

CLIMATE SUMMARY OCTOBER 2016

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HIGHLIGHTS

- ◆ October 2016 was noticeably drier than average with majority of the sites experiencing 'below average' rainfall. **Pg 1 & 2**
- ◆ 34.6°C was the warmest day time temperature recorded at Faleolo on October 4th whilst Afiamalu observed the coolest night time temperature of 15.0°C on the 3rd. **Pg 3**
- ◆ Easterlies dominated the wind statistics in October with light to gentle winds mostly experienced. **Pg 4**
- ◆ El Nino Southern Oscillation (ENSO) currently remains in NEUTRAL levels with indicators closer to La Nina thresholds. **Pg 5**
- ◆ Cooler equatorial Pacific sea surface temperature were enhanced in October with warmer anomalies in the sub-tropics of both hemispheres. Cooling in the sub-surface waters were also observed with warmer conditions in the western tropical pacific. **Pg 6**

ISSUED: NOVEMBER

Figure 1: SPCZ Position in October 2016

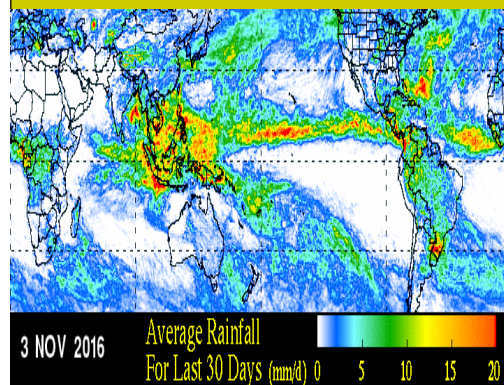
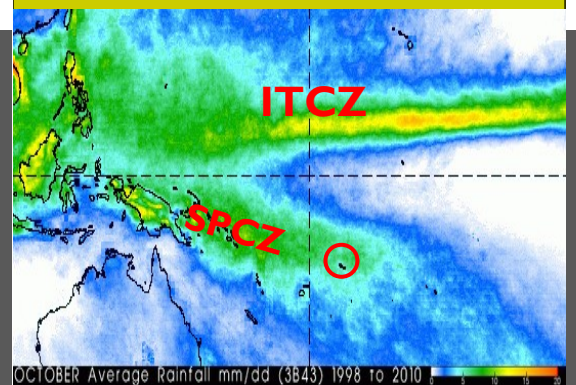


Figure 2: Normal Position of SPCZ in October



GLOBAL SCALE OBSERVATIONS

The Inter-tropical Convergence Zone (ITCZ) was displaced northward of its climatological position along the equator in the central Pacific; convection and rainfall were well above average for the Maritime Continent (Indonesia, Papua New Guinea (PNG)). The South Pacific Convergence Zone (SPCZ) on the other hand, was largely suppressed between PNG and Vanuatu and it shifted south westward. It was disorganized and farther away from the Samoan islands hence the insufficient rainfall observed in October.

LOCAL SCALE OBSERVATIONS

The weather pattern in October was largely influenced by easterly wind flow generated from high pressure systems mainly stationed farther south of Samoa. Troughs of low pressure and the SPCZ were also present. (*October 6450, Weather Summary*). October was a relatively dry month for Samoa. In fact, out of 26 rainfall stations, 18 stations received 'below average' rainfall, 4 recorded 'average' and 4 registered 'well below average'. The highest monthly rainfall of 336.4mm was recorded at Salailua Savaii followed by 262.2mm at Saletele Fagaloa, Afiamalu with 241.8mm and Letui with 237.2mm. The rest of the stations received rainfall within the range of 60.0mm to 200.0mm. The SPCZ was the driving factor of the weather on the 22nd of October which brought the highest maximum one day fall in 24 hours of 107.8mm recorded at Letui and moderate rainfall of 54.6mm at Vaiaata, 37.0mm at Tiavea, 46.0mm and 60.6mm at Afiamalu and Leauvaa respectively. Moreover, Samalaeulu recorded the highest number of rainy days (rainfall ≥ 0.1 mm) with 28 days, followed by Togitogiga and Saletele with 26 days and 24 days for Lotofaga and Tiavea.

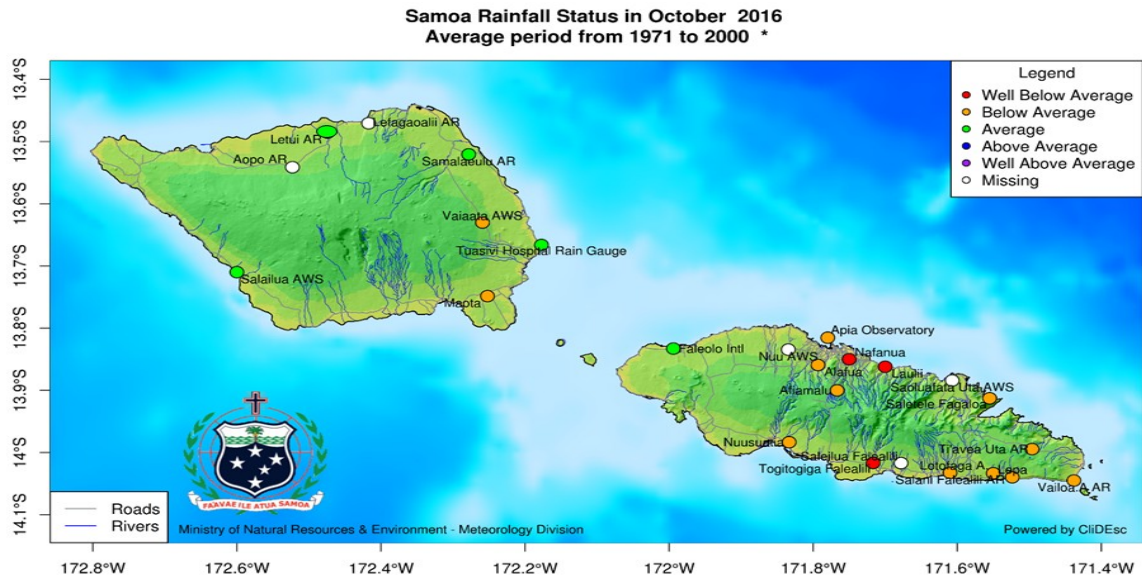
Table 1: Rainfall Statistics in October 2016

This table displays the rainfall status of all stations in the country in October 2016

| Stations | October Rainfall (mm) | October 30 Year Long Term Average | % of Average | 1 day fall (mm) | Date | # of Rainy Days | Rainfall Status |
|----------------------|-----------------------|-----------------------------------|--------------|-----------------|------|-----------------|--------------------|
| UPOLU | | | | | | | |
| Faleolo | 228.6 | 217 | 105 | 87.9 | 26th | 17 | Average |
| Fasitoo | 91.6 | 160 | 57 | 37.2 | 23rd | 9 | Below Average |
| Leauvaa | 177.2 | 397 | 45 | 60.6 | 22nd | 16 | Below Average |
| Nafanua | 112.7 | 283 | 39 | 32.0 | 31st | 19 | Well Below Average |
| Afiamalu | 241.8 | 353 | 69 | 46.0 | 22nd | 21 | Below Average |
| Apia | 135.1 | 227 | 60 | 40.0 | 31st | 15 | Below Average |
| Savalalo | 125.6 | 227 | 55 | 28.0 | 31st | 12 | Below Average |
| Alafua | 135.3 | 206 | 66 | 45.2 | 21st | 17 | Below Average |
| Vaitele | 135.6 | 260 | 52 | 52.2 | 21st | 12 | Below Average |
| Moamoa | 100.4 | 206 | 49 | 33.0 | 21st | 8 | Below Average |
| Laulii | 95.1 | 319 | 30 | 30.7 | 21st | 8 | Well Below Average |
| Saletele Fagaloa | 262.2 | 382 | 69 | 44.0 | 10th | 26 | Below Average |
| Ti'avea Uta | 165.6 | 279 | 59 | 37.0 | 22nd | 24 | Below Average |
| Nuusuatia | 201.4 | 352 | 57 | 40.8 | 28th | 20 | Below Average |
| Salani Falealili | 205.6 | 272 | 76 | 74.0 | 23rd | 23 | Below Average |
| Lepa | 158.0 | 232 | 68 | 27.2 | 11th | 18 | Below Average |
| Lotofaga | 186.6 | 349 | 53 | 67.0 | 11th | 24 | Below Average |
| Togitogiga Falealili | 206.9 | 583 | 36 | 78.2 | 11th | 26 | Well Below Average |
| Vailoa Aleipata | 72.8 | 128 | 57 | 19.0 | 24th | 18 | Below Average |
| SAVAII | | | | | | | |
| Samalaeulu | 161.2 | 245 | 66 | 41.8 | 29th | 28 | Below Average |
| Lefagaoalii | 63.6 | 204 | 31 | 21.4 | 21st | 10 | Well Below Average |
| Letui | 237.2 | 235 | 100 | 107.8 | 22nd | 18 | Average |
| Vaiaata | 202.2 | 347 | 58 | 54.6 | 22nd | 21 | Below Average |
| Salailua | 336.4 | 312 | 108 | 74.0 | 29th | 15 | Average |
| Maota | 170.0 | 255 | 67 | 60.0 | 26th | 7 | Below Average |
| Tuasivi | 216.8 | 199 | 109 | 68.2 | 29th | 15 | Average |

Figure 3: Rainfall Status Map in October 2016

This rainfall map is generated using observation data from Table 1



TEMPERATURE

Table 2: Air Temperature Statistics

This table displays the temperature statistics recorded across stations in October 2016

| Stations | Temperature (Degree Celsius) | | | | |
|--------------------------|------------------------------|------------------|------|---------------|------|
| | Mean Daily Temperature | Extreme Temp Max | Date | Extreme T Min | Date |
| Faleolo | 28.4 | 34.6 | 6th | 22.4 | 18th |
| Nafanua | N/A | N/A | N/A | 21.0 | 9th |
| Afiamalu | 22.1 | 29.6 | 16th | 15.0 | 3rd |
| Apia | 28.8 | 34.4 | 4th | 22.7 | 9th |
| Alafua | 26.8 | 32.9 | 9th | 21.5 | 9th |
| Togitogiga | 26.1 | 33.7 | 20th | 20.0 | 13th |
| Vaiaata | 26.1 | 31.3 | 1st | 19.6 | 5th |
| Salailua | 27.4 | 33.9 | 7th | 21.4 | 6th |
| N/A = Data Not Available | | | | | |

Mean daily temperature across the country in October were confined within 22.1°C to 28.8°C range. Moreover, the warmest day time temperature of 34.6°C was registered at Faleolo station on the 6th followed by 34.4°C at Apia on the 4th and Salailua recorded 33.9°C on the 7th. On the other hand, Afiamalu registered the coolest night time temperature of 15.0°C on the 3rd, followed by 19.6°C on the 5th at Vaiaata and Togitogiga recorded 20.0°C on the 13th. A high pressure influenced the weather during this period which associated with cloudless sky resulting in warmer daytime temperatures and cooler night time temperatures observed.

ATMOSPHERIC PRESSURE

Table 3: Atmospheric Pressure at Mean Sea Level (MSL)

This table displays the atmospheric statistics recorded across two stations in October 2016

| Station | Highest MSL Pressure (hPa) | Date | Lowest MSL Pressure (hPa) | Date | Average MSL Pressure (hPa) |
|---------|----------------------------|------|---------------------------|------|----------------------------|
| Apia | 1015.4 | 7th | 1006.7 | 28th | 1011.1 |
| Faleolo | 1015.6 | 7th | 1007.1 | 28th | 1011.4 |

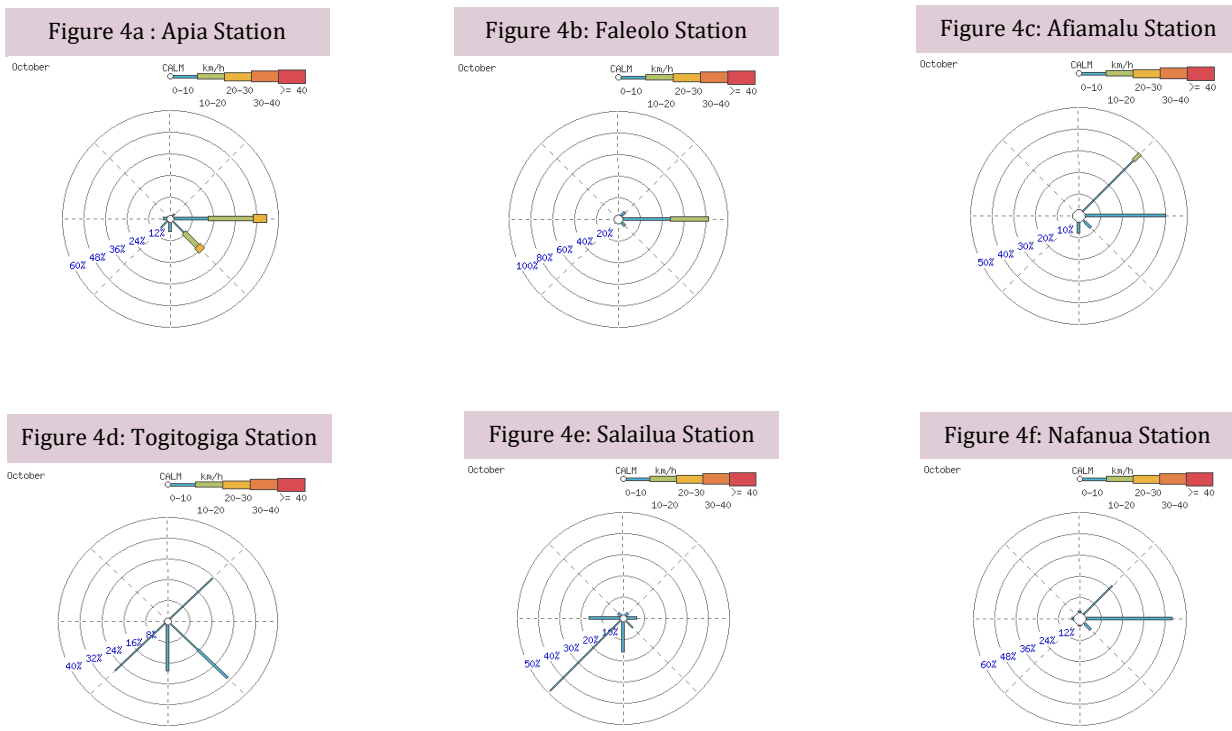
October 7th recorded the highest MSL pressure of 1015.6hPa at Faleolo. The lowest MSL pressure of 1001.7hPa was recorded on the 28th at Faleolo as the weather was driven by the trough of low pressure starting from the 28th to the end of the month. The average MSL Pressure at Faleolo and Apia were 0.3hPa difference from each other.

(Note: High pressure systems associate with good weather conditions whereas low pressure systems associate with bad weather conditions)

WIND

Figure 4: Wind Speed and Directions

The following diagrams show the different wind speed and direction that recorded daily at 9am across the country in October 2016.



Generally, the easterlies continue to dominate the wind statistics across Samoa in October with noticeable south westerlies recorded at Togitogiga and Salailua station for about 30-50% of the time in Savaii. The commonly experienced wind speed were light winds (0-10km/hr) throughout all stations with gentle winds (10-20km/hr) the second most dominant. Moderate winds (20-30km/hr) observed at Apia from east to south east.

EL NINO SOUTHERN OSCILLATION (ENSO)

CURRENT ENSO STATUS

The tropical Pacific still remains in the El Nino Southern Oscillation (ENSO) neutral level, with sea surface temperature (SST), trade winds, cloudiness near the International Dateline are shifted towards La Nina thresholds except for the Southern Oscillation Index (SOI) which retreated to weakly values in October.

The sea surface temperatures (SSTs) in the central equatorial Pacific Ocean are cooler than average and closer to thresholds of La Nina. In fact, the Nino indices anomalies enhanced in cooling compared to previous months values ~ Nino 3 = -0.36°C , Nino 3.4 = -0.49°C and Nino 4 = -0.27°C . Additionally, the cold sub-surface waters are also present but are now more confined to the equatorial central Pacific. Warmer anomalies are present in the western of 140°W .

Most of the atmospheric conditions are near La Nina status with others exhibiting neutral conditions. Stronger than average easterly trade winds in the western pacific and convection over the Maritime Continent (islands of Indonesia and Papua New Guinea) are consistent with a weak La Nina. However, the Southern Oscillation Index (SOI) has fallen substantially from +13.5 to weakly negative values of -4.3 for October 2016.

Impacts of La Nina on Samoa

- ◆ Above normal rainfall receive which may lead to flooding of low lying areas.
- ◆ Higher than normal sea level.
- ◆ Increase potential of water borne disease due to flooding.

The following sectors could be severely impacted as a consequence of abundant of rainfall:

- ◆ Agriculture
- ◆ Health
- ◆ Tourist (Accommodation Facilities)
- ◆ Forestry



Climate Information

La Nina is the positive phase of ENSO sometimes it is known as the 'opposite of El Nino'. The recent La Nina event occurred in 2010-2012 which listed as one of the strongest on record.

La Nina Thresholds

La Nina is declared when any of the following three criteria is satisfied:

- ◆ **Sea surface temperature:** Temperatures in the NINO3 or NINO3.4 regions of the Pacific Ocean are 0.8°C cooler than average.
- ◆ **Winds:** Trade winds have been stronger than average in the western equatorial Pacific Ocean during any three of the last four months.
- ◆ **SOI:** The three-month average SOI is +7 or higher.
- ◆ **Models:** A majority of surveyed climate models show cooling to at least 0.8°C below average in the NINO3 or NINO3.4 regions of the Pacific Ocean until the end of the year.

SEA SURFACE TEMPERATURE

Figure 5 : Sea Surface Temperature in September 2016

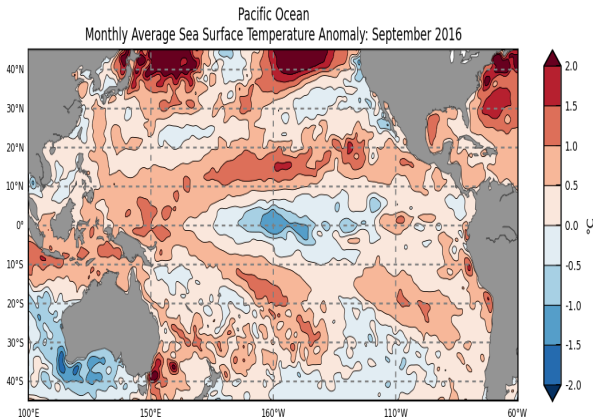
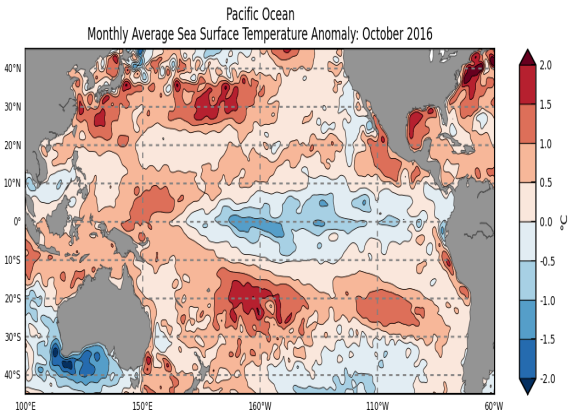


Figure 6: Sea Surface Temperature in October 2016

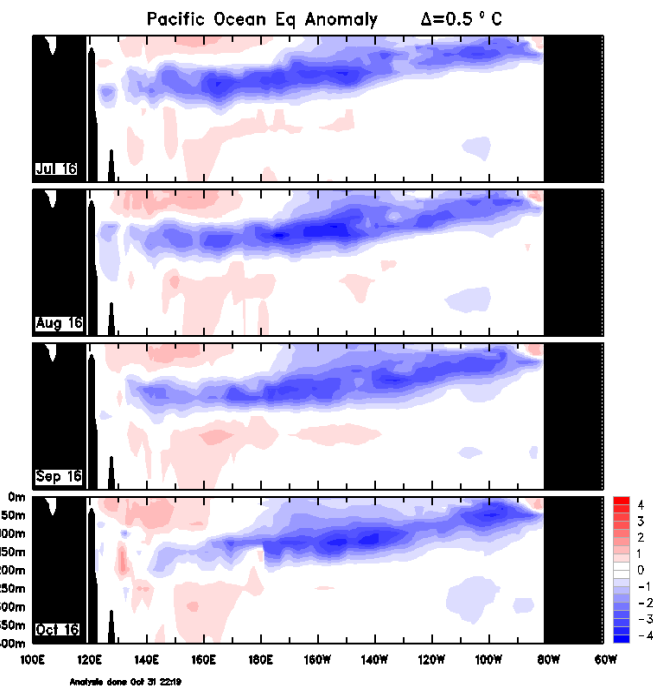


During October 2016, the sea surface temperatures (SSTs) were cooler than average in the central Pacific Ocean, but within the ENSO-neutral range. SSTs were warmer than average across most of South-East Asia, northern Australia and the western Pacific in comparison to that of September 2016. Warmer than normal SSTs are present in the Pacific Ocean subtropics of both hemispheres. The latest weekly NINO SST anomalies to 6 November were: NINO1 +0.05 °C; NINO2 - 0.06 °C; NINO3 - 0.36 °C; NINO3.4 -0.49 °C; and NINO4 -0.27 °C.

SUB-SURFACE TEMPERATURE

Figure 7: Sub Sea Surface Temperature in October 2016

The sub surface temperature anomaly in October 2016 adapted from Bureau of Meteorology, Australia



The four monthly sequence of equatorial sub-surface water temperature plot to October extracted from Bureau of Meteorology displays cooler anomalies continue to strengthen and span in the entire width of the equatorial Pacific Ocean extending down to a depth of 200m. In contrast, waters in the western Pacific continue to become warmer than average indicating a typical symptom of La Nina.