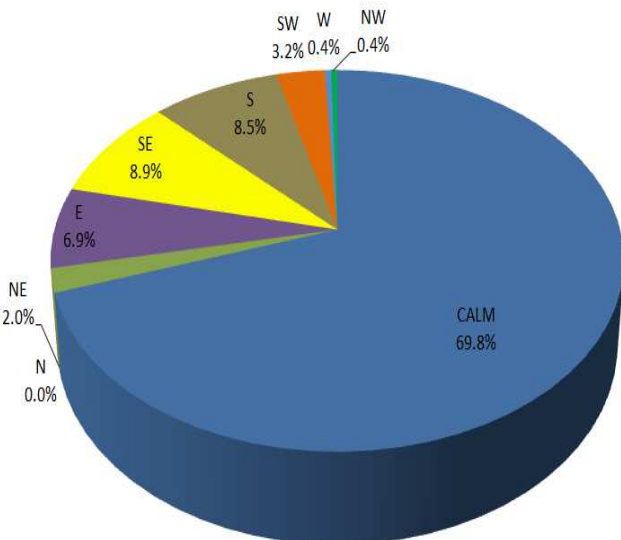


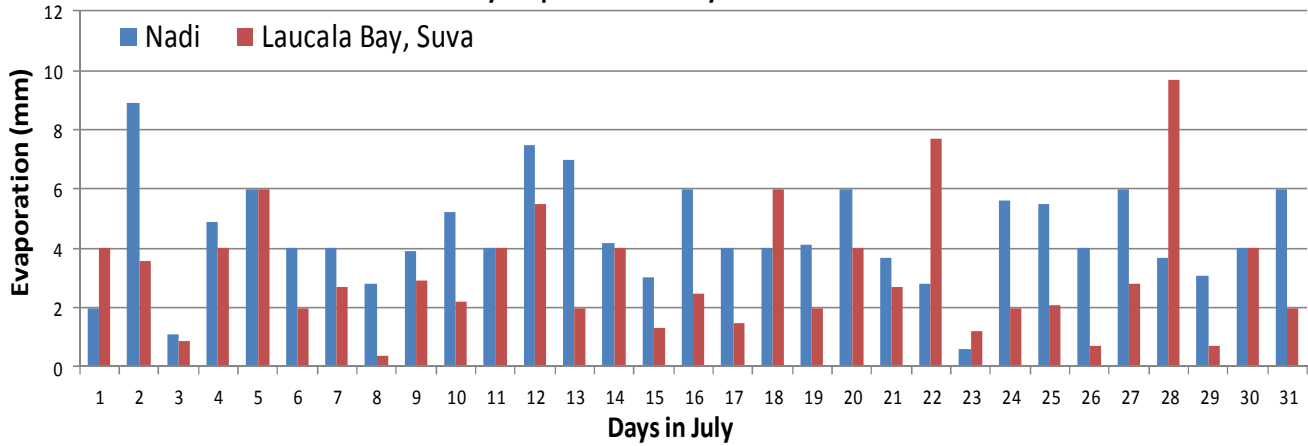
Figure 7(a) Surface Wind Direction for Nausori Airport, Fiji. (WMO 91683 Lat 18°02'47"South Long 178°33'33"East Height above MSL 3m)

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

Figure 8 Daily Evaporation for July 2014



The total monthly raised pan evaporation at Nadi Airport was 137.6mm, while Laucala Bay recorded 97.1mm. Nadi Airport's highest daily evaporation was 8.9mm on the 2nd, with Laucala Bay recording the highest of 9.7mm on the 28th.

SEA SURFACE TEMPERATURE (SST)

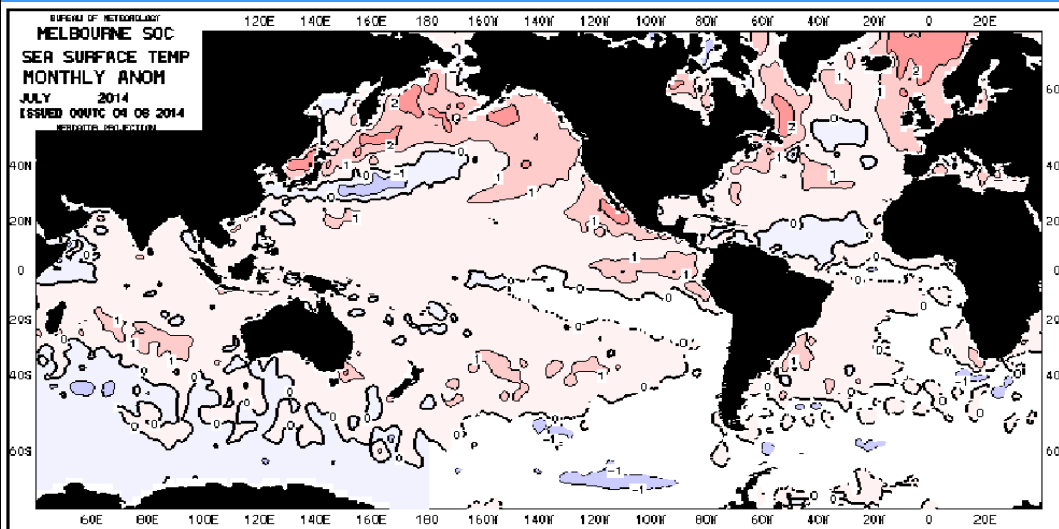


Figure 9:

SST anomalies (°C) from 1st to 31st July, 2014.

Normal SST were present in the Fiji region during July (Fiji: ~17°S, 180°), (base period: 1981-2010).

<http://www.bom.gov.au/climate/current/anomst.shtml>

CLOUD COVER

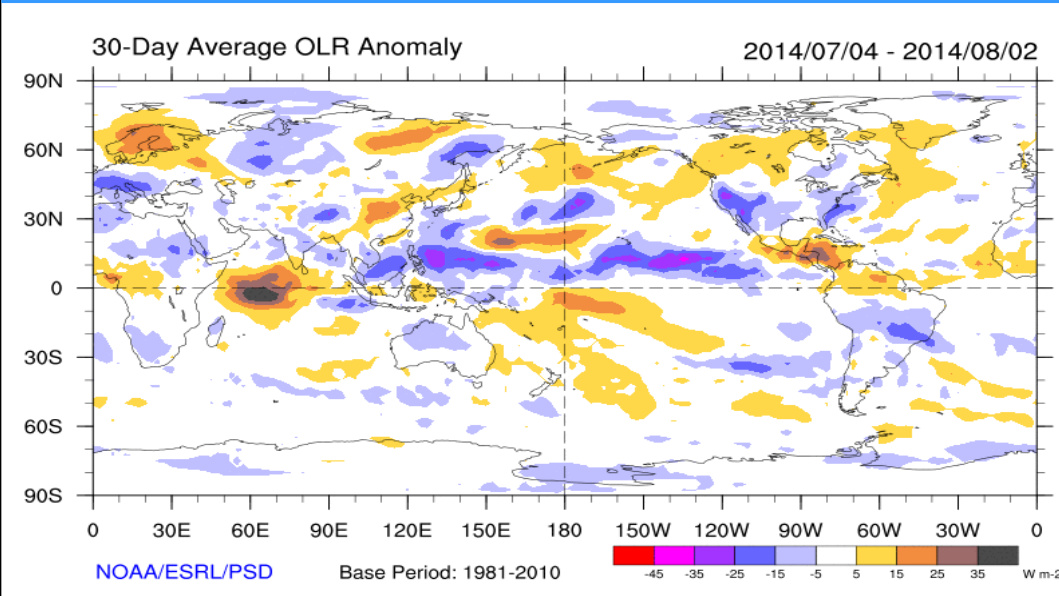


Figure 10:

Outgoing Longwave anomalies (Wm^{-2}) from 4th July to 2nd August, 2014. Below normal cloud cover was present in the Fiji region (Fiji: ~17°S, 180°) (base period: 1981-2010).

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

SEA LEVEL

Sea Level Anom (cm), Jul 27 2014

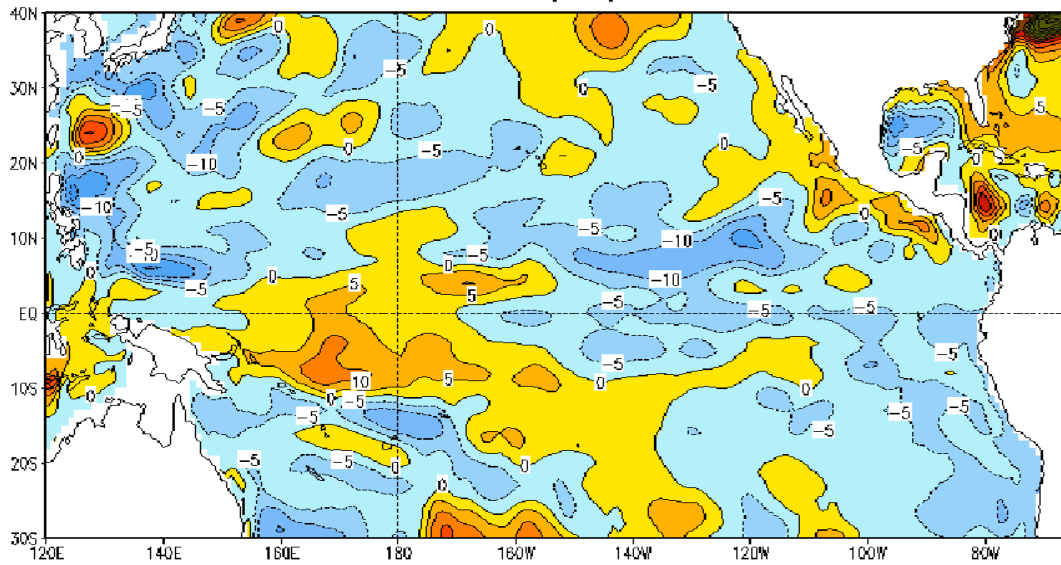


Figure 11:

Sea level was *near normal* in the Fiji region.

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

WIND ANOMALIES

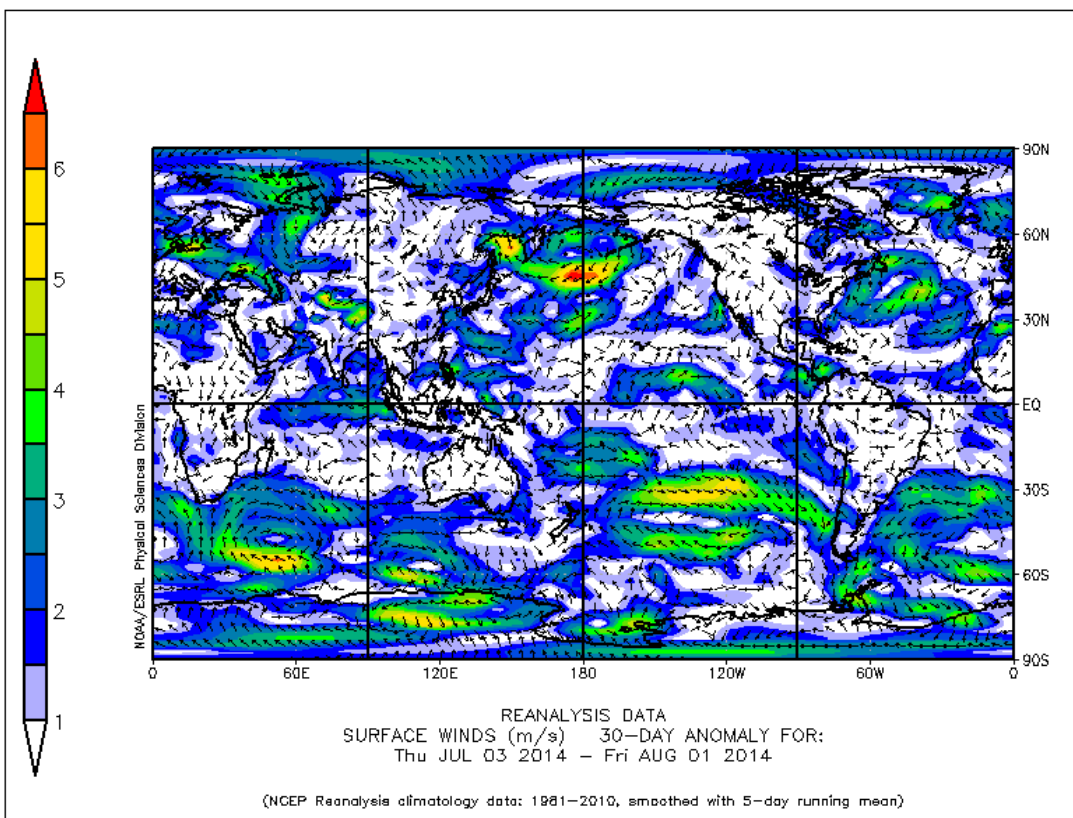


Figure 12:

Wind anomalies for July 2014.

Near normal westerly winds were in the Fiji region during July (Fiji: ~17°S, 180°) (base period: 1981-2010).

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

This Summary is prepared as soon as ENSO, climate and oceanographic data is received from recording stations around Fiji and Meteorological Agencies around the World. Delays in data collection, communication and processing occasionally arise. While every effort is made to verify observational data, the Fiji Meteorological Service does not guarantee the accuracy and reliability of the analyses presented, and accepts no liability for any losses incurred through the use of this information and its contents. The information may be freely disseminated provided the source is acknowledged.

For further information, contact: The Director of Meteorology, Fiji Meteorological Service, Private Mail Bag NAP0351, Nadi Airport, Fiji. Phone: (679) 6724888, Fax: (679) 6720430, E-mail: fms@met.gov.fj or climate@met.gov.fj. URL: <http://www.met.gov.fj>