



Climate Update for Tonga

December 2009 Climate Summary

Feb to Apr 2010 Rainfall Outlook

Issued 21st January 2010

December's Climate in Brief

- **Ha'apai groups are currently in Drought.** The warning remains in force for Vava'u groups and Tongatapu groups.
- Tropical Cyclone Mick that devastated part of Fiji did not do much damage to Tonga but brought rain that was very much needed after a long period of dry condition.
- *Above normal rainfall was recorded over Niuafu'ou in December..*
- *Rainfall outlook for the February to April period favors below normal for Tonga.*

Dry conditions remained in Ha'apai groups while tropical cyclone Mick brought rain to Tongatapu groups which was a relief to the drought it was experiencing. December rainfall totals were above normal in parts of the country while rainfall in some places continue to reflect El Nino type conditions.

Climate models suggest that tropical Pacific temperatures may gradually ease towards more average conditions over the coming months, though are likely to remain above El Niño thresholds until the southern autumn.

Rainfall outlook for the February to April period favors below normal for Tonga.

Rainfall in Tonga is reduced during an El Nino Event and the frequency of occurrence of Tropical cyclones increases from one to two cyclones to affect the country in the season.

Temperature December 2009

Mean air temperatures was below normal across the country during December. The mean temperature for the month was 25.1°C which was 1.3°C cooler than normal but 1.3°C warmer than the previous month. Daytime maximum temperatures were cooler than normal across the country. Overnight minimum temperatures were also cooler than normal .

Table 1: Temperature December 2009

Location	Highest Maximum Temp	Lowest Minimum Temp	Mean Temperature (°C)	Departure from Normal	Comments
Niuafu'ou	31.5	19.0	26.1	-1.0	Below normal
Niuaotuputu					NA
Vava'u	29.0	16.2	24.4	-2.0	Below normal
Ha'apai	30.6	21.0	25.8	-0.3	Below normal
Nuku'alofa	29.1	19.5	24.7	-0.9	Below normal
Fua'amotu	29.6	17.4	24.6	-0.6	Below normal

Rainfall December 2009

Dry conditions remained during December in Ha'apai and for the rest of the central and Southern Tonga. Most of the rainfall that was recorded in Tongatapu in December was from the depression which was later cyclone Mick. During December only three days with rain in Nuku'alofa and five days with rain in Fua'amotu. Ha'apai groups still experience drought. A drought warning remains in force for Vava'u and Tongatapu for the coming months.

Table 2. Rainfall Totals for December 2009

Station (data period)	October- Total (mm)	Novem- ber Total (mm)	December Total (mm)	Forecast Probability			Comments
				33%tile Rainfall (mm)	67%tile Rainfall (mm)	Median Rainfall (mm)	
Niufo'ou 1971-2009	23.9	280.2	430.6	220.9	329.7	252.5	Above normal
Niutopotapu 1947-2009	N/A	N/A	N/A				No data due to equip- ments lost in tsunami
Vava'u 1947-2009	29.7	223.6	118.1	129	239	172.1	Below Normal
Ha'apai 1947-2009	7.7	63.2	56.3	78	155	119	Below Normal
Nuku'alofa 1945-2009	51.7	40.1	172.1	70.7	173.7	123	Above normal
Fua'amotu 1980-2009	48.3	40.4	188.7	110.7	167.1	142.5	Above normal

Forecast Validation for the last 3 months, October - December 2009.

Table 3. Oct– Dec 2009 Rainfall

Location	Oct - Dec 2009 Forecast Range		Oct– Dec 2009 Observed Data (mm)	Comments
	33%tile Rainfall (mm)	67%tile Rainfall (mm)		
Niufo'ou	518	777	731.4	Normal
Niutopotapu			N/A	
Vava'u	383	610.7	371.4	Below Normal
Ha'apai	275.7	419.3	128.4	Below Normal
Nuku'alofa	281	424	264.2	Below Normal
Fua'amotu	279	283.1	277.1	Below Normal

The rainfall outlook for the October to December 2009 period was for normal to below normal with a moderate skill level. The observed rainfall for the last 3 months was normal in northern Tonga and below normal elsewhere. Generally, the rainfall for Oct–Dec period was moderately consistent with the outlook and the presence of an El Nino event.

Current Conditions

Drought Status (Summary analysis)

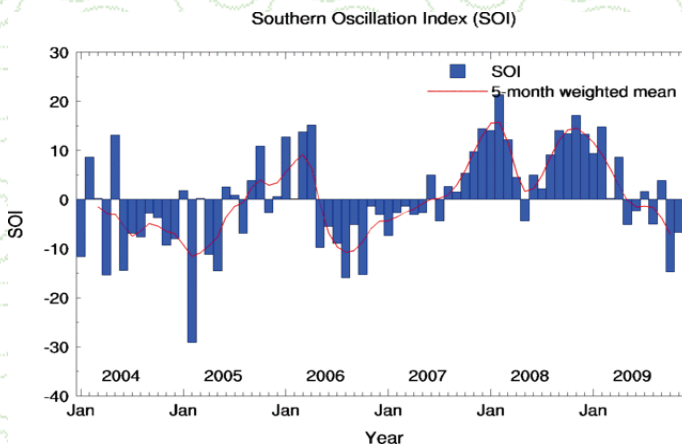
Ha'apai remains currently in drought, rainfall has been below normal for the last six months. At least 376mm of rainfall is required next month to end this drought. Drought Warning remains current for Vava'u, and Tongatapu groups.



El Niño Southern Oscillation (ENSO) status.

Central Pacific Ocean temperatures, while remaining well above El Niño thresholds, have eased slightly over the past fortnight. This corresponds to the Trade wind strength returning to near normal along much of the equator. However, significant areas east of the dateline continue to exceed their average sea surface temperature by more than 2 °C, and generally remain above values observed at the peak of the 2006 El Niño event.

Climate models suggest that tropical Pacific temperatures may gradually ease towards more average conditions over the coming months, though are likely to remain above El Niño thresholds until the southern autumn.



Seasonal Predictions for Tonga (February - April 2010)

Rainfall Outlook

SCOPIC model outlook for February to April 2010 period, generally is for rainfall to be below normal for Tonga. The skill level of the forecast is moderate to

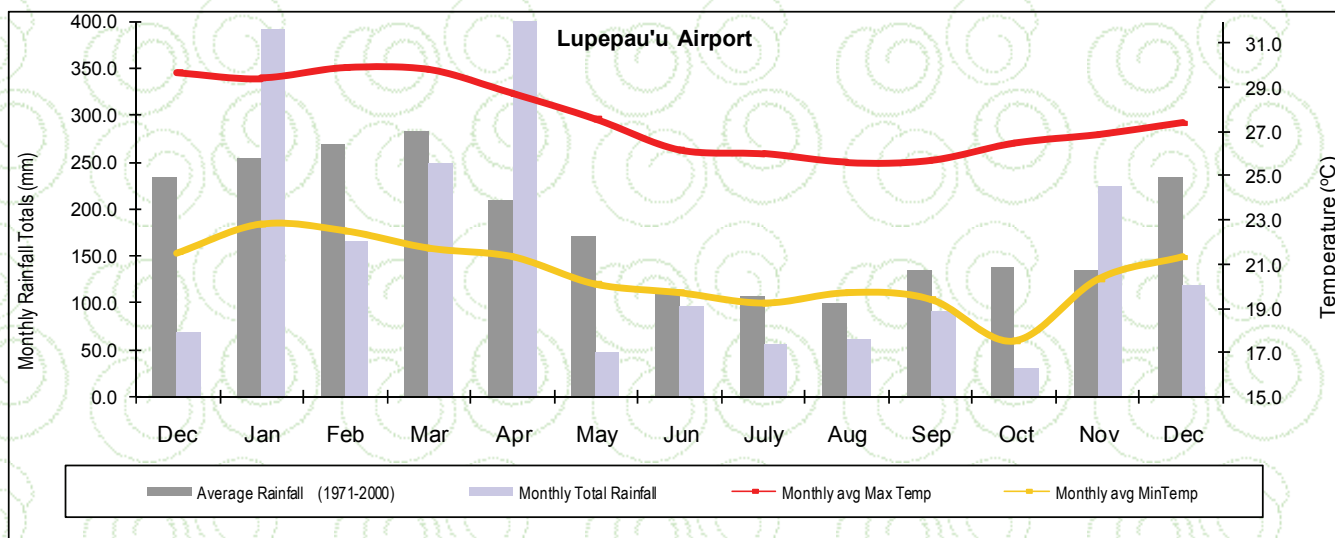
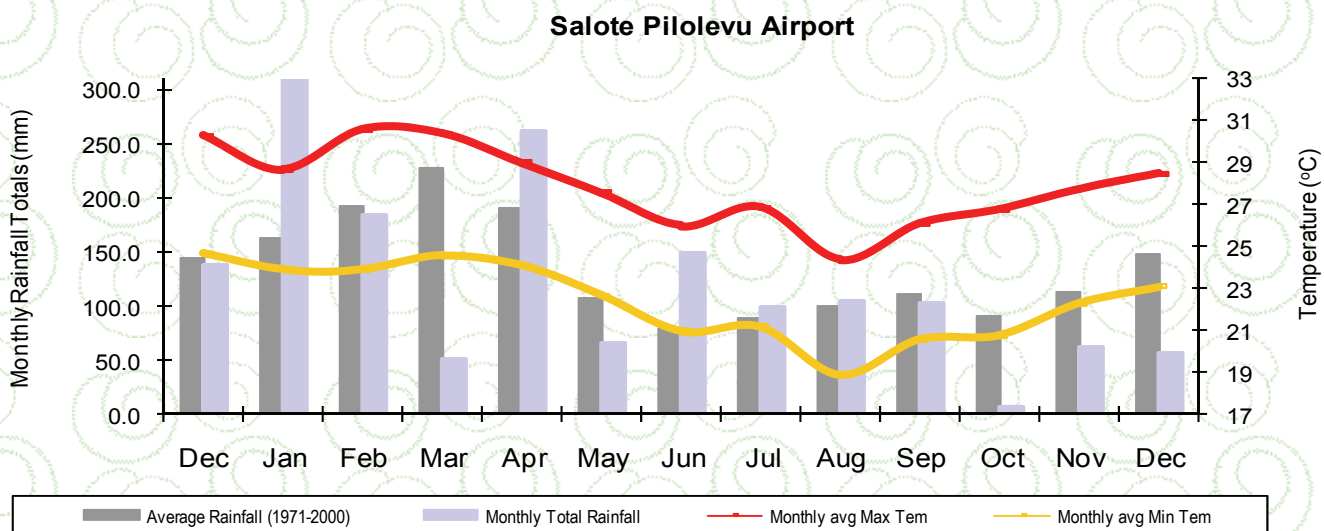
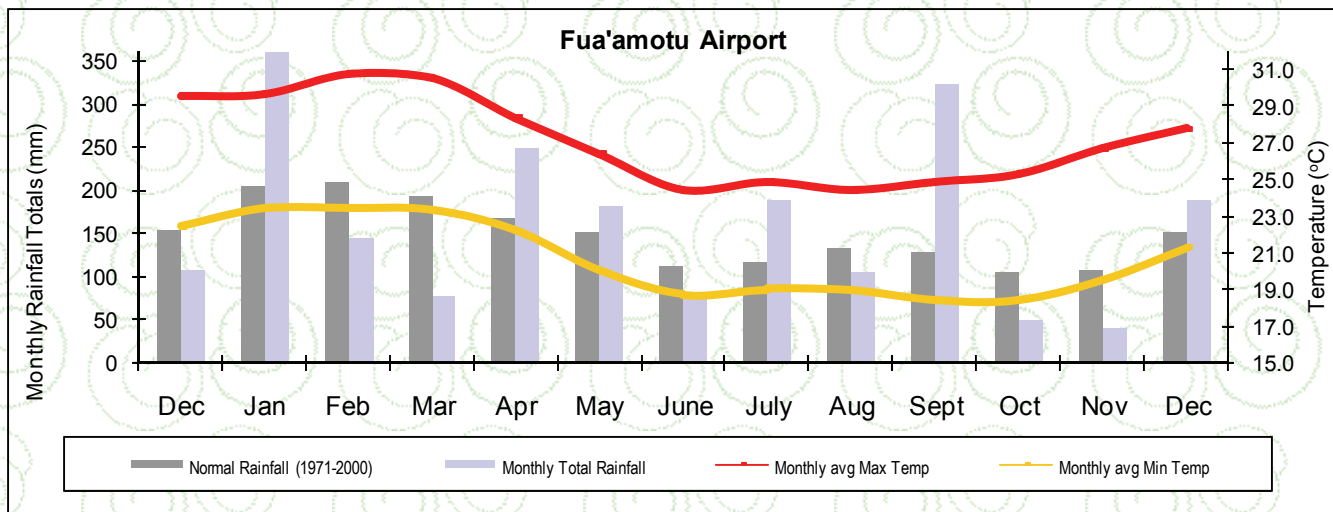
The confidence level in the outlook is related to how consistently the Pacific Ocean affects the rainfall in Tonga. Therefore the outlook confidence level for the February to April 2010 period according to climatological histori-

Table 4. Seasonal Rainfall Outlook for February—April 2010

Location	Below normal probability (%)	33%tile Rainfall (mm)	Normal Probability %	66%tile Rainfall (mm)	Above normal Probability (%)
Niuafu'ou	21	724.0	16	937.0	62
Niuaotoputapu	35	691.0	28	845.0	37
Vava'u	59	746.0	19	928.0	23
Ha'apai	67	527.0	24	721.0	9
Nuku'alofa	41	542.7	37	638.0	22
Fua'amotu	62	445.7	25	611.3	12

:Note the rainfall values are for the three month period (February—April 2010).

Rainfall Recorded over the last 13 month December 2008 to December 2009



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 Niuafu’ou.

Significant Event

- Ha’apai groups are currently in drought. Rainfall has been below normal for the last six months.
- Drought warning remains in force for Vava’u groups and Tongatapu.
- Tropical Cyclone Mick which devastated Fiji around the 14th Dec tracked SE towards Tonga however it did not do much damage to the country instead it brought rain which was a relief to the dry condition that was experienced throughout the country.

Southwest Pacific Wet Season and also the Cyclone Season

Wet Season which is also the cyclone season starts in November to the following April. During an El Nino event, rainfall in Tonga is reduced and the frequency of occurrence of cyclones increases from one to two cyclones to affect Tonga in a 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 fmt_met@met.gov.to