



Climate Update for Tonga

June 2010 Climate Summary July–September 2010 Rainfall Outlook

Issued 15th July 2010

June's Climate in Brief

- *Below Normal rainfall was recorded during June throughout Tonga.*
- *Rainfall outlook for the July to September period favors below normal to normal for Tonga.*

June rainfall was normal in Niuafu'ou and well below normal elsewhere. The last three months was below normal in the Niuaus and Vava'u, normal in Ha'apai and above normal in Tongatapu. Generally, the rainfall received in the last three months was consistent with what was predicted.

Rainfall outlook for July to September 2010 period is generally **below normal** to **normal** with low skill across the region. Skills are low during the dry season for most Pacific Islands.

The majority of climate models surveyed by the Bureau of Meteorology suggest current patterns and trends will continue, with a significant likelihood of further ocean cooling beyond La Niña thresholds before the end of the southern winter.

Historically, about 35 to 40% of El Niño events (such as occurred in 2009/10) are followed by a La Niña within the same year. The combination of current trends and model outlooks suggest the chance of a La Niña in 2010 is now clearly more likely.

Temperature June 2010

Mean air temperatures were above normal across the country during June. The mean temperature for the month was 24.7°C which was 0.4°C warmer than normal and 1.1°C warmer than the previous month. Daytime maximum and night time minimum temperatures were warmer than normal across the country.

Table 1: Temperature June 2010

Location	Highest Maximum Temp	Lowest Minimum Temp	Mean Temperature (°C)	Departure from Normal	Comments
Niuafu'ou	31.4	21.2	27.2	+0.9	Above normal
Niuaotuputu					NA
Vava'u	29.4	16.2	24.3	0.0	Above normal
Ha'apai	30.8	16.2	25.6	+1.7	Above normal
Nuku'alofa	29.7	16.5	24.4	+1.8	Above normal
Fua'amotu	29.1	16.1	24.2	+1.6	Above normal

Rainfall June 2010

June rainfall was well below normal in Tongatapu, below normal in Vava'u and Ha'apai and above normal was recorded in Niufo'ou. Above normal rainfall was recorded in Tongatapu in April – June, normal rainfall in Ha'apai and below normal elsewhere.

Table 2. Rainfall Totals for 2010

Station (data period)	April- Total (mm)	May- Total (mm)	June Total (mm)	Forecast Probability			Comments
				33%tile Rainfall (mm)	67%tile Rainfall (mm)	Median Rainfall (mm)	
Niufo'ou 1971-2010	128.8	141.3	200.3	57.0	152.7	97.7	Above normal
Niutoputapu 1947-2010	NA	N/A	20.8	65.0	158.7	94	No data due to equipments lost in tsunami
Vava'u 1947-2010	241.3	103.2	28.0	62.0	136.7	95.1	Below normal
Ha'apai 1947-2010	251.8	90.7	19.8	42.0	108.0	74.0	Below normal
Nuku'alofa 1945-2010	678.5	219.8	10.3	52.7	103.7	75.0	Well below normal
Fua'amotu 1980-2010	588.8	209.0	10.2	65.3	126.7	85.2	Well below normal

Forecast Validation for the last 3 months, April to June 2010.

Table 3. April– June 2010 Rainfall

The rainfall outlook for the April to June period was for normal in the north and below normal to normal in central and southern division with a low skill level. The observed rainfall for the last 3 months was below normal in northern and Vava'u, normal for Ha'apai and above normal in the south. Generally, the rainfall for April–June period was fairly consistence with the outlook.

Location	Apr – Jun 2010 Forecast Range		Apr– Jun 2010 Observed Data (mm)	Comments
	33%tile Rainfall (mm)	67%tile Rainfall (mm)		
Niufo'ou	492.7	669.3	470.4	Below Normal
Niutoputapu	437.0	617.0	NA	
Vava'u	411.7	535.2	372.2	Below Normal
Ha'apai	285.0	429.7	362.3	Normal
Nuku'alofa	280.3	429.7	897.8	Above Normal
Fua'amotu	305.3	506.0	808.0	Above Normal

Current Conditions

Drought Update

There is no drought warning current. However, it should be noted that June rainfall was very much below normal in most places except for Niuafu'ou which recorded above normal rainfall. The impact of the last El Nino event which ended in January this year was drought which was experienced throughout most of Tonga. This water deficit ended over most of the country when above normal rainfall was received between February and April. The current situation is for La Nina to occur in the next couple of months, this means that according to historical data, Tonga receives good rainfall during a La Nina event, however it should also be noted that it is also the Dry Season and the outlook confidence is low during this time of the year.

El Niño Southern Oscillation (ENSO) UPDATE

Sea surface temperatures in the central equatorial Pacific have continued to cool over the past fortnight, and hence the tropical Pacific is now generally cooler than average east of the date-line. Below the surface, temperatures also remain significantly cooler than average, with some areas more than 4°C cooler than normal. Trade winds in the western Pacific remain stronger than normal and cloudiness near the date-line continues to be suppressed. These indicators, together with the Southern Oscillation Index (SOI), which has been positive since April, are consistent with the developing stages of a La Niña event.

The majority of international climate models surveyed suggest current patterns and trends will continue, with a significant likelihood of further ocean cooling beyond La Niña thresholds before the end of the southern winter. Historically, about 35 to 40% of El Niño events (such as occurred in 2009/10) are followed by a La Niña within the same year. The combination of current trends and model outlooks suggest the chance of a La Niña in 2010 is now clearly more likely.

Seasonal Predictions for Tonga (July - September 2010)

SCOPIC model outlook for July to September 2010 period, generally is for rainfall to be below normal to normal for Tonga. The skill level of the forecast is low.

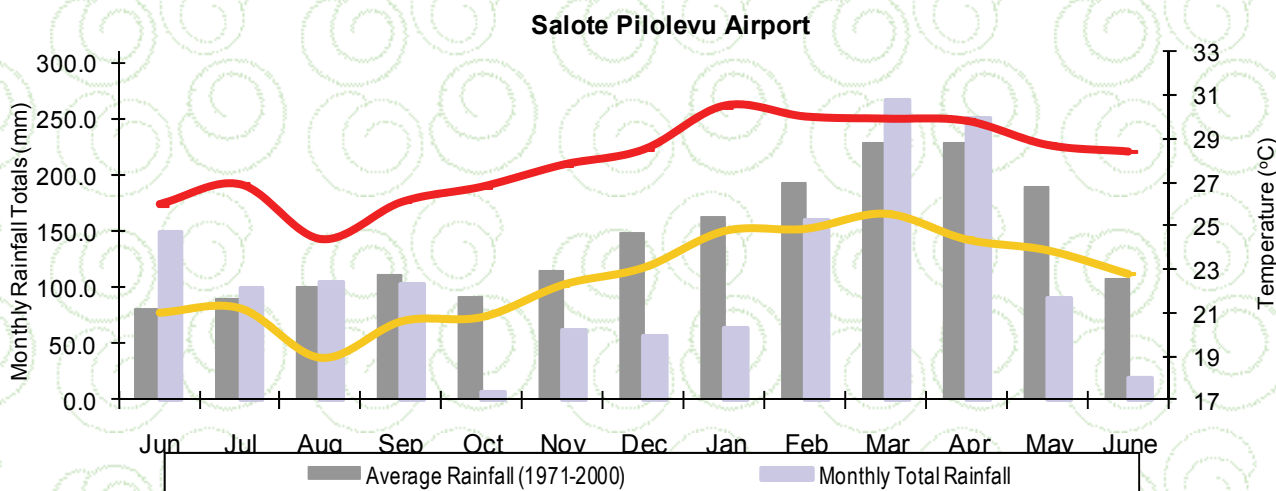
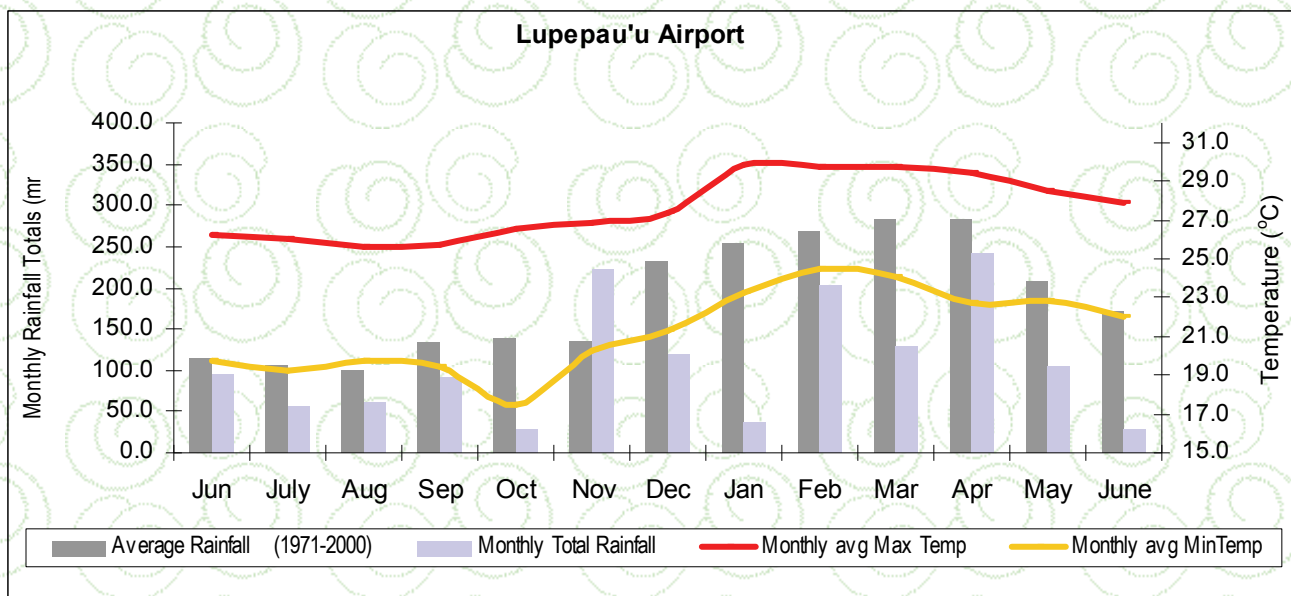
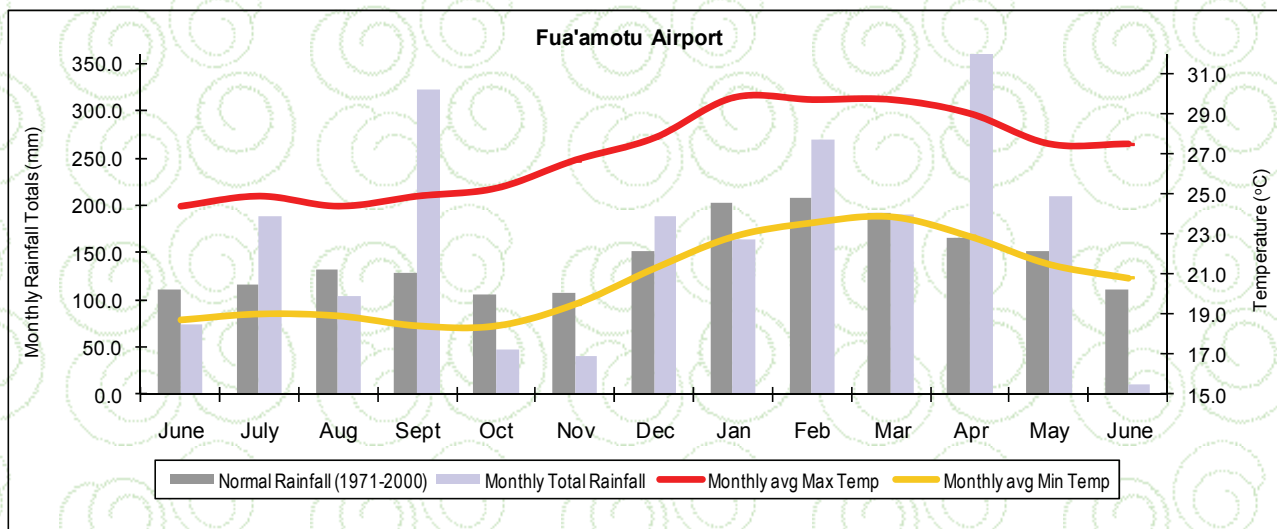
The confidence level in the outlook is related to how consistently the Pacific Ocean affects the rainfall in Tonga. Therefore the outlook confidence level for the July to September 2010 period according to climatological historical

Table 4. Seasonal Rainfall Outlook for July to September 2010

Location	Below normal probability (%)	33%tile Rainfall (mm)	Normal Probability %	66%tile Rainfall (mm)	Above normal Probability (%)
Niuafu'ou	27	264.3	28	420.7	45
Niuatoputapu	43	208.0	26	368.0	31
Vava'u	32	254.0	38	396.3	30
Ha'apai	41	232.0	30	362.3	29
Nuku'alofa	40	275.7	18	376.3	42
Fua'amotu	33	286.0	11	419.0	57

:Note the rainfall values are for the three month period (July to September 2010).

Rainfall Recorded over the last 13 month June 2009 to June 2010



Note:

The Tonga Meteorological Service currently uses the **Seasonal Climate Outlook for Pacific Island Countries (SCOPIC)** Model for its seasonal rainfall prediction, validation and drought analysis. The system analyses current sea surface temperature patterns across the Pacific Ocean and then matches the most similar patterns experienced through the available historical period. The terms “**Below normal**” refers to rainfall in the lowest 33%, “**Normal**” refers to rainfall between the 33% and 67%, “**Above normal**” refers to rainfall in the highest 67%. Table 4 shows the percentage chance of receiving rainfall in each category from meteorological stations in Tonga. If conditions are **Climatology** then it means that we are forecasting an equal chance of rainfall to be in any tercile.

Average day time and **night time** temperature is the average daily maximum and minimum temperature recorded throughout Tonga.

The drought analysis summary is based on the ENSO phases on a 4 month aggregate drought index using the Standardised Precipitation Index (SPI) method. SCOPIC focuses mainly on meteorological drought as it uses only rainfall for analysis. “**Drought** is a weather-related natural disaster that occurs when there is not enough water for users' normal needs. As people use water in many different ways, there is no universal definition”. In this analysis we refer to **drought** as a prolonged period of **below-normal** rainfall (6-month rainfall that is below the 40th percentile).

In this issue the use of Southern Tonga refers to Tongatapu and ‘Eua, Central Tonga refers to Ha’apai and Vava’u, Northern Tonga is referred to Niuatoputapu and Niufo’ou.

Significant Event

- Highest maximum temperature was 31.4°C in Niufo’ou.
- Highest rainfall recorded in 24 hours was 104.1mm recorded in Niufo’ou on the 26th
- Lowest rainfall recorded in June was recorded in Fua’amotu and Nuku’alofa being 10.2mm and 10.3mm. In Fua’amotu this is the lowest June rainfall in its record and in Nuku’alofa this is the 3rd lowest June rainfall since its record started.

Southwest Pacific Dry Season

Dry Season starts in May to October. Very little chance of cyclone occurring during this time of the year. Most of the drought in Tonga occur during an El Nino Event. Dry season is also known as the Cool Dry Season..

Disclaimer

This summary is prepared as soon as possible following the end of the month, once climate data is received from recording stations around Tonga so the values may change on receipt of later information and the ENSO information is received from various Meteorological Agencies. Delays in data collection, communication and processing occasionally arise. While every effort is made to verify observational data, the Tonga Meteorological Service does not guarantee the accuracy and reliability of the analysis and rainfall predictions presented, and accepts no liability for any losses incurred through the use of this summary and its contents. This information should be used as for guidance only. All requests for data and for further information about this forecast should be directed to the Director of the Tonga Meteorological Service, at P.O. Box 845, Nuku’alofa. Or email at fnt_met@met.gov.to