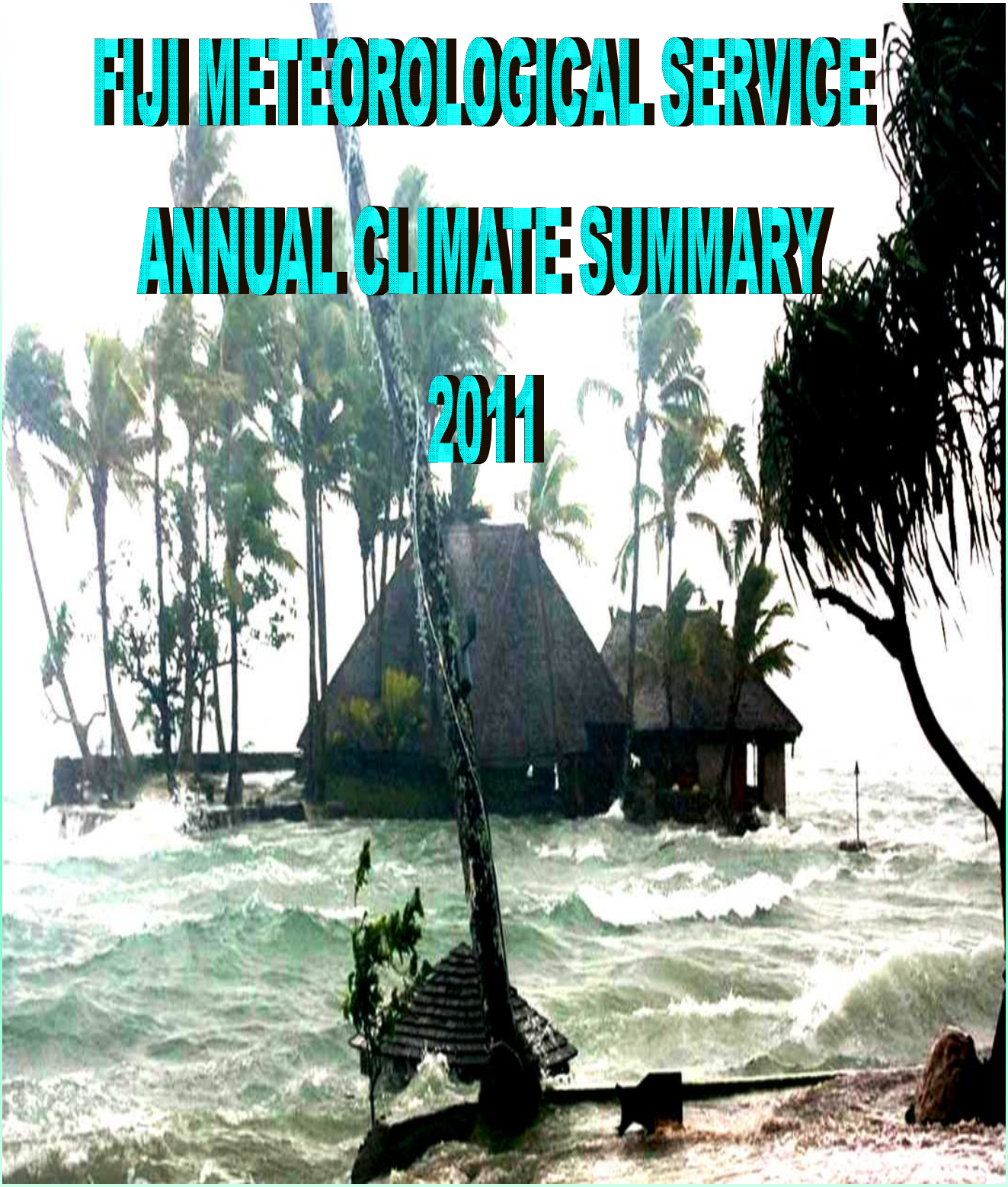
FIJI METEOROLOGICAL SERVICE

ANNUAL CLIMATE SUMMARY

2011



Heavy damaging swells and sea flooding along the Coral Coast in May 2011 ***(source: SOPAC).***

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In this Issue

HIGHLIGHTS OF 2011

- *Weather and climate conditions varied significantly from one month to another as the country was influenced by the two distinctive phases of El Niño Southern Oscillation (ENSO);*
- *Moderate to strong La Niña conditions persisted during the first quarter, ENSO neutral conditions prevailed from May to August and weak to moderate La Niña conditions re-emerged in October and persisted until end of 2011;*
- *Strongly negative Out-going Long-wave Radiation (OLR - which is an indirect measure of cloudiness) anomalies persisted during the beginning of 2011, while the rest of the year recorded near normal anomalies and hence below normal cloudiness in the Fiji region as indicated by satellite observations;*
- *The SPCZ was located to the southwest of its mean position for most of the year, having significant impact on Fiji's rainfall pattern;*
- *The Sea Surface Temperatures (SST) were around 1.0˚C to 2.0˚C above normal during the year in the Fiji region as seen from satellite observations;*
- *A total of 64 new climate extremes (7 rainfall, 56 temperature and 1 sunshine) were established during the year;*
- *Normal to wetter than normal conditions were experienced across the country with annual rainfall ranging from 99% to 148% of normal;*
- *The average mean temperature was 0.6˚C warmer than normal, ranking second highest, equivalent to 2001 & 2000, while 2007 (1.0°C) remains the warmest year on record;*
- *The daytime (maximum) and the night-time (minimum) air temperatures were 0.7˚C and 0.6˚C warmer than normal respectively;*
- *Stronger than normal wind speeds were observed in most parts of the country ,which is typical during La Niña events;*
- *Sunshine hours were normal to above normal with the first half of 2011 recording above normal while below normal during the second half;*
- *The monthly average radiation recorded at Nadi Airport was below normal throughout the year;*
- *There were no cyclones that directly affected Fiji in 2011, though some parts of the country experienced strong winds and heavy rain as a result of tropical cyclones passing close to the Fiji Group;*
- *No significant sea level anomalies were observed in the Fiji region, however, anomalies of 5-10cm were observed during January and July (appendix 2A &2B).*

Note: All comparisons are with respect to "Climatic Normal". This is defined to be an average climate conditions over 30 year period. Fiji uses 1971-2000 period as its "climatic normal".

WEATHER PATTERNS

The weather patterns during 2011 were significantly influenced by the presence of La Niña conditions in the region. The South Pacific Convergence Zone (SPCZ) was displaced to the southwest of its mean position for most of the year, as normally experienced during La Niña events. While no topical cyclone (TC) directly affected the country in 2011, a few of them passed close to the country. Consequently, associated strong winds and heavy rainfall were experienced in parts of Fiji. Brief accounts of month by month weather are presented below.

January was typically moist and humid, with afternoon showers common over the main islands. Three Tropical Cyclones (TC), "Vania" "Wilma" and "Yasi", formed in Nadi's area of responsibility (AoR), while "Zelia" and "Anthony" entered Nadi's Area of Responsibility (AoR) briefly during the month. TC "Wilma" passed south of the Southern Lau Group on the 25th, resulting in strong winds with occasional rainfall over the island group. Tropical Depression (TD09F), which later developed into TC "Yasi", tracked westwards just north of the Fiji group between 28th and 29th causing rain and strong winds over Rotuma, Vanua Levu, Taveuni and northern Yasawa. Heavy rain associated with violent thunderstorm activity was experienced over the western Viti Levu on the 27th, with over 90mm of rainfall recorded at Nadi Airport in one hour between 5-6pm. The SPCZ in the vicinity of Rotuma resulted in rainfall over the island most of the days.

The weather in **February** was dominated by the presence of the SPCZ, troughs of low pressure and TC "Atu". Tropical depression (TD11F) was located on the northeast of Vanuatu on the 17th, gradually intensified and developed into a TC on the 19th. TC "Atu" indirectly affected Yasawa & Mamanuca Groups, western Viti Levu and Kadavu, with strong winds and rain. There were reports of flooding in parts of Vanua Levu and western Viti Levu between 17th and 20th. TC "Zaka" also formed in Nadi's AoR during the month, however, it did not have any significant effect on the Fiji Group. Rotuma was affected a couple of times by the SPCZ and a few westward moving rain bands occasioning substantial rainfall.

March was characterized by moist easterly wind flow and transient troughs of low pressure. TC "Bune" indirectly affected parts of the country from 24th to 27th. There were reports of strong and gusty winds in the Northern and Eastern Divisions during this period. Two rare meteorological events were also reported to have occurred in parts of Fiji during the month. A waterspout was spotted off the coast of Ba on the 13th, while on the 14th, a whirlwind in Vakacegu Settlement, Navua damaged a few houses. Rotuma received most of its rainfall from SPCZ and moist easterly wind flow.

Weather in **April** was dominated by series of troughs of low pressure, moist easterly wind flow and a frontal system. It was a typical transition month, with wetter than *normal* condition experienced in some areas and drier than *normal* in others. An active trough of low pressure between 4th and 10th resulted in rainfall over most parts of the country, with Penang Mill and Nadi Airport recording the highest rainfall of 105mm and 87mm respectively. Rotuma experienced fine weather on most of the days.

The 2010/11 La Niña ended in **May**, with the transition to neutral conditions occurring during the month. However, the lingering effects of the La Niña continued to influence Fiji's rainfall pattern, with the SPCZ displaced to the southwest of its mean position. Troughs of low pressure, moist easterly wind flow and a frontal system within the vicinity of Fiji resulted in majority of the places recording *above average* to *well above average* rainfall. The sub-tropical high pressure systems were also dominant during the month. Damaging heavy swells were experienced in the southern parts of Fiji on the 20th as a result of high pressure system (1034HPA) over the Tasman Sea directing uniform strong to near gale force winds to the south of the fetch front. Rotuma experienced *below normal* rainfall during the month.

The country's weather in **June** was influenced by the passing ridges of high pressure interspersed by troughs of low pressure and a frontal system. The moist easterly wind flow was the dominant feature during the 1st half of the month. From 25th to 27th, an active trough of low pressure resulted in widespread rainfall over the Fiji Group, with a number of stations recording more than its *normal* total monthly rainfall in just three days. The country experienced cool conditions from 27th to 29th as a ridge of high pressure directed a cool southerly wind flow over the group, with Rarawai Mill recording the lowest minimum temperature of 13.7°C on the 29th. A strong wind warning was enforced for all Fiji waters from the 25th to 29th. Rotuma received only half of its *normal* rainfall and it was mainly from SPCZ and moist easterly wind flow.

Three major rainfall producing systems were experienced during **July**. A trough of low pressure affected the country from 1st to 4th, followed by a cold front from 23rd to 26th and then another trough of low pressure from 29th to 31st. The weather during the rest of the month was mostly dominated by ridges of high pressure. A damaging heavy swell warning was issued for most parts of Fiji from 11th to 15th as a ridge on the southwest of the Group generated heavy southerly swells. The trend of *below normal* rainfall continued at Rotuma.

August was dominated by transient ridges of high pressure interspersed by troughs of low pressure. Rainfall varied considerably across the country, with rainfall ranging from *well below average* to *well above average*. A ridge of high pressure directed cool southerly wind flow over the country from 6th to 8th, with majority of the stations recording the lowest daily minimum temperature during this period. Rotuma received intermittent showers for most of the month, largely due to the presence of the SPCZ and the easterly wind flow.

WEATHER PATTERNS

In **September**, Fiji's weather was similar to August. An active trough of low pressure from 1st to the 4th and a cold front from 26th to the 30th brought widespread rainfall across the country, with majority of the stations recording most of the total monthly rainfall during this period. Rotuma experienced fine weather on most of the days, recording 12 days with rainfall and received 28% of *normal* rainfall during the month.

La Niña conditions were firmly re-established in **October**. While most of the country recorded *average* to *well above average* rainfall, the northeastern parts of Fiji received *below average* rainfall. Widespread rainfall were recorded across the country between 5th and 10th resulting from a trough of low pressure. The trend of *below normal* rainfall continued at Rotuma, with only 3 days exceeding 15mm of rainfall.

November showed a typical wet weather pattern. The presence of a tropical disturbance and the combined effects of the SPCZ, eastward moving troughs, trade showers, afternoon thunderstorm activities and a frontal system resulted in wetter than *normal* conditions over majority of the places. A tropical disturbance embedded in the SPCZ moved over the Group on the 14th, resulting in widespread flooding in the low lying areas. There were also reports of strong winds over Lau and Lomaiviti land areas on the 15th. It was a wet month at Rotuma, with the wettest period being from 13th to 16th.

Fiji's weather during **December** was dominated by the SPCZ, associated moist easterly wind flow, troughs of low pressure and transient ridges of high pressure. The SPCZ brought widespread rainfall over the country between 19th and 23rd, with isolated heavy falls. A trough of low pressure over the Group also resulted in widespread rainfall between 24th and 27th. Wet conditions were experienced at Rotuma on the majority of the days as a result of moist easterly wind flow and the SPCZ lying close to the island.

WIND SUMMARY - Mean Wind (10 minutes average)

The 10 minutes average wind statistics recorded at every three hourly intervals at Nadi Airport, Nausori Airport, Nabouwalu, Udu Point, Vunisea and Rotuma, showed that east to southeast winds were common at most of the stations during 2011. While calm conditions accounted for nearly half of the total observations at some of the stations, the three hourly annual average wind speeds ranged from 3.3 to 8.2 knots. The minimum annual average wind speeds were recorded at 0300hrs, whereas the highest average maximum wind speeds were recorded at 1500hrs at the majority of the stations.

Nadi Airport in the Western Division experienced calm conditions on 24% of the instances during the year. East to southeast winds were dominant, accounting for 38% of the observations, followed by west to northwesterly winds, which were observed on 18% of the occasions (Figure 1(a)). The winds at Nadi Airport were generally slight to gentle in strength (Figure 1(b)), however, fresh to strong northerly breezes of up to 22 knots were recorded on February 21st and 22nd as Tropical Cyclone (TC) Atu tracked southeast to the west of the Fiji Group.

Calm conditions were predominant at Nausori Airport in the Central Division accounting for 53% of the three hourly statistics. However, east to southeast winds were most common, prevailing on 25% of the time (Figure 2(a)). The wind speeds at the station were generally slight to gentle in strength, but moderate to fresh breeze were also recorded on certain occasions (Figure 2(b)).

At Nabouwalu in the Northern Division, calm conditions prevailed on 24% of the occasions. The east to southeast winds were predominant accounting for 61% of the annual observations. While the wind strengths at the station were generally slight to moderate, fresh to strong breezes were also recorded on a number of occasions between July and November.

Udu Point in the Northern Division experienced clam conditions on 12% of the instances. The east to southeast winds were predominant accounting for 60% of the observations. The wind strengths at the station were generally slight to moderate. However, strong northerly breeze of up to 25 knots were experienced on the March 24th and 25th as TC Bune lay slow moving on the south of the Group. Then again on the June 27th, strong to near gale force winds of up to 30 knots were recorded at Udu Point as a ridge of high pressure extended over the Group from the southwest.

Calm conditions accounted for 41% of the three hourly statistics at Vunisea in the Eastern Division. The east to southeast winds were most common, which were observed on 45% of the instances. The wind strengths generally ranged from light to gentle.

Rotuma experienced calm conditions on 45% of the occasions in 2011. The east to southeast winds persisted on 29% of the occasions, followed by north to northeasterly winds, which accounted for 22% of the observations. The wind strengths at the station were generally slight to gentle.

Care should be taken in interpreting the information provided for Nabouwalu, Udu Point, Vunisea and Rotuma since a number of observations were not recorded at these stations during the year. Of all the possible observations, only 40%, 54%, 63% and 76% of the observations are available for Udu Point, Nabouwalu, Vunisea and Rotuma respectively. The data sets for Nadi Airport and Nausori Airport are almost complete.

light air: 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: 22-27knots, near gale: 28-33 knots

EXTREME WINDS

While no tropical cyclone (TC) directly affected the country during the year, strong breeze were experienced on a number of occasions in parts of the country. TC "Wilma" caused strong breezes of up to 25 knots over the southern Lau Group on January 25th. A tropical depression, which was later named TC "Yasi", directed strong breezes of up to 25 knots over Vanua Levu, Taveuni and northern Yasawas between January 28th and 29th. Between February 21st and 22nd, strong northerly winds with speeds of up to 25 knots and gusts of up to 35 knots were experienced over the Yasawa and Mamanuca Groups, western Viti Levu and Kadavu as TC "Atu" tracked southeast to the west of Fiji. On the March 14th, a whirlwind in Vakacegu Settlement in Navua destroyed a few houses. TC "Bune" affected parts of the country from March 24th to 27th resulting in strong and gusty winds over the Southern Lau Group. Then on the May 20th, a high pressure system over the Tasman Sea directed uniform strong to near gale force winds to the south of the fetch front, creating high swells south of Fiji's Exclusive Economic Zone (EEZ), affecting coastal areas. Then on June 27th, strong to near gale force winds of up to 30 knots were recorded at Udu Point. From July 11th to 15th, strong winds as a result of ridge on the southwest of the group generated heavy swells resulting in sea flooding and piling of debris along the Coral Coast and in some of the outer islands in the southern Lau Group. On November 15th, strong winds were experienced in the Lau and Lomaiviti Groups as a result of a tropical disturbance affecting the country.

ANNUAL FREQUENCY OF WIND DIRECTIONS AND SPEEDS AT NADI AND NAUSORI AIRPORTS

Figure 1(a) Surface Wind Direction for Nadi Airport, Fiji. (WMO 91680 Lat 17˚45'35"South Long 177˚26'42"East Height above MSL

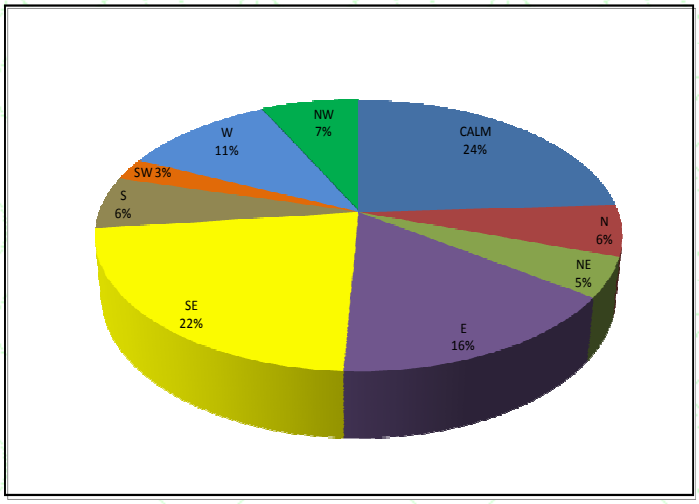


Figure 1(b) Surface Wind Speed for Nadi Airport, Fiji. (WMO 91680 Lat 17˚45'35"South Long 177˚26'42"East Height above MSL 22m)

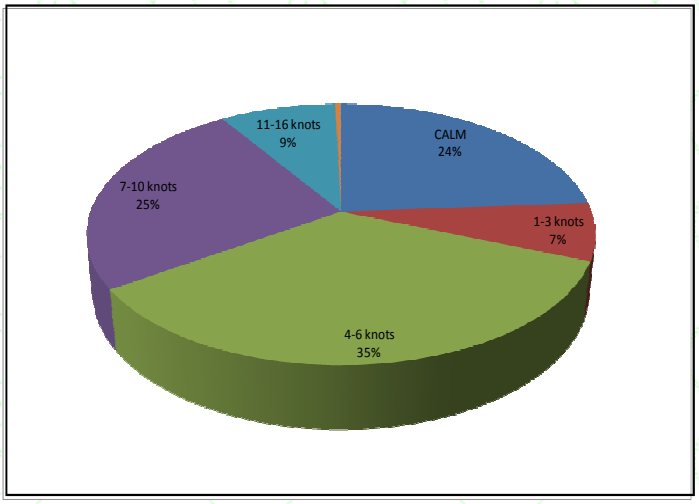


Figure 2(a) Surface Wind Direction for Nausori Airport, Fiji. (WMO 91683 Lat 18˚02'47"South Long 178˚33'33"East Height above MSL 3m)

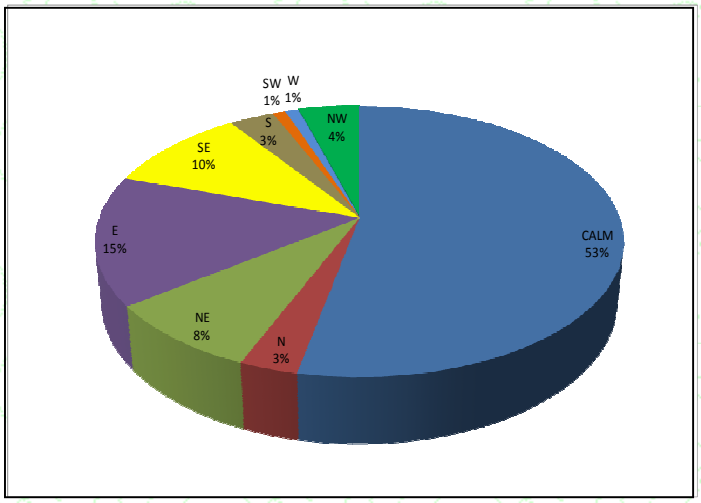
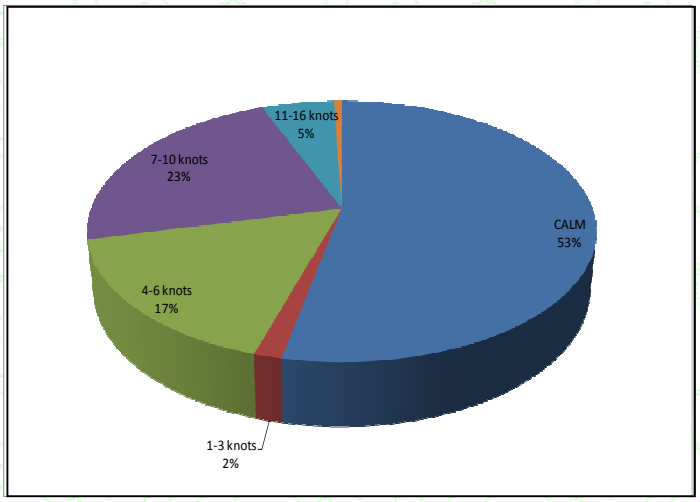


Figure 2(b) Surface Wind Speed for Nausori Airport, Fiji. (WMO 91683 Lat 18˚02'47"South Long 178˚33'33"East Height above MSL 3m)



RAINFALL

Fiji's rainfall was largely influenced by the lingering 2010/11 moderate to strong La Niña followed by a brief neutral conditions and a re-emergence of weak to moderate event towards the end of 2011. The South Pacific Convergence Zone (SPCZ) was located to the southwest of the mean position for most of the year and resulted in enhanced rainfall over Fiji.

This was evident as the dry season was wetter than *normal* at majority of the locations. It was noted that the June to September period was extremely wet at Laucala Bay - Suva (149%), Nausori Airport (138%), Nadi Airport (131%), Nabouwalu (127%), Lakeba (120%), Vunisea (119%) and Labasa Airfield (118%). The locations on the windward side of the country experienced greater effect of the wetter conditions as sustained stronger and moist trade winds prevailed, which is typical of La Nina events.

Fiji's annual rainfall was 115% of *normal*. During the year, apart from March (75%), April (88%), August (84%) and September (82%), Fiji's monthly rainfall were *above normal* at most of the stations (Figure 3 below).

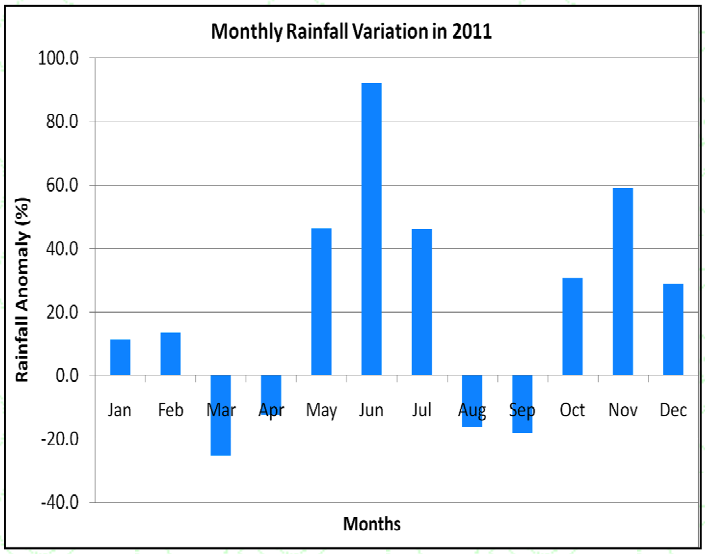


Figure 3: Departures from mean monthly rainfall for Fiji. Negative departures were recorded in March, April, August and September.

The annual rainfall ranged from 132% to 148% in the Western Division, 99% to 130% in the Eastern Divisions, 99% to 117% in the Northern Division and 102% to 105% in the Central Division. Rotuma recorded 76% of *normal*.

Monthly rainfall was 111% of *normal* in January, 113% in February, 146% in May, 192% in June, 146% in July, 131% in October, 159% in November and 129% in December. The rest of the months recorded less than 90% of *normal* rainfall.

High variability in rainfall was observed during the months of change from wet to dry (April and May) and dry to wet (September and October) seasons.

Penang Mill, Nadi Airport, Lakeba and Rotuma recorded 150%, 133%, 136% and 100% of *normal* respectively within the first quarter.

At **Laucala Bay - Suva**, annual rainfall was *normal* (102%). Extremely wetter conditions were experienced in June (270%), July (142%), September (125%), November (153%) and December (169%), otherwise, *normal* to drier than *normal* conditions prevailed (Appendix 1A). The driest month was March when 39% of *normal* rainfall was recorded. The highest monthly rainfall of 469.0mm was recorded in December and the lowest of 89.1mm was recorded in August.

Nadi Airport (Western Division) experienced wetter than *normal* conditions for most of the year receiving 148% of *normal* annual rainfall. The monthly rainfall ranged from 119% to 244%, except September, which recorded 90% of *normal* (Appendix 1B). January recorded the highest rainfall of 465mm and September the lowest of 62mm.

At **Vunisea, Kadavu,** rainfall was *normal* (99%). The station recorded *below normal* rainfall in January, February, March, July and November ranging from 48% to 92% , however, most of the dry season months received *normal* to *above normal* rainfall (Appendix 1C). The lowest monthly rainfall of 102.0mm was recorded in November, followed by 105.3mm in July.

Rainfall at **Labasa Airfield** (Northern Division) varied considerably during the year, with February to April (24%-83%) being drier than *normal* and May to July (121%-161%) being considerably wetter than *normal* (Appendix 1D). The other wetter months were January and October when 171% and 127% of *normal* rainfall was recorded respectively. The highest monthly rainfall of 661mm was recorded in January and the lowest of 36mm was recorded in September.

Lakeba Island also experienced wetter than *normal* conditions receiving 130% of annual rainfall. Notably, more than 150% of *normal* rainfall was recorded in January, February, June, July, October, November and December (Appendix 1E) . February and June received more than twice its *normal* monthly rainfall. The highest rainfall of 487mm was recorded in February and the lowest of 25mm in September.

It was relatively dry in **Rotuma**, with January (169%) and November (167%) the only months with rainfall greater than 100% departure from *normal* (Appendix 1F). The rest of the months recorded *normal* to *below normal* rainfall, ranging from 19% to 94% of *normal*. The stations highest monthly rainfall of 599.1mm was recorded in January, followed by 471.7mm in November, while the lowest of 55.9mm (19% of normal) was recorded in April. Rotuma was in meteorological drought during most of the year, while the rest of the stations were recording *normal* to *above normal* rainfall.

MEAN AIR TEMPERATURE

The annual average mean air temperature was 26.0˚C, which was 0.6˚C warmer than *normal*. The 2011 mean air temperature is ranked the second highest over the historical record, with 2007 being the warmest year for Fiji. Globally, 2010 is ranked the warmest year, which is at the same level as 1998 and 2005.

With the exceptions of January and February, the rest of the months were warmer than *normal* with May to July being significantly warmer than *normal* across the country with positive departures greater than 1.0˚C were observed in May (1.2°C), June (1.1°C) and July (1.1°C) (Figure 4).

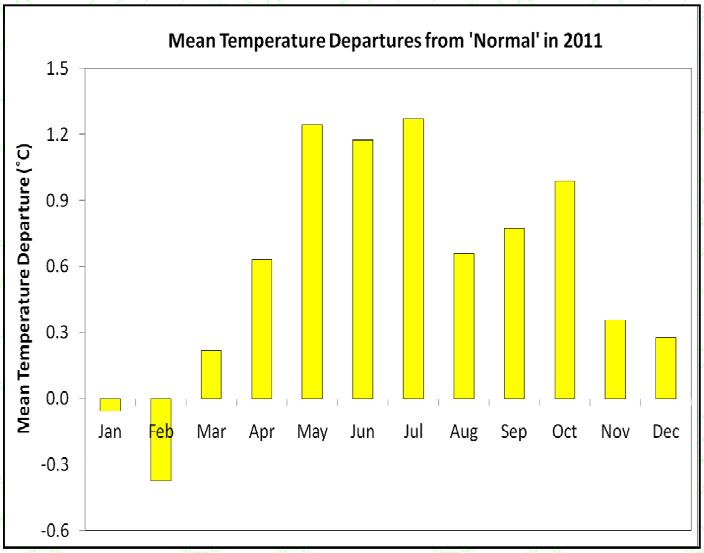


Figure 4: Monthly average mean temperature departure from *normal*.

Comparatively, 2011 was 0.6˚C warmer than 2009 and 0.1˚C cooler than 2010. Temperature in July, October, November and December were warmer than 2009 and 2010 (Figure 5).

At **Laucala Bay (Suva)** the annual average mean air temperature was 26.5˚C. The location recorded sustained warmer than *normal* mean temperature throughout the year. The observed annual departure from *normal* was 0.9˚C, with the greatest departure of 1.4˚C recorded in June. Other significant positive departures (>0.5˚C) from *normal* were also recorded from March to December 2011 (Appendix 1A).

The annual average mean air temperature at **Nadi Airport** was 25.9˚C, which recorded 0.4˚C above *normal*. The monthly average mean temperature was consistently warmer from April to November (Appendix 1B) and significant (>1.0˚C) departures from *normal* were recorded in the months of May to July. The only observed negative departure of –0.7˚C was recorded in February.

At **Vunisea**, the annual average mean air temperature was 25.7˚C, which was 1.0˚C *above normal*. Apart from June and September (no data available), sustained positive departures were recorded at the station (Appendix 1C). The positive departures of greater than 1.0˚C were recorded in the months of May (1.8˚C), July (1.3˚C) and October (1.4˚C).

At **Labasa Airfield,** the annual average mean air temperature was 26.0˚C, which was 0.5˚C warmer than the *normal*. April to October period was warmer than *normal,* with positive departures ranging from 0.3˚C to 1.3˚C (Appendix 1D). Significant positive departures (>1.0˚C) were recorded in May (1.3˚C), June (1.0˚C) and July (1.1˚C).

The annual average mean temperature at **Lakeba Island** was 25.9˚C, which was 0.4˚C *above normal*. The monthly average mean temperatures at Lakeba were consistently warmer than *normal* from May to December (Appendix 1E), with the highest positive departure of 1.4˚C recorded in July and October. Other significant (>0.5˚C) positive departures were recorded in the months of May, June, August and September.

At **Rotuma**, the annual average mean air temperature was 27.8˚C, with warmer than *normal* conditions experienced from March to October period (Appendix 1F). The annual departure from *normal* was 0.5˚C, with the positive departures of greater than 1.0˚C recorded in May (1.1˚C) and July (1.2˚C).

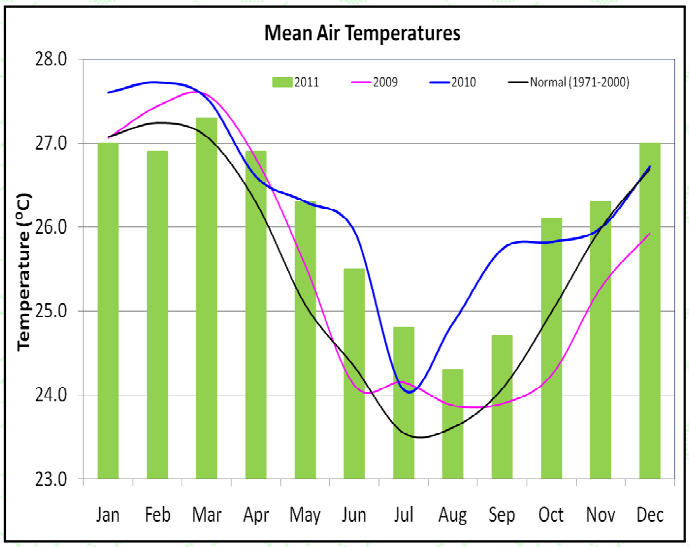


Figure 5: 2011 Mean temperature relative to 2009, 2010 and *normal*.

Note: All comparisons are with respect to "Climatic Normal". This is defined to be an average climate conditions over 30 year period. Fiji uses 1971-2000 period as its "climatic normal".

MINIMUM AIR TEMPERATURE

The annual average night-time (minimum) air temperature was 22.5˚C, 0.6˚C warmer than the *normal*. Similar departure from *normal* was recorded in 1988, 2000 and 2002.

The country experienced cooler than *normal* night-time air temperatures during the wet months, however, warmer than *normal* conditions were experienced during the dry months. The coolest month was August when several locations recorded temperatures below 18˚C in the coastal areas and below 15˚C in the inland areas.

The average night-time temperatures ranged from 20.9˚C to 23.4˚C across the country with January to March period being *normal* to *below normal* and persistently warmer than *normal* from May to November. Anomalies of greater than 0.7˚C were recorded in July (1.4˚C), May and October (1.2˚C), August (0.9˚C) and June and November (0.8˚C) (Figure 6).

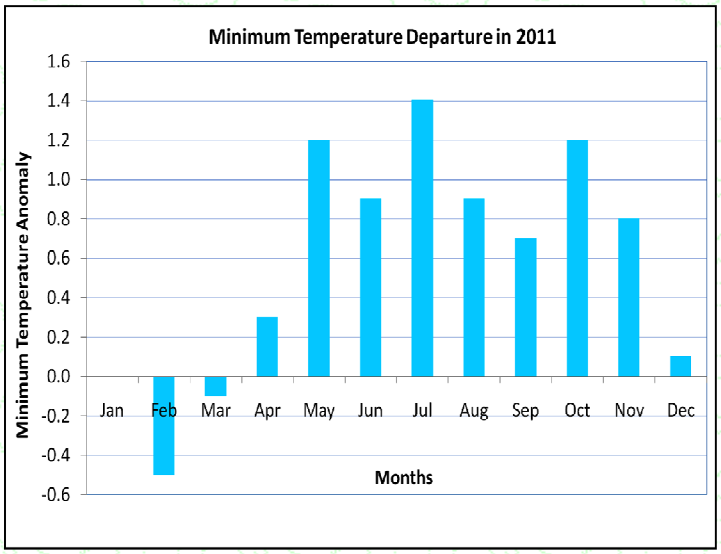


Figure 6 : Night-time (minimum) temperature departure from *normal* with significantly warmer (≥0.7˚C) period from May to November.

Comparatively, 2011 was 0.5˚C warmer than 2009 and 0.2˚C cooler than 2010. Temperature in February was cooler, while October, November and December were warmer than *normal* (Figure 7).

A total of 9 daily and 19 new mean monthly night-time air temperature records were established around the country.

The annual average night-time temperature at **Laucala Bay (Suva)** was 23.8˚C, which was 1.3˚C warmer than *normal*. Warmer than *normal* conditions were experienced throughout the year at Laucala Bay as persistent positive departures were recorded from January to December, with April to December recording significant positive departures of greater than 1˚C (Appendix 1A).

At **Nadi Airport**, the annual average night-time temperature was 21.9˚C, which was 1.0˚C above *normal*. Apart from February and March, the location experienced warmer than *normal* night-time temperatures (Appendix 1B). Significant positive departures of greater than 1.0˚C were recorded from April to October. Departures in excess of 2.0˚C were recorded in May and July 2.1˚C. In contrast, no significant negative departures were recorded.

Vunisea (Kadavu) recorded annual average night-time temperature of 22.8˚C, which was 1.1˚C above *normal*. Apart from June (no data available), persistently warmer than *normal* night-time temperatures (Appendix 1C) were experienced during the year. Significant positive departures greater than 1.0˚C were recorded in April, May and August to October. Departure in May exceeded +2.0˚C.

The annual average night-time temperature at **Labasa Airfield** was +0.5˚C warmer than *normal* in 2011. Negative departures were recorded during January to March period, ranging between –0.1˚C to – 0.7˚C. However, positive departures were recorded from April to November and ranged from 0.2˚C to 1.4˚C (Appendix 1D). Significant positive departures greater than 1.0˚C was recorded during May (+1.4˚C), August (+1.0˚C) and October (+1.3˚C).

The annual average night-time temperature at **Lakeba Island** was 22.6˚C, which was near *normal* (Appendix 1E). Significant (≥1.0˚C) negative anomalies were recorded in February (-1.6˚C) and April (-1.4˚C), while July and October recorded significant positive departures of 1.0˚C and 1.4˚C respectively.

Rotuma's annual average minimum temperature was 25.1˚C, which was 0.6˚C *above normal*. Except January, all other months recorded positive departures with significant departures (>1.0˚C) recorded in September and October 2011 (Appendix 1F). The only negative departure of –0.3˚C was recorded in January.

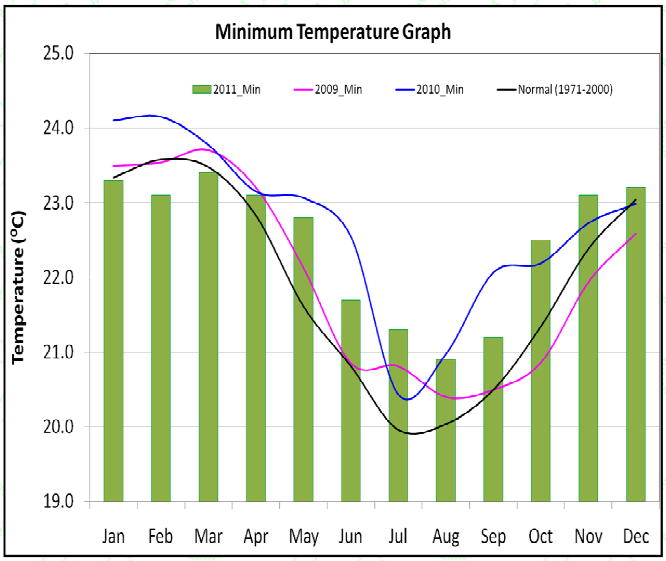


Figure 7: 2011 night-time (minimum) temperature relative to 2009, 2010 and *normal*.

MAXIMUM AIR TEMPERATURE

The monthly average daytime temperatures was *normal* in November, *below normal* in January and February and *above normal* for the rest of the months. The maximum temperature was significantly (≥1.0˚C) warmer than *normal* from April to July (Figure 8).

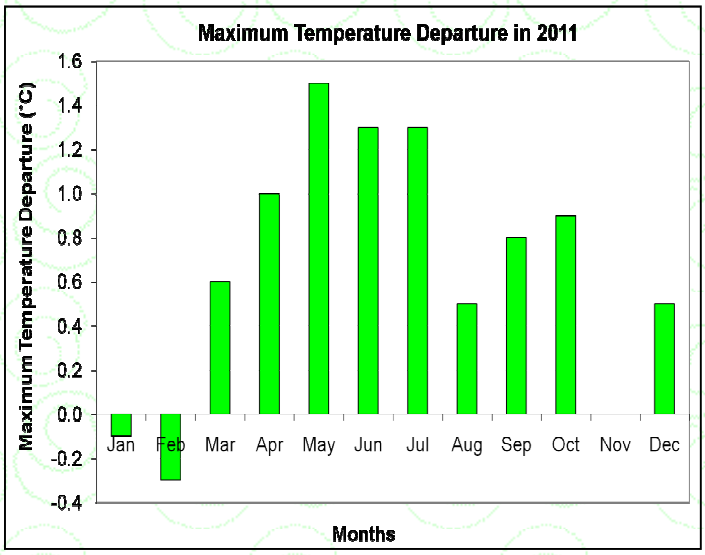


Figure 8: Monthly average daytime (maximum) temperature departure from *normal* with significantly warmer period from May to July.

The annual average daytime (maximum) air temperature was 29.7˚C, 0.7˚C *above normal*, ranking the second warmest on record, equivalent to 2010 and 2009. 2007 still remains the warmest year on record. Comparatively, 2011 was 1.6˚C warmer than 2009 and 0.4˚C warmer than 2010. The average temperatures in April, May, July, October and December were all above the past two years temperatures (Figure 9).

A total of 8 new daily daytime (maximum) temperature records (4 new daily high and 4 new daily low maximum temperatures) and 20 new monthly high air temperature, including 1 new low records were established.

The annual average daytime temperature at **Laucala Bay** (Suva) was 29.5˚C, ranging from 26.9˚C to 31.7˚C (Appendix 1A). The annual departure was 0.5˚C. Apart from November, the station recorded positive departures in the range of 0.1˚C to 1.1˚C. A significant positive departure of 1.0˚C was recorded in May.

At **Nadi Airport**, the annual average daytime temperature was 30.0˚C, with monthly temperatures ranging from 28.1˚C to 31.0˚C (Appendix 1B). Positive departures of 0.5˚C were recorded during May, June and July, while the rest of the months recorded negative departures, ranging from –1.1˚C to –0.1˚C. Notably, a significant negative departure of –1.1˚C was recorded in February at the station.

The annual average daytime temperature at **Vunisea** (Kadavu) was 0.9˚C warmer than *normal*. The temperatures fluctuated between 26.1˚C to 30.4˚C with May to July being warmer than *normal* (Appendix 1C). Vunisea recorded positive temperature anomalies throughout the year except in February when negative anomaly of –0.3°C was recorded Significant positive anomalies (≥1.0˚C) were recorded in May, June, July and October.

The annual daytime temperature at **Labasa Airfield** was 0.4˚C warmer than *normal.* The monthly temperatures ranged from 20.7˚C to 32.2˚C, with persistently warmer than *normal* from April to July (Appendix 1D). Apart from January, February and November, the maximum air temperature at the station was warmer than *normal.* Significant positive departures (≥1.0˚C) were recorded during the April to June period, while significant negative departure of –1.1˚C recorded in November.

Annual average daytime temperature on **Lakeba Island** was 29.4˚C, which was 1.0˚C above *normal*. The island experienced consistently warmer than *normal* temperatures throughout the year (Appendix 1E) with only exception in February. A negative departure of –0.4˚C was recorded in February, while significant positive departures were recorded in May (1.8˚C), June (1.5˚C), July (1.7˚C), October (1.5˚C) and April (1.4˚C).

At **Rotuma**, the annual average maximum temperature was 30.5˚C, which was 0.9˚C above *normal*. The period from March to October was warmer than *normal* (Appendix 1F), with significant positive anomalies recorded during the months of May and July (1.3˚C). The negative departures recorded were below –0.5˚C.

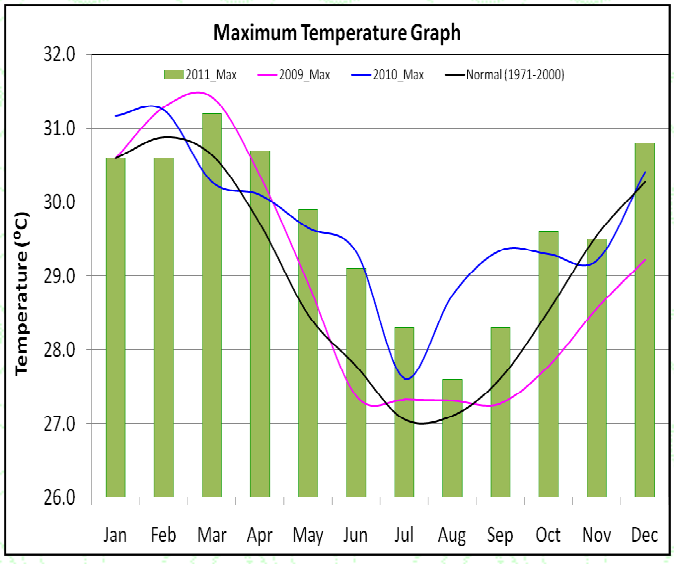


Figure 9: 2011 daytime (maximum) temperature relative to 2009, 2010 and *normal*.

Note: All comparisons are made with respect to "Climatic Normal". This is defined to be an average climate conditions over 30 year period. Fiji uses 1971-2000 period as its "climatic normal".

NEW RECORDS

A total of 64 new climatic extremes were established in 2011, which includes 20 daily, 44 monthly records. Of these new records, 56 were temperature, 7 rainfall and 1 sunshine. In 2010, there were 102 new records, 38 more than 2011.

There were 44 new monthly climatic records established during the year, of which, 20 were maximum and 19 minimum air temperatures, 4 rainfall and 1 sunshine. In addition, there were a total of 20 new daily records broken which included 3 rainfall, 8 maximum and 9 minimum temperature (Table 1). The highest number of new records were established in July (20), followed by May (11) and February (10). Other months recorded less than 10 records with 1 each in January, September and November. Two (2) daily and three (3) mean monthly minimum temperatures were equaled in 2011.

Table 1	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Daily Rainfall	-	1	-	-	-	1	1	-	-	-	-	-	3
Daily Maximum Temperature	1	1	-	1	-	2	2	1	-	-	-	-	8
Daily Minimum Temperature	-	2	1	-	1	1	4	-	-	-	-	-	9
Monthly Total Rainfall	-	1	2	-	-	-	-	-	-	-	1	-	4
Monthly Maximum Temperature	-	1	-	-	6	4	8	-	1	-	-	-	20
Monthly Minimum Temperature	-	4	1	1	4	-	5	1	-	3	-	-	19
Total Sunshine	-	-	-	1		-	-	-	-	-	-	-	1
Total	1	10	4	3	11	8	20	2	1	3	1	0	64

Table 1: summary of new rainfall, sunshine and temperature records established across the country.

RARE EVENTS

WHIRLWIND AND WATER SPOUT IN MARCH

Two rare events were reported by the media in 2011; a whirlwind and a waterspout. The Fiji Times (14/03/11) reported the occurrence of water spout at Raviravi settlement in Ba on the March 13th. In another incident, Fiji Times (15/03/11) reported an occurrence of whirlwind, that damaged a house at the Vakacegu settlement in Navua on March the 14th. Water spouts are said to have similar characteristics of a tornado but winds are much lighter and do not last long but can be very dangerous. Whirlwind and waterspout are weather phenomenon in which a vortex of wind forms due to instabilities and turbulence created by surface heating.

DAMAGING HEAVY SWELLS IN MAY

Swells that hit the Coral Coast area from May 19th to 22nd were generated by a high pressure system (1034HPA) in the Tasman Sea southwest of Fiji. It directed uniform strong to gale force winds to the south of the fetch front, hence creating heavy damaging swells south of Fiji.

The Fiji Times (21/05/11) reported that resorts along the Coral Coast suffered damage from swells on the 19th and 20th. Seawalls at some resorts and beach villas were also damaged (Figure 10).

Figure 10: Heavy swells along the Coral Coast in May (source: SOPAC)

SUNSHINE, SOLAR RADIATION AND SEA LEVELS

The total annual ***sunshine*** was *above normal* at Laucala Bay (Suva) (104%) and *below normal* at Labasa Mill (84%), Nadi Airport (88%) and Rotuma (84%) (Figure 11).

The monthly sunshine at **Laucala Bay (Suva)** varied during the year with *above normal* sunshine recorded in February (105%), March (114%), May (108%), June (134%), July (111%) and December (110%). The other months received *below normal* sunshine ranging from 83% to 99% of *normal*. The lowest sunshine of 112.7 hours was recorded in September, followed by 128 hours during August.

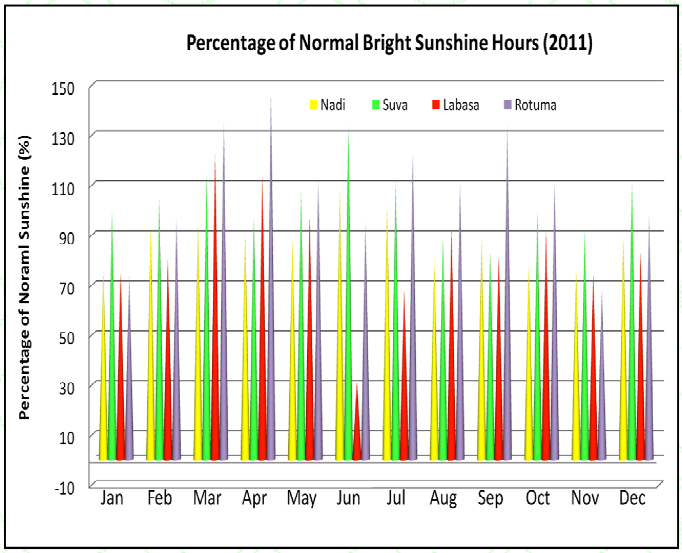


Figure 11: Total monthly and annual sunshine hours in 2011 at Laucala Bay (Suva), Nadi Airport, Labasa Mill and Rotuma.

Nadi Airport recorded *below normal* (88%) sunshine in 2011. Sunshine varied with seasons, with *above normal* sunshine hours recorded during June (108%) and July (101%), while the rest of the stations recorded *below normal* sunshine hours, ranging from 75% to 94% of the *normal*. The highest sunshine hours of 220.9 hours was recorded in July, followed by 220.7 hours in June.

At **Labasa Mill**, the total annual sunshine was 84% of *normal*. *Above normal* sunshine hours were recorded in the months of March (122%) and April (114%), while the rest of the months recorded *below normal* sunshine ranging from 31% to 97%. The highest sunshine hours of 205.4 hours was recorded in March, while the lowest of 61 hours was recorded in June.

The annual sunshine at **Rotuma** was *below normal* in 2011. The monthly sunshine was *above normal* during March to May and July to October periods and ranged from 111% to 146%. The highest sunshine of 266.9 hours was recorded in April and lowest of 126.2 hours recorded in January.

The variation in net ***radiation*** are primarily controlled by the changes in intensity and duration of solar insolation, which are driven by the variation in day length (total sunshine hours) and angle of incidence of the sun.

Apart from November (instrument unserviceable), radiation at Nadi Airport was 0.5MJ/m^2 *below normal* . The highest monthly radiation of 17.9MJ/m^2 was recorded in December, followed by 15.2MJ/m^2 recorded in February and 14.4MJ/m^2 in September. July recorded the lowest radiation value of 8MJ/m^2 followed by 9.1MJ/m^2 in August (Figure 12). Notably, negative departure from *normal* was recorded in October (-7.6MJ/m2), August (-7.7MJ/m2), January (-7.3MJ/m2), March and July (-6.7MJ/m2), and February (-5.3MJ/m2).

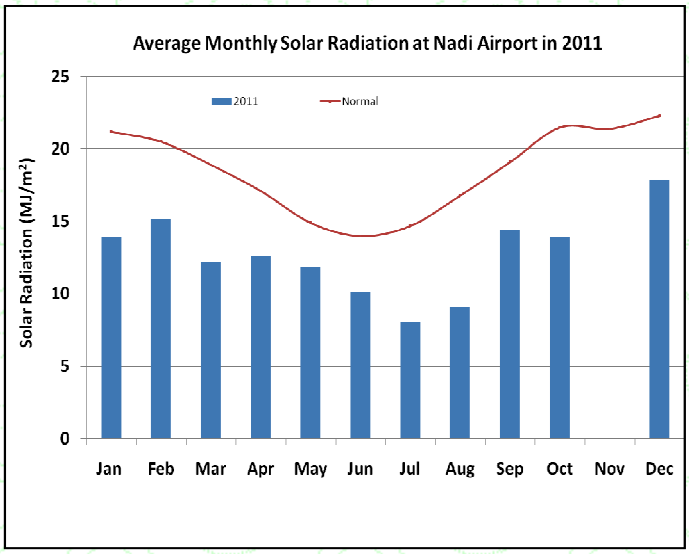


Figure 12: Monthly radiation for 2011 at Nadi Airport.

Sea levels in 2011 were significantly influenced by La Niña, with higher than *normal* sea levels experienced over most of the western Pacific. The mean sea level during the year at Lautoka SEAFRAME station was 1.32m, with a maximum of 2.48m in October, and a minimum of 0.18m in November. The mean sea level at Suva SEAFRAME station was 1.24m, with a maximum of 2.20m in September, and a minimum of 0.27m in November (Figure 13). These levels were generally 10 to 20cm high than *normal* in the Fiji region.

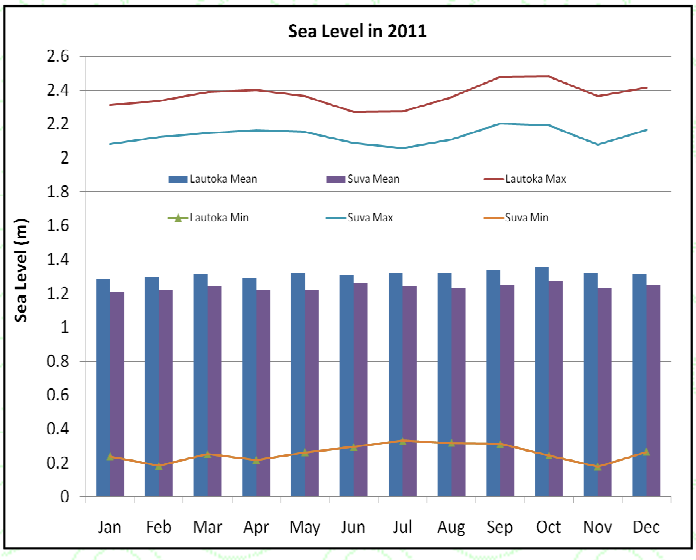


Figure 13: Mean, maximum and minimum sea levels at Lautoka and Suva SEAFRAME stations in 2011.

SEASONAL CLIMATE FORECAST VERIFICATION

Fiji Meteorological Service has twenty seven (27) sites around the country, which are used for the monitoring climate of Fiji. The national, divisional and locality forecasts are issued seasonally (3month periods) and verified for individual locations and success (consistent) forecasts are presented (Figure 14). In 2011, there were 60% of consistent forecasts or had the total observed rainfall in the predicted category, 29% near consistent forecasts, 8% inconsistent forecasts and 3% of the forecasts could not be verified (due to missing observations). There was a high success rate in the seasonal predictions for the Western (74%) followed by the Eastern (58%), Central (56%) and Northern Divisions (46%).The overall assessment of the model performance in 2011 is rated as good to very good compared to the total variance explained by the predictors (SOI and SST) in the Fiji region. It needs to be noted that there are other factors that drives Fiji's rainfall and the skill in the prediction can be significantly improved with dynamical modelling coupled with the skill and experience.

In total, three hundred and twenty four (324) individual seasonal climate predictions were issued. Of these, 60% of the forecasts were consistent, one hundred and ninety four (194) consistent, ninety four (94) near consistent and twenty four (24) inconsistent forecasts, while 11 forecasts could not be verified due to unavailability of the data or missing records. During wet season, there was 61% consistent forecasts, 22% near consistent forecasts, 13% inconsistent forecasts and 4% unverified forecasts. Similarly, during dry season, 59% consistent forecasts, 36% near consistent, 3% inconsistent and 2% unverified forecasts.

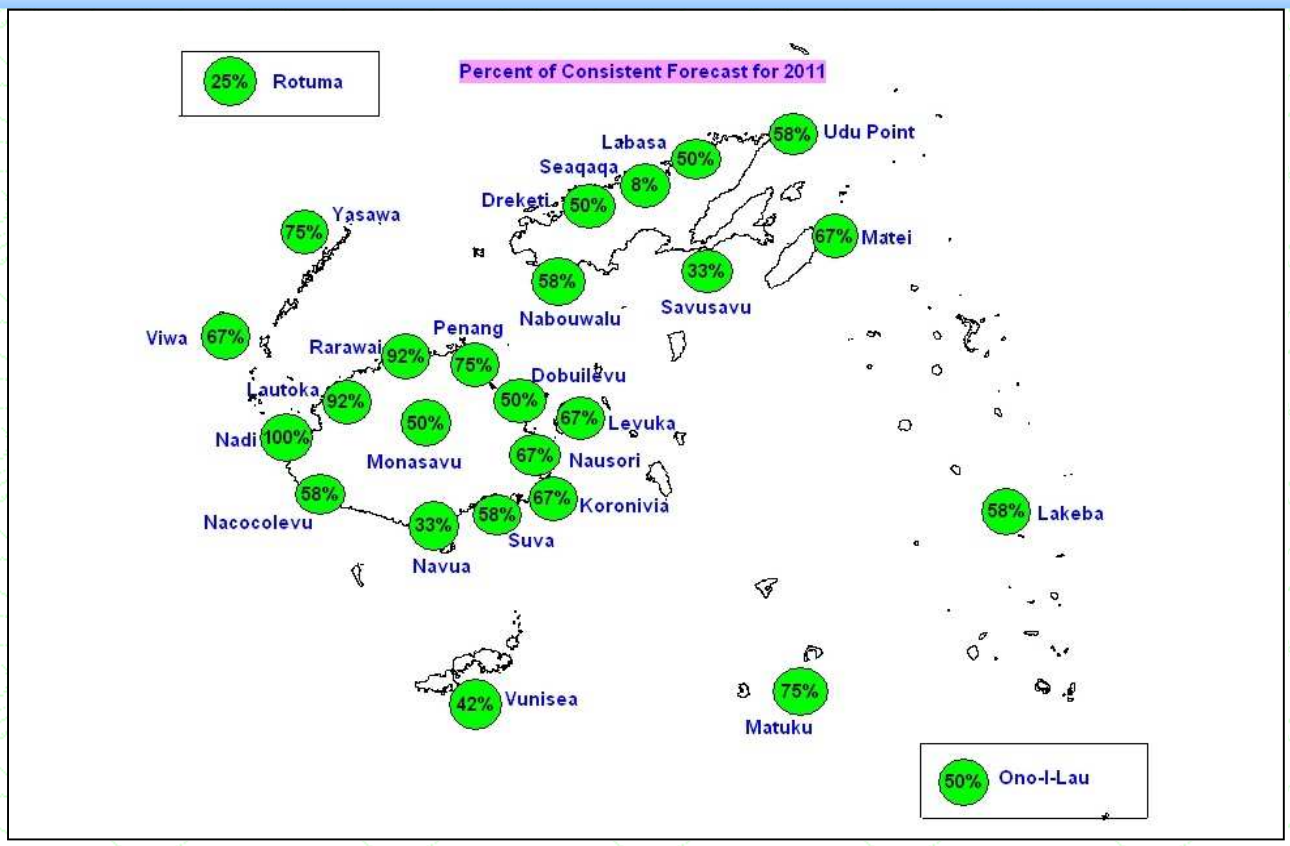
In the **Western Division**, 74% of the forecasts were consistent, 21% near consistent and 5% inconsistent. The wet season had a higher consistency rate (75%) compared to the dry season (73%).

In the **Central Division,** there were 56% consistent forecasts, 35% near consistent, 3% inconsistent and 6% unverified forecasts. For Central Division, there is slightly high consistency in the wet season prediction (58%) compared to the dry season prediction (54%). There was no inconsistent forecast during the dry season in the Central Division.

For the **Eastern Division**, 58% of forecasts were consistent, 30% near consistent, 5% inconsistent and 7% unverified forecasts. The Eastern Division had higher consistency rate (63%) in the wet season compared to the dry season (53%). There were none inconsistent forecasts in the dry season.

In the **Northern Division**, 46% of forecasts were consistent, 32% near consistent, 18% inconsistent and 4% unverified forecasts. Higher consistency rate was observed during the dry season (48%) than in the wet season (45%). Rotuma had 33% consistent forecasts, 50% near consistent forecast sand 17% inconsistent forecasts.

FIGURE 14: FORECAST VERIFICATION



EL NINO SOUTHERN OSCILLATION (ENSO) - 2010/11 EVENT

The Pacific experienced one of the strongest La Niña events of the century in 2011. The 2010/11 La Niña event began during the second half of 2010, immediately after the 2009/10 El Niño event and developed into a moderate to strong event during 2011.

The tropical Pacific Ocean remained much cooler than average, with the sub-surface temperatures up to 4°C cooler than *normal* in the central and eastern Pacific (Appendix 4A). In the equatorial Pacific, the trade winds were stronger and the cloud patterns were consistent with that of La Niña (Appendix 3A), SOI remained strongly positive, with the January value of +19.9, followed by a +22.3 in February (Figure 16).

Through April and May, the existent strong La Niña event weakened and the SST warmed to *normal* values. However, the atmospheric indicators, especially SOI, remained strongly positive during this period and remained consistent with a developed La Niña with April value reaching +21.5. *Below normal* cloudiness near the Dateline and stronger than *normal* trade winds in the equatorial Pacific persisted. During May, the event finally ended with all indicators reaching neutral levels and in June, persisting through July (Appendix 3B).

During August, weak La Niña conditions re-emerged with negative SST anomalies (Figure 15) developed in parts of the equatorial Pacific Ocean, with anomalies more than 1°C became evident in parts of the central Pacific (Appendix 4B). The re-emergence of the 2010/11 La Niña continued during August and September, trade winds enhanced, reduced cloudiness around the Dateline and SOI strengthened from +2.1 to +11.7 A weak La Niña was re-established in the equatorial Pacific by December.

The presence of moderate to strong La Niña in the region impacted the rainfall over Fiji. The main rain producing systems, the SPCZ was located close to the country, hence, most parts of the country experienced enhanced rainfall. The formation and distribution of tropical cyclones and the mean position of the tropical cyclone genesis trough was displaced to the southwest, thus, fewer cyclones threatened the country during the cyclone season. Sea levels were about 10 to 20cm *above normal* for most months.

There were six ENSO Updates issued in 2011, which continuously updated users of the changing ENSO conditions, its impact on rainfall and associated extreme events.

SEA SURFACE TEMPERATURE (SST) ANOMALIES

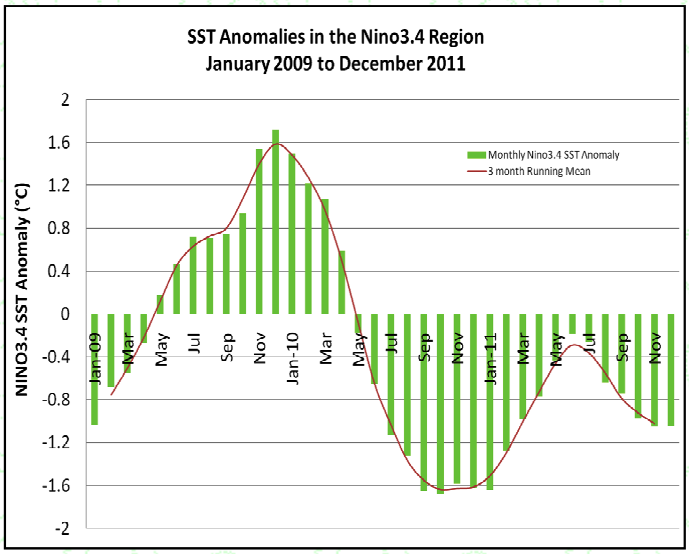


Figure 15: Monthly Nino3.4 SST variation and 3 monthly running mean from January 2009 to December 2011 for El Niño 2009/10 and 2010/11 La Niña events.

SOUTHERN OSCILLATION INDEX (SOI)

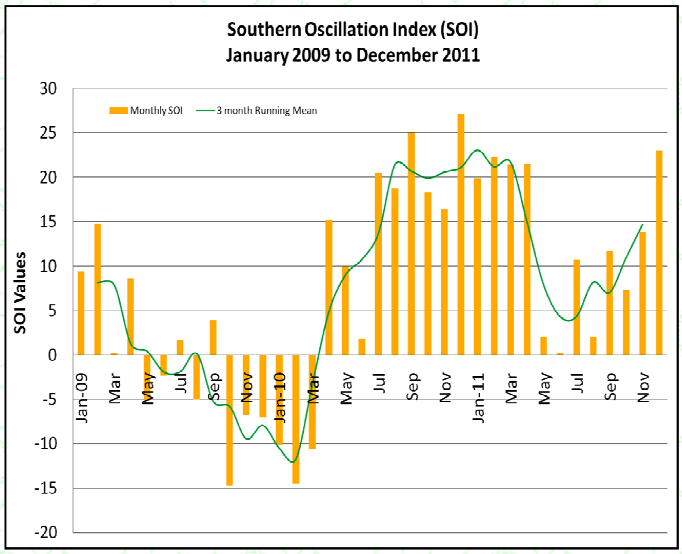


Figure 16: Monthly SOI variation and 3 month running mean from January 2009 to December 2011 for 2009/10 El Niño and 2010/11 La Niña events.

TROPICAL CYCLONES SOUTHWEST PACIFIC AND THE FIJI REGION

The Regional Specialized Meteorological Centre (RSMC) - Tropical Cyclone Centre (TCC) Nadi Area of Responsibility (AoR) extends from the equator to 25°S and 160°E to 120°W. Eight (8) tropical cyclones traversed the RSMC - TCC Nadi AoR in 2011. These tropical cyclones were namely; *Anthony, Atu, Bune, Vania, Wilma, Yasi, Zaka and Zelia* (Figure 17). Though Tropical Cyclone (TC) Vania, Anthony and Zelia formed far west of Fiji, they did not have direct impact on Fiji's.

Tropical Cyclone "Wilma" originated from a tropical depression (06F) near Wallis and Futuna on the 20th January 2011. The depression developed into a category 1 tropical cyclone near Samoa on the 23rd and upgraded to category 2 cyclone on the 24th. Wilma intensified into a category 3 cyclone before passing south of the Southern Lau Group. Strong winds up to 46km/hr with occasional rain and squally thunderstorms were experienced over the Southern Lau Group. It attained category 4 status on the 26th as it moved further away from the Fiji Group.

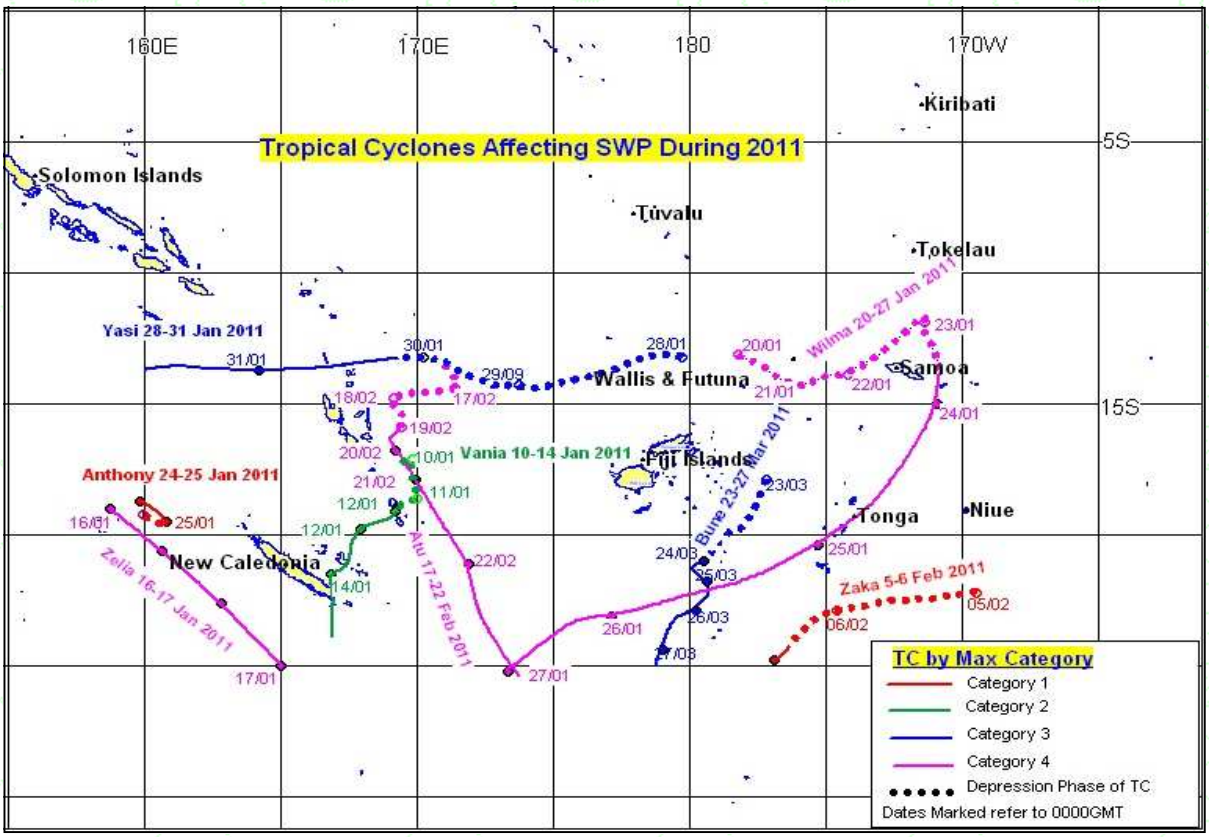
A Tropical depression (TD09F) developed near Wallis and Futuna on the 27th and turned into Tropical Cyclone "Yasi" on the 30th near Vanuatu. TC Yasi underwent rapid development attaining Category 2 status on the 31st and further intensified into category 3 cyclone 12 hours later. It caused heavy rain and thunderstorms with strong winds of 46km/hr over Vanua Levu, Taveuni and northern Yasawa Group.

On the 6th February, Tropical Cyclone Zaka developed from a tropical depression (TD10F) that was located to the southeast of Fiji on the 5th. Zaka took a westward track and was a very short lived tropical cyclone as it attained Category 1 status within a few hours and category 2 in the early hours on the 7th before downgrading to category 1.

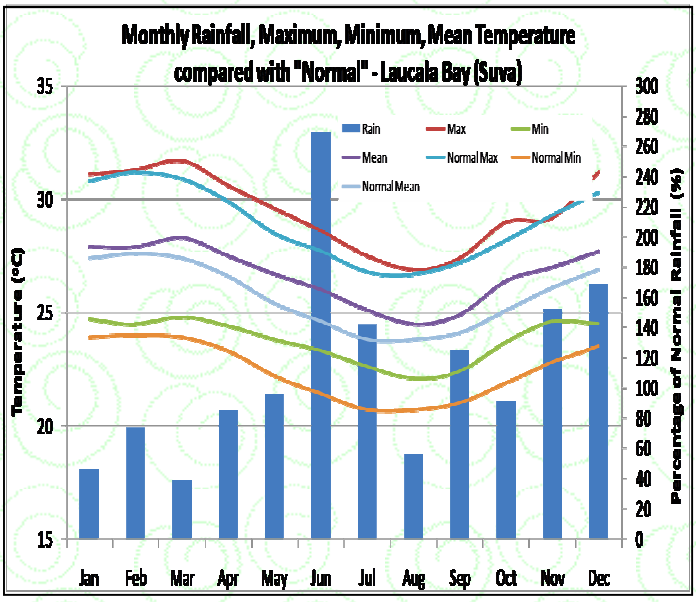
Tropical cyclone Atu formed from a tropical depression (TD11F) was located just northeast of Vanuatu. As it drifted southwest, it intensified and gradually became a category 1 system on the 19th. Atu continued to intensify rapidly reaching category 2 system by midnight and 6 hours later into category 3 and finally to a category 4 system. Between the 21st and 22nd, strong northerly winds with speeds up to 45km/hr and gusts up to 65km/hr affected the Yasawa and Mamanuca Groups, Western Viti Levu and later Kadavu.

Tropical Cyclone Bune formed from a Tropical Depression (TD13F) on March 23rd and tracked southwest over the southern Lau Group. Bune was upgraded into category 2 cyclone on the 24th and further developed and intensified to a category 3 cyclone on the 25th. Strong and gusty winds were experienced especially over the southern Lau Group from the 24th to 27th as "Bune" slowly drifted southwards, moving away from the country.

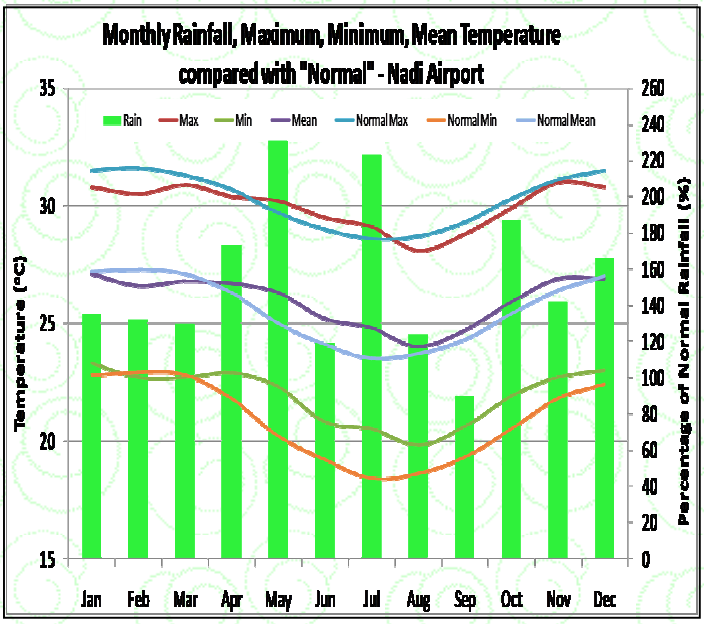
Figure 17: TROPICAL CYCLONE TRACKS IN NADI'S Area of Responsibility– JANUARY TO DECEMBER 2011



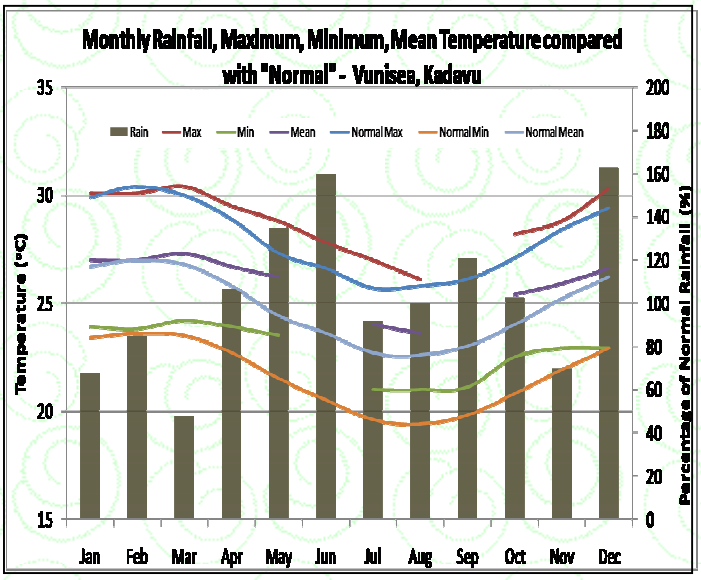
APPENDIX 1A : LAUCALA BAY, SUVA



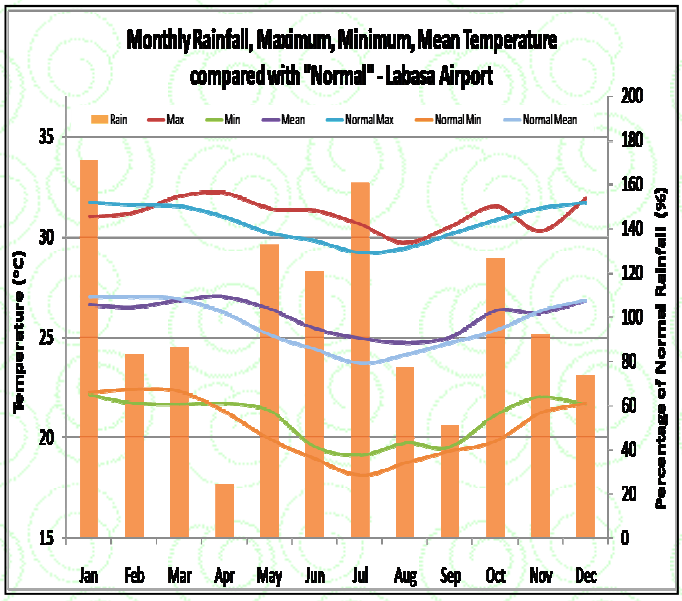
APPENDIX 1B : NADI AIRPORT



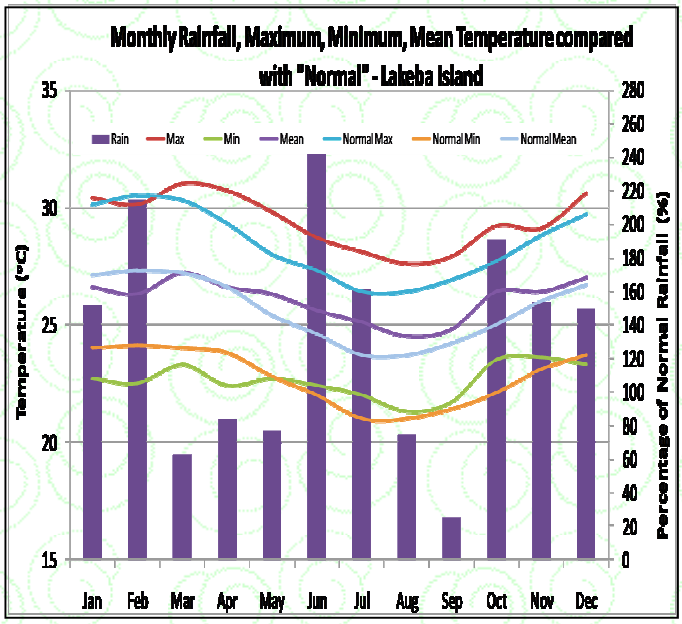
APPENDIX 1C : VUNISEA, KADAVU



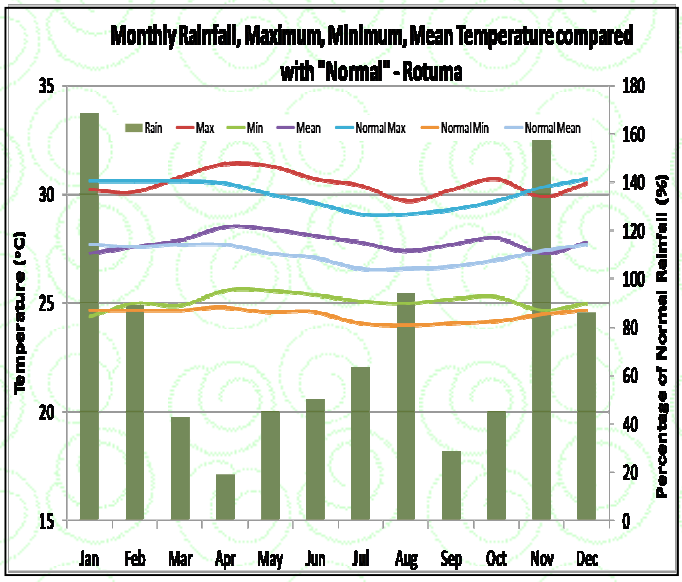
APPENDIX 1D : LABASA AIRPORT



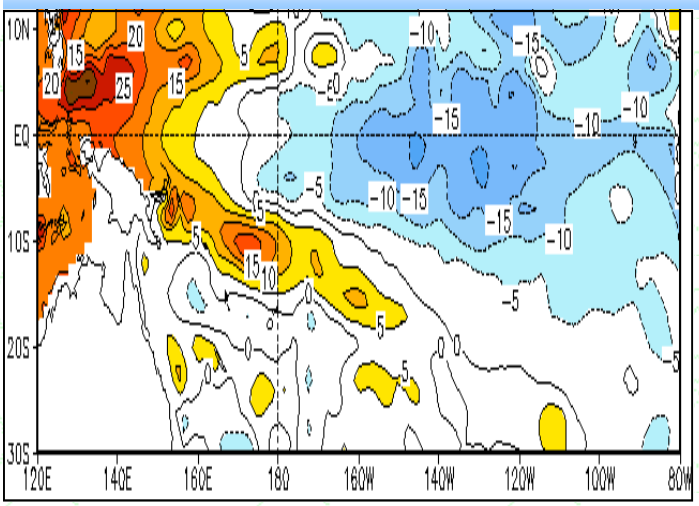
APPENDIX 1E : LAKEBA ISLAND



APPENDIX 1F : ROTUMA

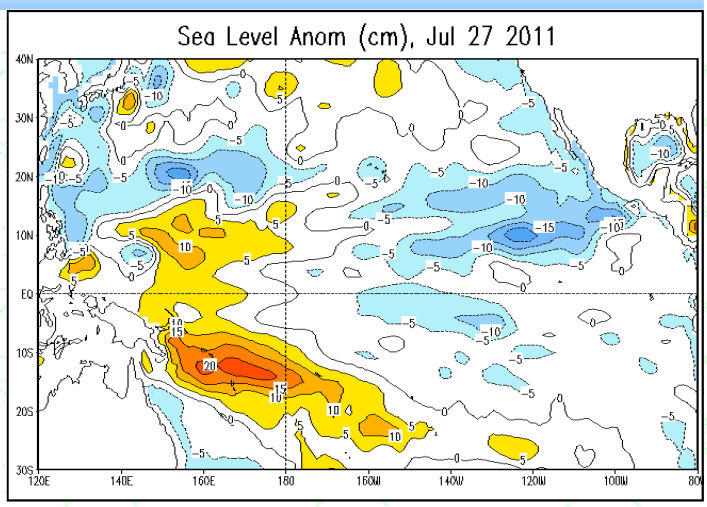


APPENDIX 2A: SEA LEVEL– JANUARY 2011



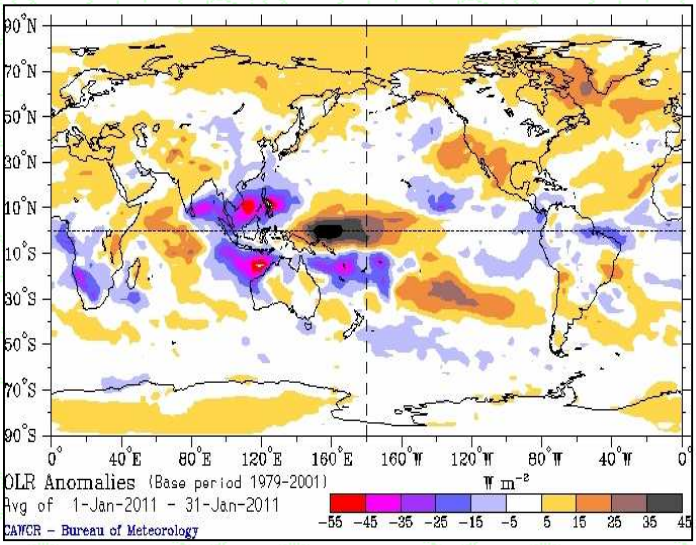
Source: http://www.cpc.noa.gov/products_analysis/monitoring/enso_update/sealevel.gif

APPENDIX 2B: SEA LEVEL– JULY 2011



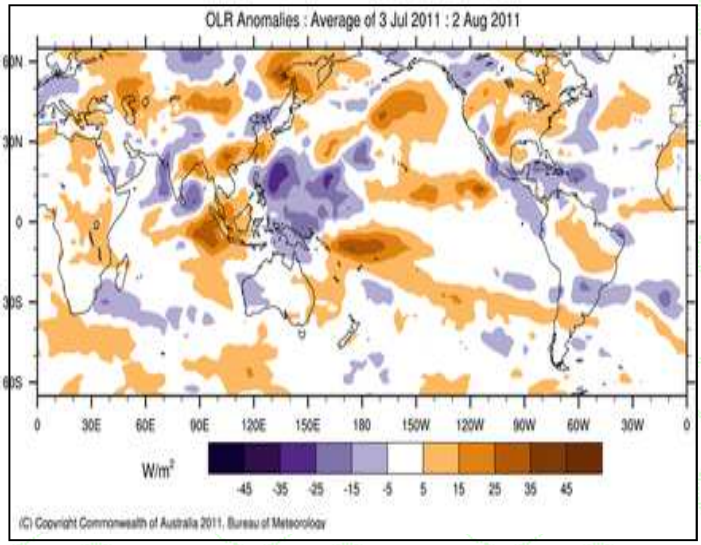
Source: http://www.cpc.noa.gov/products_analysis/monitoring/enso_update/sealevel.gif

APPENDIX 3A : FEBRUARY OUT-GOING LONGWAVE RADIATION



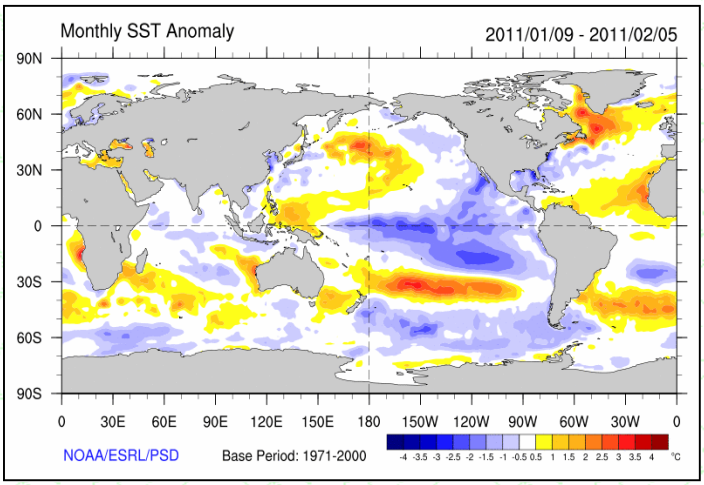
Source: http://cawcr.gov.au/bmrc/clfor/cfstaff/matw/maproom/OLR/map.lastmonth.gif.

APPENDIX 3B : AUGUST OUT-GOING LONGWAVE RADIATION



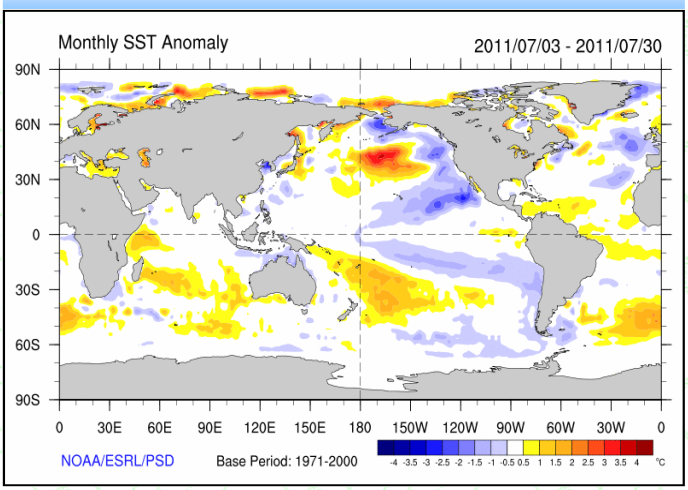
Source: http://cawcr.gov.au/bmrc/clfor/cfstaff/matw/maproom/OLR/map.lastmonth.gif.

APPENDIX 4A: FEBRUARY SST (LA NINA PATTERN)



Source: http//: www.cdc.noaa/map/images/sst/sst.anom.month.gif

APPENDIX 4B: AUGUST SST (NEUTRAL PATTERN)



Source: http//: www.cdc.noaa/map/images/sst/sst.anom.month.gif

APPENDIX 5A : MAXIMUM AIR TEMPERATURE

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Labasa Airfield	Max	31.0	31.2	32.0	32.2	31.4	31.3	30.6	29.7	30.5	31.5	27.7	31.9	31.1
	Dep	-0.7	-0.4	0.5	1.2	1.2	1.5	1.4	0.3	0.4	0.7	-1.1	0.2	0.4
Nabouwalu	Max	30.5	30.8	31.3	30.6	29.6	28.6	28.0	27.6	28.1	28.8	28.9	30.7	29.5
	Dep	0.4	0.4	1.2	1.6	1.8	1.5	1.7	1.3	1.3	1.1	0.0	1.1	1.1
Penang Mill	Max	30.4	30.7	31.3	31.4	30.1	29.6	28.9	28.1	29.1	30.2	30.2	31.2	30.1
	Dep	0.1	0.2	0.8	1.8	1.6	1.9	1.5	0.7	1.1	1.3	0.5	0.9	1.0
Nadi Airport	Max	30.8	30.5	30.9	30.4	30.2	29.5	29.1	28.1	28.8	29.9	31.0	30.8	30.0
	Dep	-0.7	-1.1	-0.4	-0.3	0.5	0.5	0.5	-0.6	-0.5	-0.4	-0.1	-0.7	-0.3
Laucala Bay, Suva	Max	31.1	31.3	31.7	30.6	29.6	28.6	27.5	26.9	27.4	29.0	29.2	31.2	29.5
	Dep	0.3	0.1	0.8	0.7	1.1	0.9	0.7	0.2	0.2	0.8	-0.1	0.9	0.5
Nausori Airport	Max	30.4	30.4	31.0	30.5	29.3	28.6	27.5	26.7	27.1	28.6	28.6	30.6	29.1
	Dep	0.0	-0.4	0.5	1.2	1.5	1.4	1.2	0.5	0.5	1.0	-0.2	0.9	0.6
Vunisea, Kadavu	Max	30.1	30.1	30.4	29.5	28.8	27.8	27.0	26.1	u/s	28.3	28.8	30.2	28.8
	Dep	0.2	-0.3	0.4	0.7	1.5	1.2	1.5	0.3	1.7		0.4	0.9	0.9
Lakeba	Max	30.4	30.1	31.0	30.7	29.8	28.7	28.1	27.6	27.9	29.2	29.1	30.6	29.4
	Dep	0.3	-0.4	0.7	1.4	1.8	1.5	1.7	1.2	1.1	1.5	0.3	0.9	1.0

APPENDIX 5B : MINIMUM AIR TEMPERATURE

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Labasa Airfield	Min	22.1	21.7	21.6	21.7	21.3	19.5	19.1	19.7	19.5	21.1	22.0	21.6	20.9
	Dep	-0.1	-0.7	-0.7	0.4	1.4	0.6	0.9	1.0	0.2	1.3	0.8	-0.1	0.5
Nabou-walu	Min	23.8	23.6	24.1	23.7	23.6	23.1	23.0	22.2	22.6	23.5	23.3	23.8	23.4
	Dep	-0.4	-0.8	-0.2	-0.3	0.4	0.5	1.2	0.6	0.6	0.9	-0.1	-0.2	0.2
Penang Mill	Min	23.0	23.1	23.6	23.0	22.7	22.1	22.1	21.2	21.5	22.4	23.1	23.5	22.6
	Dep	-1.0	-0.8	-0.2	-0.2	0.6	0.7	1.7	0.5	0.3	0.2	0.1	0.0	0.2
Nadi Airport	Min	23.3	22.7	22.7	22.9	22.3	20.8	20.5	19.8	20.6	21.9	22.7	23.0	21.9
	Dep	0.5	-0.2	-0.1	1.1	2.1	1.6	2.1	1.2	1.3	1.4	0.9	0.6	1.0
Laucala Bay, Suva	Min	24.7	24.5	24.8	24.4	23.8	23.3	22.6	22.1	22.4	23.7	24.6	24.5	23.8
	Dep	0.8	0.5	0.9	1.1	1.6	1.9	1.9	1.4	1.4	1.8	1.8	1.0	1.3
Nausori Airport	Min	23.1	22.8	22.8	22.8	22.4	21.0	20.3	20.2	20.5	21.7	22.9	22.6	21.9
	Dep	0.0	-0.5	-0.4	0.3	1.3	0.5	0.7	0.6	0.5	0.8	1.1	0.0	0.4
Vunisea-Kadavu	Min	23.9	23.8	24.2	23.9	23.5	u/s	21.0	21.0	21.1	22.5	22.9	22.9	22.8
	Dep	0.5	0.2	0.7	1.2	2.0	u/s	1.4	1.6	1.3	1.7	0.9	0.0	1.1
Lakeba	Min	22.7	22.5	23.3	22.4	22.7	22.4	22.0	21.3	21.7	23.5	23.6	23.3	22.6
	Dep	-0.4	-1.6	-0.7	-1.4	0.0	0.4	1.0	0.3	0.3	1.4	0.5	-0.4	-0.1

APPENDIX 5C : SUNSHINE HOURS (ACTUAL AND PERCENTAGE OF NORMAL)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rotuma	Actual	126.2	154.8	223.5	266.9	212.3	179.2	243.2	230.6	239.7	218.7	148.8	191.9	1896.2
	%	74	96	135	146	112	95	122	111	134	111	76	102	84
Labasa Mill	Actual	131.2	124	205.4	205.2	189.9	61	135.7	186	145.4	171.7	134.6	157.9	1848.0
	%	75	80	122	114	97	31	68	92	81	91	74	89	84
Nadi Airport	Actual	157.6	174.1	180.1	178.6	183.3	220.7	220.9	181	187.9	185	170.1	203.5	2242.8
	%	75	93	94	90	88	108	101	79	89	78	76	89	88
Laucala Bay, Suva	Actual	190.3	185.7	192.4	150.1	156.2	188.7	150.4	128	112.7	161.9	154.2	215.1	1985.7
	%	99	105	114	97	108	134	111	89	83	99	92	110	104

APPENDIX 5D : TOTAL MONTHLY RAINFALL (MM) AND PERCENTAGE OF NORMAL RAINFALL

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Labasa Airfield	Actual (mm)	660.6	286.7	319.9	56.7	152.8	81.0	87.3	36.6	36.4	156.5	168.3	177.7	2220.5
	%	171	83	86	24	133	121	161	77	51	127	92	74	105
Nabou-walu	Actual (mm)	282.8	163.7	226.3	311.9	268.9	212.8	105.9	116.8	81.8	165.6	511.4	365.0	2812.9
	%	91	59	68	104	157	217	115	112	72	97	294	148	117
Penang Mill	Actual (mm)	659.4	591.8	314.4	277.7	384.6	74.7	38.8	78.5	44.0	184.5	389.1	181.2	3218.7
	%	167	176	74	103	238	75	70	108	46	162	243	69	132
Nadi Airport	Actual (mm)	464.8	385.7	442.4	277.0	217.9	76.4	101.4	80.4	62.5	190.6	187.9	295.6	2782.6
	%	135	132	130	173	244	119	223	124	90	187	142	166	148
Laucala Bay, Suva	Actual (mm)	170.7	195.6	146.1	313.3	259.4	440.2	192.2	89.1	220.8	199.8	376.3	469.0	3072.5
	%	46	74	39	85	96	270	142	56	125	91	153	169	102
Nausori Airport	Actual (mm)	208.4	230.8	332.0	209.2	375.6	337.4	253.8	83.4	125.2	275.3	313.1	320.4	3064.6
	%	57	86	87	58	152	224	217	57	76	141	128	120	105
Vunisea, Kadavu	Actual (mm)	196.9	195.1	145.2	250.2	250.9	202.2	105.3	128.8	163.7	146.3	102.0	301.9	2188.5
	%	68	85	48	107	135	160	92	100	121	103	70	164	99
Lakeba	Actual (mm)	367.3	486.7	184.6	173.6	103.3	205.2	129.5	77.1	25.5	235.1	218.3	268.3	2474.5
	%	152	215	63	84	77	254	161	75	25	191	154	150	130