PACIFIC ENSO UPDATE

A Quarterly Bulletin of the Pacific El Niño-Southern Oscillation Applications Climate (PEAC) Center

2nd Quarter, 2015 Vol. 21, No. 2 **ISSUED: May 29h, 2015**

Providing Information on Climate Variability in the U.S.-Affiliated Pacific Islands for the Past 20 Years.

http://www.prh.noaa.gov/peac

CURRENT CONDITIONS

The weather and climate of the central and western tropical Pacific through April 2015 was extraordinary, with noteworthy extremes of rainfall, typhoons and oceanic response to strong atmospheric forcing. The most damaging climatic extreme was the occurrence of a super typhoon (Maysak) that swept across Micronesia leaving a trail of destruction from Chuuk State westward through Yap State, with Ulithi experiencing a devastating direct strike. A selection of additional weather and climate highlights includes:

(1) Republic of Marshals Islands (RMI) -- record-setting heavy daily and monthly rainfall on some atolls;

(2) Western North Pacific -- abundant early season tropical cyclones (5 in 4 months);

(3) Western Pacific -- the occurrence of twin tropical cyclones (Bavi and Pam);

(4) Western Pacific -- a major westerly wind burst;

(5) Guam – February 2015 was the driest month of record;

(6) Guam – large waves (20-25 feet) on the east and northeast coasts;

(7) Pacific Basin – Major subsurface warming signaling the onset (or continuation) of El Niño!

The 2015 First Quarter rainfall was above average at most locations, with regional dryness noted only in the far west of Micronesia (Yap and Palau), and at Utirik, the northern-most island of the Marshall Islands (Fig. 1 and Fig. 2, located on back page). At locations in eastern Micronesia, rainfall was abundant, with extraordinary amounts occurring during March and again in April. Wetter than average rainfall (and in some cases, much wetter than average rainfall) was observed at many islands during January through April. A typhoon was observed in each of January, February and March, which is a first such occurrence in the typhoon record of the western North Pacific (see the typhoon discussion).

At the close of 2014, it was thought that the state of the Pacific climate, which was then at the threshold of El Niño, would hover at that threshold for a couple of months then ease back into ENSO-neutral. The possibility of a few months of moderate dryness was forecast for most of Micronesia, with the highest chance of this in the western half (e.g., Guam, CNMI, Yap and Palau). An extension of the typhoon season into January 2015 was also anticipated — and did occur! Typhoon Mekkhala (01W) formed southeast of Pohnpei in mid-January and travelled westward toward the Philippines. When another typhoon formed in early February, a whole new forecast scenario opened: El Niño might strengthen and persist through 2015. The same suite of climate indicators that had predicted El Niño in the first few months of 2014 was once again present in even greater force in early 2015. This includes heavy rainfall in the RMI, early season typhoons, westerly wind bursts on the equator, and falling sea level. During early March, a major westerly wind burst occurred that led to the formation of the tropical cyclone twins Bavi and Pam (Fig. 3). This westerly wind burst (WWB) and associated tropical cyclone outbreak shown in Figure 3 registered as the highest value of the Madden-Julian Oscillation (MJO) ever recorded (Fig. 4, next page). This WWB forced an oceanic response to its east: a deepening of the thermocline that yielded a major subsurface warm anomaly (Fig. 5, next page) that could reinforce and push the climate system into El Niño for the rest of the year. Characteristically, forecasts of the duration and magnitude of El Niño that are made in the spring, are historically poor. This is known in climate circles as the "spring barrier".

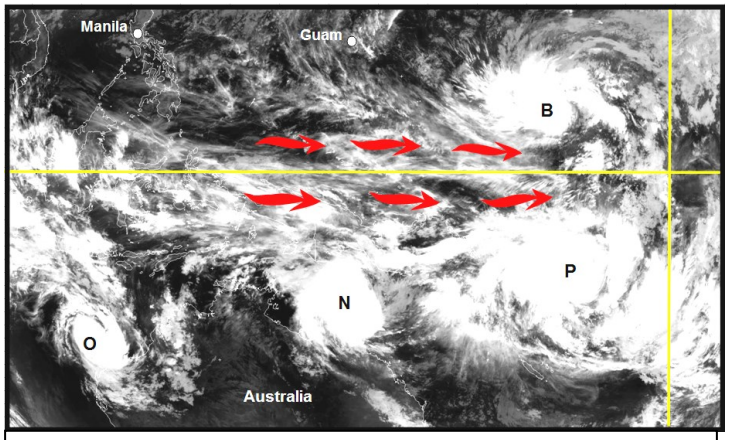


Figure 3. Tropical Cyclone Twins symmetrical with respect to the equator (B = Bavi and P = Pam) developed from a major westerly wind burst that occurred in early March 2015. Two other tropical cyclones (O = Olwyn and N = Nate) also formed along the monsoon trough in the Southern Hemisphere. MTSAT infrared satellite image time is 1800 UTC 11 March 2015.

Sea level either stayed as it was in late 2014 or continued to fall across most of Micronesia during early 2015. In fact, the sea level residuals in the Micronesian region of the western North Pacific during fall 2014 (and continuing to present) are at their lowest values for the past decade. The

CURRENT CONDITIONS

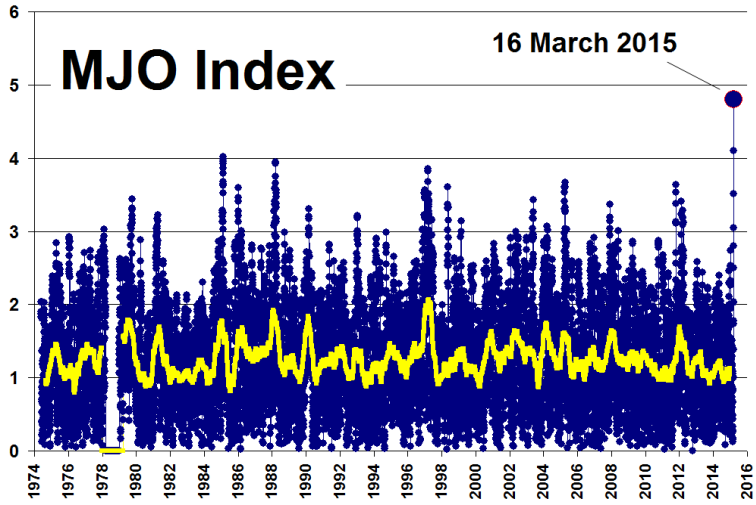


Figure 4. An index of the Madden-Julian Oscillation rises to its all-time high on the week of 16 March 2015 as the amount of deep cloud associated with a westerly wind burst in the equatorial western pacific arrives.

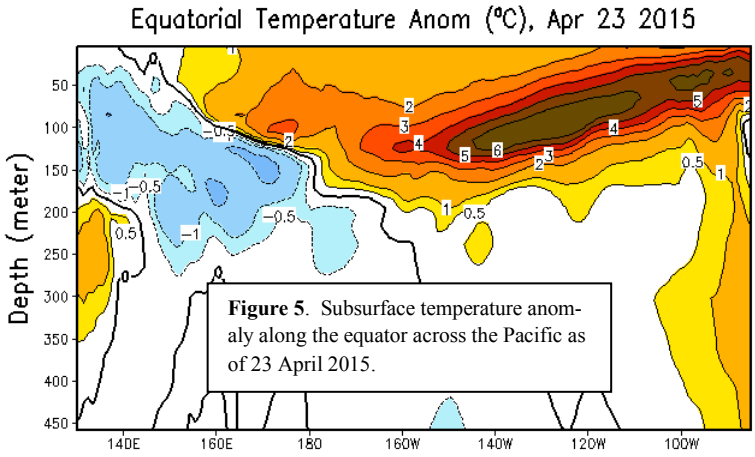


Figure 5. Subsurface temperature anomaly along the equator across the Pacific as of 23 April 2015.

behavior of the sea level across all of Micronesia was, and is, typical for a weak to moderate El Niño event. See the discussion of sea level for more details.

Four typhoons and one tropical storm (all the early season output of the basin) formed within the boundaries of Micronesia during the first four months of 2015. All of these generated heavy rainfall, large waves and high winds somewhere within Micronesia. The eye of Super Typhoon Maysak passed over Ulithi (10°N ; 139.7E) on the night of 31 March, with major damage reported. Other islands in Chuuk and Yap State were also adversely affected by the passage of Maysak. (See the tropical cyclone summary and the individual local variability summaries for more details.)

All of the weather patterns occurring in the USAPI during 2015, as discussed above, typically occur during El Niño, and some (such as the very abundant early season tropical cyclone activity) occur usually during a moderate or strong El Niño. Indeed, the climate system has already been declared El Niño, as indicated by the latest discussion from the U.S. Climate prediction Center.

As of May 14th 2015, according to the most recent Climate Prediction Center (CPC) and International Research Institute (IRI) for Climate and Society there is a 90% chance of El Niño continue through the Northern Hemisphere summer 2015.

SEA SURFACE TEMPERATURES

For the past Quarter (February, March, and April), ENSO Neutral conditions transitioned into an El Niño Advisory. Overall, across the Pacific representative conditions of El Niño were present with atmospheric and oceanic coupling. Above-average SSTs remained across the equatorial Pacific steadily increasing in all regions. The subsurface heat content continued to warm in response to a down-welling oceanic Kelvin wave. Consistent with ocean-atmosphere coupling convection shifted eastward towards the central equatorial Pacific. Low-level winds continued over the western Pacific and upper-level winds prevailed in eastern tropical Pacific. The combined atmospheric and oceanic state remains in an El Niño Advisory for the third quarter.

SOUTHERN OSCILLATION INDEX

The 3-month average of the Southern Oscillation Index for the 2nd Quarter of 2015 including February, March, and April remained negative at –0.3. The respective monthly values were 0.4, -1.2, and –0.1. Consecutive periods of negative SOI values and warm ocean waters across the eastern tropical Pacific are indicative of El Niño.

Normally, positive SOI values in excess of +1.0 are associated with La Niña conditions, and negative SOI values below -1.0 are associated with El Niño conditions. Low SOI values suggest a weak coupling between the ocean and the atmosphere. The SOI is an index representing the normalized sea level pressure difference between Darwin, Australia and Tahiti.

TROPICAL CYCLONE ACTIVITY

The PEAC archives western North Pacific tropical cyclone numbers, track coordinates, and 1-minute average maximum sustained wind taken from operational warnings issued by the Joint Typhoon Warning Center (JTWC) of the U. S. Air Force and Navy, located at Pearl Harbor, Hawaii. Western North Pacific tropical cyclone names are obtained from warnings issued by the Japan Meteorological Agency (JMA), which is the World Meteorological Organization's Regional Specialized Meteorological Center (RSMC) for the western North Pacific basin. The PEAC archives South Pacific tropical cyclone names, track coordinates, central pressures, and 10-minute average maximum sustained wind estimates from advisories issued by the Tropical Cyclone Warning Centers at Brisbane, Nadi, and Wellington. The numbering scheme and the 1-minute average maximum sustained wind estimates are taken from warnings issued by the JTWC. There are sometimes differences in the

Tropical Cyclone Summary

During the first four months of 2015, the JTWC numbered five significant tropical cyclones (Fig. 6, next page). Each of these was named by the Japan Meteorological Agency (JMA). Three of these five (Mekkhala, Higos and Maysak) became typhoons as per estimates by the JTWC. The other two (Bavi and Haishen) reached only to tropical storm intensity.

The calendar year 2015 began with the dying remnants of Tropical Storm Jiangmi still present at low latitudes between the Philippines and Borneo. Not soon after the demise of Jiangmi, a tropical disturbance originating to the southwest of Pohnpei on the 9th

TROPICAL CYCLONE ACTIVITY

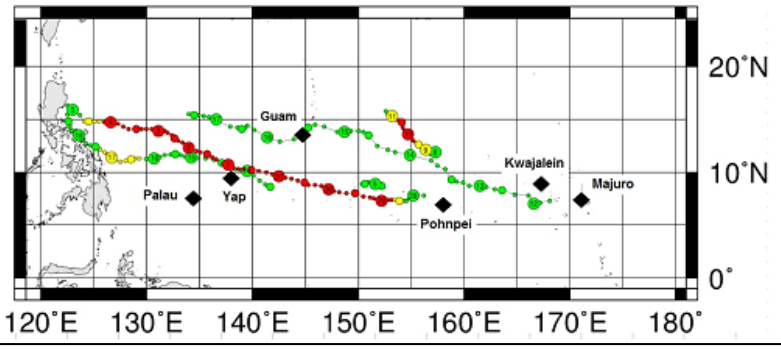


Figure 6. WestPAC tropical cyclones during JFMA 2015. Note that all five of the cyclones formed within the boundaries of Micronesia, with one of them (Bavi) becoming a tropical storm while passing Kwajalein. This early season distribution of tropical cyclones is strongly indicative of El Niño to the point where it may be considered diagnostic of El Niño.

of January moved quickly westward (passing to the south of Guam) and was named Mekkhala on the 14th of January. It became the first numbered and named tropical cyclone of the 2015 season. The PEAC had earlier predicted (based on the presence of borderline or weak El Niño during 2014) that the month of January 2015 would likely see the formation of a typhoon with an origin in Micronesia. Less than a month later, a monsoon depression in the far east of Micronesia (i.e., near Kosrae) evolved to become the season's 2nd typhoon. Higos underwent a period of rapid deepening when located to the northeast of Guam and reached its 105 kt peak intensity on the 10th of February (according to the JTWC). At its peak, Higos achieved the status of the strongest February typhoon since Typhoon Nancy in 1970. In less than 24 hours after reaching its peak, Higos rapidly weakened and fell below typhoon intensity on the afternoon of the 11th. During early March 2015, a major westerly wind burst (WWB) began to take shape along the equator in the western Pacific, and by the 10th of March, four named tropical cyclones were active in the western Pacific: Pam, Olwyn and Nate in the Southern Hemisphere, and Bavi in the Northern Hemisphere (see Fig. 3). Bavi and Pam were a textbook case of the formation of tropical cyclone twins symmetrical with respect to the equator as the product of an intense WWB. Bavi was a large tropical cyclone, but not of high intensity. Its expansive wind field allowed it to generate large waves that were problematic in the Marshall Islands and later on Guam (see the local variability summaries for more details). Bavi's twin, Pam, was a very intense typhoon that severely affected the South Pacific island nation of Vanuatu. Next up in the chain of early season tropical cyclones of 2015 was Super Typhoon Maysak. This typhoon also formed in the far eastern reaches of Micronesia (southwest of the RMI). It moved westward to become a typhoon a day or so prior to moving directly over Chuuk Lagoon. After leaving Chuuk behind, it intensified even further to become a super typhoon before making a devastating pass over Ulithi Atoll in Yap State. Maysak was perhaps the earliest Category 5 super typhoon recorded in the western North Pacific. Its spectacular structure was photographed from the International Space Station when it was passing near Ulithi (Fig. 7)

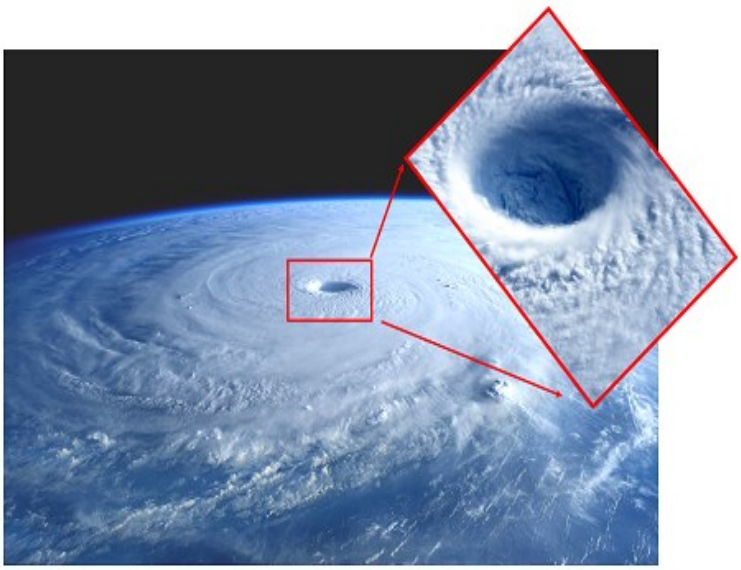


Figure 7. Super Typhoon Maysak 31 March 2015. Composition adapted from photographs by NASA/Terry Virts (ISS Astronaut, Spacewalker)

Shortly after Maysak made landfall in the Philippines as a weaker typhoon, yet another tropical cyclone was born: Tropical Storm Haishen, the 5th significant tropical cyclone of 2015. Haishen was short-lived, although it did briefly become a tropical storm within Chuuk State and affected some of the northern atolls of that state (see the local variability summaries for further discussion of Haishen and the effects of 2015's other tropical cyclones).

An abundance of early season tropical cyclones as seen during the first four months of 2015 (and also during the early months of 2014) is a typical response to El Niño onset in the western North Pacific. In fact, abundant early season typhoons in the western North Pacific may be used as a condition to diagnose the onset of El Niño. Used as such, 2014 saw the meteorological onset of El Niño in the spring, although the necessary oceanic response was delayed until later in the year. The ongoing abundance of 2015 early season typhoon activity in the western North Pacific was/is even more pronounced than it was at the beginning of 2014. Indeed, the basin is already in the oceanic condition of El Niño (see CPC discussion above), with the meteorological components of El Niño sharply and prominently established in the western Pacific.

PEAC Center Tropical Cyclone Assessment

Western North Pacific and American Samoa

Three organizations typically produce seasonal outlooks for tropical cyclone activity in the western North Pacific that are routinely used by the PEAC Center for guidance on the upcoming typhoon season: (1) The Guam Weather Forecast Office (WFO), (2) The City University of Hong Kong Laboratory for Atmospheric Research, and (3) The Benfield Hazard Research Centre Tropical Storm Risk (TSR) research group.

No agency outlined above has released an outlook for the 2015 typhoon season at the time of this writing. However, the PEAC has an obligation, based on perceived danger, to produce a forecast of tropical cyclone activity at this time: The risk of a damaging tropical cyclone in Micronesia is greatly enhanced by El Niño, even weak or moderate ones. Indeed, the US-Affiliated Pacific Islands (US-API) of the western Pacific have already this year suffered great damage from tropical cyclones associated with El Niño. This damage has

TROPICAL CYCLONE ACTIVITY

been widespread (though not everywhere severe) from the Marshall Islands and westward across Chuuk State, Guam, the CNMI and Yap State. This is likely to continue. The risk of a typhoon remains high, with two focal points: (1) the early season risk continues high through June, especially from Chuuk State westward through Yap State and including Guam and the CNMI. — During the summer months, the monsoon trough usually lifts far enough to the north to keep typhoons safely away from all islands except the Mariana islands northward of Saipan; and (2) Later in the year (October 2015 through January 2016) the risk of a damaging typhoon rises again across Micronesia from Guam all the way eastward to the RMI. Most Micronesia islands will have individually about a 1-in-3 chance of serious effects from some combination of high winds, large waves, extreme rainfall associated with a typhoon during 2015, with a near 100% chance of additional severe effects from a typhoon somewhere generically within all of Micronesia during the remainder of 2015. American Samoa passed its 2014-2015 cyclone season without major problems, and now enters its dry season with no serious tropical cyclone threats anticipated. If a moderate or strong El Niño develops during 2015, American Samoa may face a busy 2015-2016 cyclone season, but there is ample time to consider this.

SEASONAL SEA LEVEL OUTLOOK FOR THE US-AFFILIATED PACFIC ISLANDS

The following sections describe: (i) the Canonical Correlation Analysis (CCA) forecasts for seasonal (mean and maxima) sea level anomalies (seasonal cycle removed) for the forthcoming seasons April-May-June (AMJ), May-June-July (MJJ), and June-July-August (JJA) of 2015, (ii) AMJ return values at 20 and 100-yr period, (iii) the observed monthly mean and maximum sea-level anomalies for the previous season JFM 2015, and (iv) Seasonal sea level variability: Island Summary. *Note that, seasonal cycles have been removed for the data anomalies that are defined as 'deviations or departures from the normal' using the 1983 through 2001 mean sea level value computed at each station. Also note that CCA-forecasting technique adopted here does not account for sea level deviations created by other atmospheric or geological factors such as tropical cyclones, storm surges or tsunamis.*

Seasonal Sea Level Forecast (anomalies with respect to climatology) for AMJ, MJJ, and JJA of 2015

Forecasts of the sea-level anomalies in the USAPI (see http://www.prn.noaa.gov/peac/map.php) are presented using CCA statistical model. Based on the independent SST and zonal wind (U) (SST-U) values in JFM of 2015, the resulting CCA model has been used to forecast the sea level of three consecutive seasons: AMJ, MJJ, and JJA (see Table 1: left panel shows values for seasonal mean while the right panel shows the seasonal maxima). All the tide gauge stations (at 0 to 2-months lead time) provided skillful forecasts for these three consecutive seasons .

Table 1: Forecasts of sea level anomalies in inches (AMJ, MJJ, and JJA)

	Seasonal Mean Deviations [1]				Seasonal Max Deviations [2]					
Tide Gauge Station	**AMJ**	**MJJ**	**JJA**	**Seasonal Outlook[3]**	**AMJ**	**MJJ**	**JJA**	**Seasonal Outlook[3]**	**AMJ: Return Period[4]**	
Lead Time [5]	**0M**	**1M**	**2M**	**Seasonal Outlook[3]**	**0**	**1M**	**2M**	**Seasonal Outlook[3]**	**20- YR**	**100-YR**
Marianas, Guam	+1	+1	+1	Normal	+17	+18	+18	Normal	5.6	6.7
Malakal, Palau	-4	-4	-4	Below	+33	+32	+32	Below	9.6	14.3
Yap, FSM	-3	-3	-2	Below	+27	+27	+26	Marginal Below	16.7	33.0
Chuuk, FSM**	-2	-2	-2	Below	+29	+29	+29	Marginal Below	n/a	n/a
Pohnpei, FSM	0	0	0	Normal	+29	+29	+29	Normal	5.8	7.1
Majuro, RMI	0	0	0	Normal	+39	+39	+39	Normal	4.1	5.1
Kwajalein, RMI	+1	+1	+1	Normal	+37	+37	+38	Normal	4.5	5.9
Pago Pago, Am. Samoa***	+2	+2	+2	Marginal Above	+27	+27	+28	Marginal Above	3.9	5.4
Honolulu, Hawaii	+2	+2	+2	Marginal Above	+19	+19	+18	Marginal Above	4.1	5.9
Hilo, Hawaii	+2	+2	+2	Marginal Above	+25	+24	+24	Marginal Above	7.9	11.4

Table 1 and Supporting Statistics: : (-) indicate negative anomalies (fall of sea level from the mean), and (+) indicate positive anomalies (rise of sea level from the mean), n/a: data not available. Anomalies from -1 to +1 inches are considered negligible and anomalies from -2 to +2 inches are unlikely to cause any adverse climatic impact. Forecasts for Chuuk (**) are estimated subjectively based on information from WSO Chuuk and observations from neighboring stations of Pohnpei and Yap. *** There was a level shift (approximately 2-4 inches) in American Samoa at the time of September 2009 earthquake. So, -2 inches needs to adjust to the current tide-gauge values of Pago Pago. See PEAC website for the explanations of footnote (1 to 5). Also note that all information is based upon the 1983-2001 epoch.

The current sea level forecasts indicate that most of north Pacific stations are likely to be normal (normal and average are synonymously used throughout the sea level section) and below normal in the forthcoming AMJ, MJJ, and JJA seasons. Palau, Yap, and Chuuk are expected to be below, and Guam, Pohnpei, Majuro, and Kwajalein are expected to be normal (+ 0 to 1 inches above) while the lone

SEASONAL SEA LEVEL OUTLOOK FOR THE US-AFFILIATED PACFIC ISLANDS

south Pacific Island Pago Pago is expected to be slightly above normal. In Hawaii, both Honolulu and Hilo are likely to be slightly elevated, but still close to normal. This trend is very supportive to the on-going El Ninõ state; several features across the tropical Pacific are characteristic of El Niño conditions. Within the current ENSO state, further fall is still possible; however, any major fall is most unlikely in the forthcoming seasons (AMJ, MJJ, and JJA). Other than Palau (4 inches fall), while the current forecasts for all other stations for AMJ, MJJ, and JJA seasons of 2015 show a marginal decline when compared to the previous quarter, it is still very significant fall when compared to the forecasts of AMJ, MJJ, and JJA of 2014.

Observed Monthly Mean Sea Level Anomalies (with respect to climatology) for JFM 2015

The monthly time series (January to March) for sea level anomalies have been taken from the UH Sea Level Center. The full time series (in mm) for monthly mean is available at: ftp://ilikai.soest.hawaii.edu/islp/slpp.anomaliess. Locations of all these stations can be found at http://www.prn.noaa.gov/peac/map.php.

Current Conditions: As compared to previous months, the monthly mean sea level in February and March of 2015 recorded further fall in most of the stations. Currently, most of the stations are marginally below normal. The monthly maximum values remained stable in most of the stations. The recent trend of sea level is very supportive to the on-going El Nino state. Normally sea level is lower than normal during any El Nino year, higher than normal in any La Nina year, and normal or close to normal (with +/- 2 inches variations) in any ENSO-neutral year.

Table 2: Monthly observed mean/maximum sea-level anomalies in inches

Tide Gauge Station	Monthly Mean Deviations[1]				Monthly Max Deviations[2]			
	Jan	Feb	Mar	Standard Deviations	Jan	Feb	Mar	Sea level Trend
Marianas, Guam	+4	+2	+0.8	4.4	+18	+18	+16	Falling
Malakal, Palau	+1	-1	-4	5.3	+38	+37	+32	Falling
Yap, FSM	+2.1	-1	-1	4.9	+30	+28	+29	Stable
Chuuk, FSM*	**	**	**	*	**	**	**	**
Pohnpei, FSM	**	**	**	3.6	**	**	**	**
Majuro, RMI	+3.4	+1.6	**	2.4	+32	+32	+25	Falling
Kwajalein, RMI	+2	+1.5	-0.4	3.1	+47	+46	**	Falling
Pago Pago, American Samoa	+9.6*	+8.4	+8.4	3.3	+40	+42	+38	Falling
Honolulu, Hawaii	0	+3	+2.4	1.6	+35	+35	+35	Stable
Hilo, Hawaii	+1	***	+3	2.0	+21	+20	+17	Stable
					+26	+24	+24	

Table 2. +/- indicate positive anomaly (rise) and negative anomaly (fall) respectively. Note that any changes between (0~ ±1) inch is considered to be negligible. Also note that changes within the range of (+/-) 2 inches are unlikely to cause any adverse climatic impact. *** Guesstimated values, ** Data currently unavailable; Figures in parenthesis are year-to-year seasonal anomaly. 1: Difference between the mean sea level for the given month and the 1983 through 2001 mean sea level value at each station (seasonal cycle removed); 2: Same as 1 except for maxima; SD stands for standard deviations. Red: Falling trend, Black: Stable SL, and Blue: Rising trend. * In Pago Pago, there was a level shift (approximately 2-4 inches) at the time of September 2009 earthquake.

Starting from JFM 2014 to JFM of 2015, a comparative perspective of seasonal sea level variations is given below. In JFM 2015, most of the island recorded considerable fall (4 to 6 inches) when compared to the sea level of JFM 2014. This fall is even more significant when compared to the last 10 years. The sea level was considerably higher than normal during the last decade—a "La Nina type trend". Currently all are close to normal (+/- 2 inches variation)—a "neutral or El Nino type trend". Island-wise current sea level outlooks are synthesized to the right:

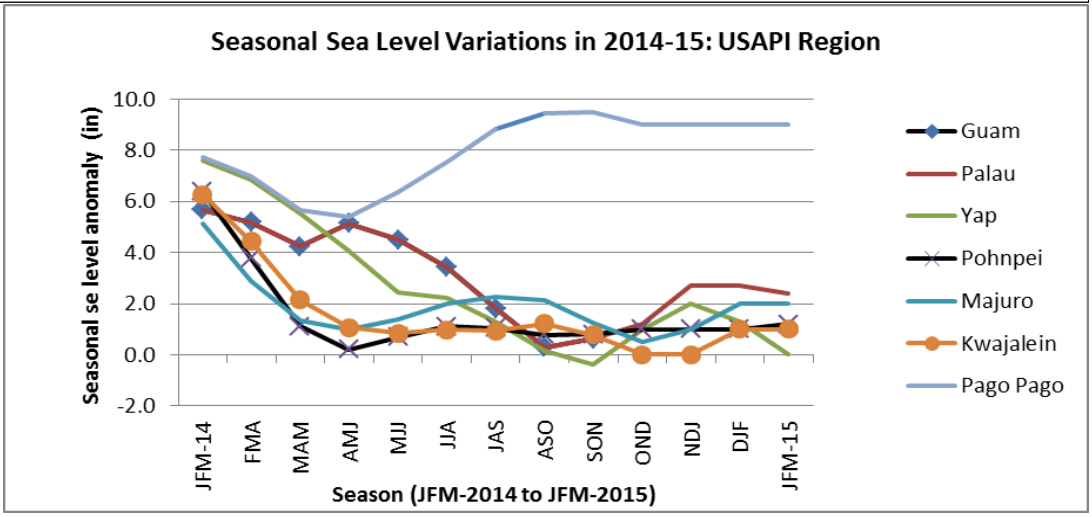


Figure 6. A comparative perspective of Island-wise seasonal sea level variations (JFM 2014 to JFM 2015) (*Note that Pago

LOCAL SUMMARY AND FORECAST

NOTE: *All Predictions[1] listed in the rainfall summaries were made in the 4th Quarter 2014 Pacific ENSO Update Newsletter. Also note that all Forecast rainfall quantities[2] represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.*

American Samoa: The March-April-May season saw near normal climate for American Samoa with high month to month variability. Severe Tropical Cyclone Pam, active in the South Pacific from Mach 6 to the 22 produced some large swells that affected American Samoa but did not produce any significant damage on the island. Rainfall totals for each month varied greatly with March and April being dry and May being wet. American Samoa will be entering its Dry season (June through August). This transition is usually sharp, with monthly rainfall going from an average of 9.8 inches in May to about 5.9 inches in June.

Since January 2014, the monthly mean sea level in Pago Pago remained above normal and in May it was reading + 4.5 (or +1.5 with a –3 inches level shift adjustments) inch above normal. Currently, it is +8.4 (or 5.4) inches above normal. This rise is expected, as the sea level fall in American Samoa displays a couple of months delay with respect to north Pacific Islands.

American Samoa Rainfall Summary: 1st Qtr 2015					
Station		**Jan.**	**Feb.**	**Mar.**	**1st Qtr**
Pago Pago WSO	**Inches**	**26.87**	**12.22**	**6.88**	**45.97**
	% Avg.	**201%**	**102%**	**64%**	**128%**

Climate Outlook: The 2015 Dry season, June Through August, should be average with monthly rainfall totals just shy of 6 inches per month for the three month period. The developing El Niño conditions will increase the likelihood of dry conditions for American Samoa during the first half of 2016, especially if the coming El Niño develops into a moderate to strong event. El Niño events tend to shift tropical cyclone activity in the South Pacific eastward, but the magnitude of this shift is strongly dependent on the intensity of the event. If the coming El Niño develops in to a strong event, Cyclone genesis could shift eastward as far as French Polynesia, while for a moderate event, TC genesis could be enhanced in the American Samoa region.

Forecasts for the next seasons (AMJ, MJJ, and JJA) indicate slightly elevated sea level (2 to 3 inches) and, when compared to the forecasts of first quarter 2015; this is marginal rise. Predicted rainfall for American Samoa from January 2015 through December 2015 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]
April - June 2015 (Onset of Next Dry Season)	**100%**
July - September 2015 (Heart of Next Dry Season)	**100%**
October - December 2015 (Onset of Next Rainy Season)	**90%**
January - March 2016 (Heart of Rainy Season)	**80%**

[1] Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

LOCAL SUMMARY AND FORECAST

Guam/CNMI: The weather during the first four months of 2015 was peculiar on Guam and in the CNMI. For example: the 1st quarter was wetter than average throughout the region, but ironically the month of February was very dry with the 0.18 inches recorded at the Guam Weather Forecast Office the lowest rainfall total for any month in that site's 66-year historical record. All five of the western Pacific basin's early season tropical cyclones had some effect on the wind, waves and rainfall of the region. The center of Tropical Storm Bavi passed directly over Guam on the night of 15 March. The highest winds associated with Bavi were on its north side, which placed Saipan in a band of 45kt sustained winds with gusts to near typhoon force. These high winds toppled some trees and knocked out electrical power on many areas of the island. Farther south on Guam, the winds reached minimal gale force, but the waves on the northeast coast reached 20-25 feet. Foaming white water from huge breaking waves surged to 30-ft inundation levels at several places along the 6-meter coastal terrace that rims the northern end of the island below a 500-foot nearly vertical sea cliff. These waves were the highest to occur along this coastal area in over a decade! Fortunately this remote coastline is uninhabited. Then, just two weeks after the passage of TS Bavi over Guam, Typhoon Maysak passed roughly 300 n mi to the south of Guam to bring another round of high surf to the island's eastern shores. The waves were not quite as high as those generated by Bavi, but almost claimed a life at a popular sea-cliff jump.

Since January 2014, unlike other north Pacific stations, the monthly mean sea level in Guam has remained steady above normal. It started to fall from July and fell very quickly; approximately 6 inches. Guam is normal and, consistent to the current weak El Ninõ state.

Guam and CNMI Rainfall Summary: 2015 1st Qtr.					
Station		**Jan**	**Feb**	**Mar**	**1st Qtr**
GUAM					
GIA (WFO)	**Inches**	**9.49**	**0.48**	**5.96**	**15.93**
	% Avg	**166%**	**9%**	**146%**	**106%**
AAFB	**Inches**	**11.66**	**0.58**	**5.29**	**17.53**
	% Avg	**205%**	**11%**	**129%**	**117%**
Southern Mountains	**Inches**	**9.82**	**0.60**	**4.92**	**15.34**
	% Avg	**172%**	**11%**	**120%**	**102%**
CNMI					
Capitol Hill	**Inches**	**8.61**	**0.53**	**7.00**	**16.14**
	% Avg	**215%**	**18%**	**280%**	**185%**
Saipan Intl. Airport	**Inches**	**4.66**	**0.35**	**5.95**	**10.96**
	% Avg	**146%**	**15%**	**298%**	**144%**
Tinian Airport	**Inches**	**5.35**	**0.13**	**5.43**	**10.91**
	% Avg	**134%**	**4%**	**217%**	**115%**
Rota Airport	**Inches**	**5.75**	**0.46**	**8.72**	**14.93**
	% Avg	**109%**	**10%**	**236%**	**109%**

LOCAL SUMMARY AND FORECAST

Climate Outlook: If current El Niño conditions persist through the summer into next fall, Guam and the CNMI could be in for some wild weather! Extremes of rainfall with high month-to-month variability are likely. Tropical cyclones will be a continual danger through the end of the year, with the odds of damaging heavy rainfall, wind and waves form a passing typhoon at nearly 30% for each island individually, and a near certainty to occur somewhere in the region as a whole. With prospects for pronounced highly variable rainfall on weekly to monthly time scales, and also considering the likely near passage of a tropical storm or two, the rainfall over the next three months should total to average to above average.

Sea level forecasts are normal for the next seasons (AMJ, MJJ, and JJA) with possibility of a marginal above sea level (0 to +1 in).

Predicted rainfall for the Mariana Islands from April 2015 through March 2016 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]	
	Guam/Rota	Saipan/Tinian
April – June 2015 (Second Half of Dry Season)	110%	120%
July - September 2015 (Heart of Rainy Season)	120%	120%
October - December 2015 (Transition to Rainy Season)	100%*	95%*
January – March 2016 (First Half of Dry Season)	80%	80%

[1] Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

* the direct passage of a typhoon could result in much higher rainfall on any island

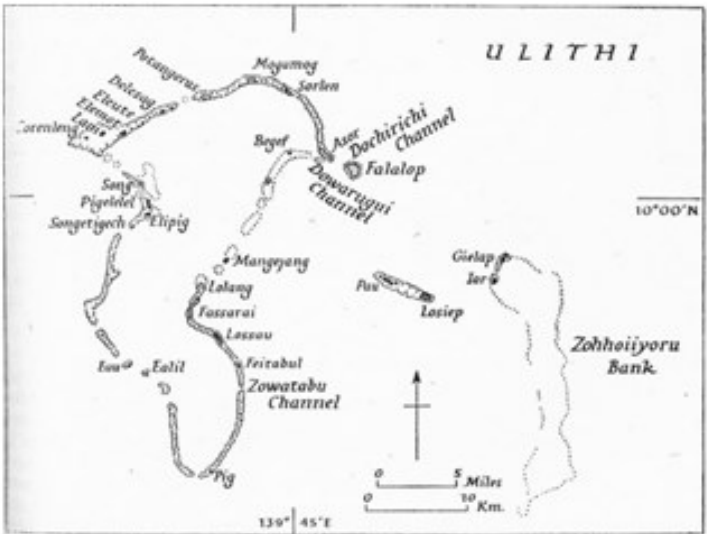
Federated States of Micronesia

Yap State: Yap State has been relentlessly pounded by tropical cyclones over the past four months, with four named tropical cyclones passing through the State: Hagupit, Jangmi, Mekkhala and Maysak. Two of these tropical cyclones – Hagupit and Maysak -- were devastating for some islands. During the local evening of 03 December 2014, Typhoon Hagupit (TC22W, 2014) passed about 60 miles to the south of Yap Island, and near or over Ngulu Atoll (8.4N 137.5 E). There were reports there of significant damage, but no deaths or injuries among the six people on-island at the time. On the day before Christmas 2014, the tropical depression that would later become tropical storm Jangmi (TC23W, 2014) passed to the south of Yap Island and caused only a period of unremarkable rain showers with typical (20-30 kt) gusty winds in the showers. During the night of 14 January 2015, Tropical Storm Mekkhala (TC01W 2015) passed approximately 50 n mi to the north of Yap island, and less than 25 n mi to the south of Ulithi Atoll (10.0 N 139.7 E). The peak wind gust on Yap Island was 36 mph (31 kt) accompanied by about 0.5 inches of rainfall. Ulithi Atoll reported over 4 inches of rainfall during the passage of this tropical cyclone; however, there were no reports of significant damage or injuries there or anywhere in Yap State associated with this storm. Lastly, on the night of 31 March

LOCAL SUMMARY AND FORECAST

2015, Super Typhoon Maysak (TC04W 2015) passed very close to Ulithi Atoll, causing catastrophic damage.

Ulithi Atoll is located just over 100 nautical mi to the ENE of Yap Island. It consists of 40 islets totaling 1.7 sq mi, surrounding a lagoon about 22 mi long and up to 15 mi wide—one of the largest atolls in the world. Ulithi's population was 773 in 2000. There are four inhabited islands on Ulithi Atoll: Falalop, Asor, Mogmog, and Fedarai. Falalop is the most accessible with an air strip, a small resort hotel, a gas dealership, one general merchandise store and one of the three public high schools in Yap state. Mogmog is the seat of the high chief of Ulithi Atoll. During World War II, Ulithi Atoll was for a time the world's largest naval facility. In March 1945, the US serviced 15 battleships, 29 carriers, 23 cruisers, 106 destroyers, and a train of oilers and supply ships from Ulithi – at the time kept secret and referred to only as "a Pacific base".



Super Typhoon Maysak developed from a tropical disturbance that formed in the far eastern portion of Micronesia. It had a long westward track and caused much damage and four deaths while passing through Chuuk State. Moving farther to the west and becoming a Category 5 super Typhoon, it made a very close pass to Ulithi Atoll as a Category 5 super typhoon. The center of the well-defined eye of this powerful super typhoon (seen earlier in Fig. 5, TC Activity section) passed about 20 miles to the north of Ulithi Atoll on the night of 31 March. Guam National Weather Service forecaster Patrick Chan reported that the outer southern edge of the inner eye wall of super typhoon Maysak passed directly over Ulithi Atoll. The outer southern edge of the eye wall likely did not contain the strongest winds of the super typhoon which means Ulithi (10.0° N 139.7°E) was spared the 160 mph sustained winds of this system, but based on all data including the level of damage from photos and reports, likely experienced 130-140 mph winds with gusts up to 155-170 mph. Also, the island of Fais (9.8°N 140.5°

LOCAL SUMMARY AND FORECAST

E) probably got 100-110 mph winds gusting up to 125-135 mph. Damage on Ulithi Atoll was assessed as very severe (Fig. 7).

Figure 7. Houses were blown apart by Typhoon Maysak, their contents strewn in the wreckage of trees on Ulithi atoll. (Photograph supplied to Australian Broadcasting Corporation by Brad Holland, freelance photographer and Co-chair of the American Society of Illustrators Partnership.)

Freelance photographer Brad Holland, visited Ulithi Atoll two days after the storm hit and took some of the first images to show the devastation on Falalop island, located in Yap state:

"There's not one thing that's not destroyed on that island,"

"I asked the chief how long it will take to change the island with machetes,"

"He said that his people can do it in two years.

"Two years until rebuilding can begin, without tools. That's the status."

Amazingly no one was killed by the storm on Ulithi.

The monthly mean sea level in Yap displayed considerable fall in the last couple of months. It fell about 7 inches fall when compared to AMJ of 2015. Currently it is stable and slightly below normal (-1 inch).

Yap State Rainfall Summary: 2015 1st Quarter

Station		Jan	Feb	Mar	1st Qtr
Yap State					
Yap WSO	Inches	5.86	4.60	4.22	14.68
	% Norm	80%	77%	71%	76%
Ulithi	Inches	13.80	3.71	3.14	20.65
	% Norm	222%	73%	62%	126%
Woleai	Inches	6.65	11.74	8.47	26.86
	% Norm	62%	157%	102%	101%

Climate Outlook: With the state of the climate now in El Niño, the risk of additional tropical cyclone activity in Yap State remains high (1-in-3 chance for individual island sites, and near 100% chance for all of Yap State) through at least June. The risk of a typhoon in Yap State could decrease slightly late in the year if El Niño becomes strong, in which case typhoon activity would be pulled so far to the east that any late-season typhoon would likely pass safely to the north of the State.

LOCAL SUMMARY AND FORECAST

Looking far ahead, the maturation of El Niño in 2015 followed by its demise in early 2016 would likely bring several months of very dry weather across all of Yap State in early (JFMA) 2016.

Sea level forecasts for the next seasons (AMJ, MJJ, and JJA) indicate below normal sea level (2-3 inches below) and, when compared to the forecasts of the previous quarter, this is about 2-3 inches further fall.

Predicted rainfall for Yap State from April 2015 through March 2016.

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]	
	Woleai	Yap & Ulithi
April – June 2015 (End of Dry Season)	100%	120%
July – September 2015 (Heart of Next Rainy Season)	100%	120%
October – December 2015 (End of Next Rainy Season)	90%	90%
January – March 2016 (Heart of Dry Season)	75%	75%

[1] Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

Chuuk State: During the first Quarter of 2015, most of the islands of Chuuk State were drenched with above normal rainfall. The high rainfall was delivered in large measure by a continual parade over the past five months of tropical disturbances and named tropical cyclones passing through regional waters. On 01 December 2014, the developing Typhoon Hagupit passed close to Ta Atoll with serious damage reported. An extreme daily rainfall of nearly 6 inches occurred at the WSO on Weno in the Chuuk Lagoon during the 2nd week of January 2015 as Typhoon Mekkhala was forming nearby. Typhoon Maysak crossed east-to-west through Chuuk State during 28 through 30 March 2015. The eye of Maysak passed directly over Chuuk Lagoon during the morning hours of 29 March as a strong Category 1 typhoon with sustained one-minute winds of 75 to 90 mph over open water. Damage was severe on many of the islands that dot the lagoon (Fig. 8). An aerial pass over the islands in the Chuuk Lagoon revealed (to the UOG PEAC scientist) a patchwork of damage, with some islands showing heavy damage (trees toppled and lying in a tangled mat strewn across with debris from damaged homes), while at other islands, and on portions of the larger high islands in the lagoon, damage appeared to be light. The head of the Red Cross in the Federated States of Micronesia reported that 60 to 80 percent of homes on Weno, the capital of Chuuk State, were damaged or destroyed by Typhoon Maysak, with up to 6000 people displaced. Four storm-related deaths were confirmed, one from a mudslide and three from fallen trees or limbs. Chuuk was the first Micronesian state to be struck by the typhoon**.** High surf events occurred throughout December 2014, with particularly large waves noted on the 5th and the 14th. Over the course of December 2014, there were reports of three boating/ wave-related accidents, including one sunken boat with 5 survivors and a drowning incident due to high surf. Minor inundation was reported on the east side of Weno Island inside the Lagoon.

LOCAL SUMMARY AND FORECAST

Figure 8. A ship rests on rocks after it ran aground during squalls brought on by Typhoon Maysak near the coastal village of Neauo, Chuuk State, on March 29, 2015. Photo By Hiroyuki Mori, resident, Chuuk State.

Chuuk State Rainfall Summary: 2015 1st Qtr					
Station		**Jan**	**Feb**	**Mar**	**1st Qtr**
Chuuk Lagoon					
Chuuk WSO	**Inches**	**14.32**	**9.68**	**17.37**	**41.37**
	% Avg	**134%**	**157%**	**208%**	**164%**
Southern Mortlocks					
Namoluk	**Inches**	**18.51**	**15.79**	**10.91**	**45.21**
	% Avg	**175%**	**166%**	**91%**	**141%**
Northern Mortlocks					
Nama	**Inches**	**12.62**	**12.46**	**13.39**	**38.47**
	% Avg	**118%**	**201%**	**160%**	**153%**
Northern Atolls					
Fananu	**Inches**	**7.13**	**7.39**	**5.23**	**19.75**
	% Avg	**67%**	**119%**	**63%**	**78%**
Western Atolls					
Polowat	**Inches**	**8.93**	**9.15**	**7.79**	**25.87**
	% Avg	**112%**	**146%**	**125%**	**126%**

Climate Outlook: With El Niño in-place and likely to continue for at least the next 3 months, episodes of westerly winds and heavy rainfall will continue across all of Chuuk State through the summer and into the fall. Tropical cyclone activity will remain above average, with several of the basin's named storms originating as monsoon depressions in the state. The risk of another strike by a damaging tropical cyclone remains above average (20-30%), with possible hazards ranging from heavy rainfall, mudslides, and high wind and waves. Month-to-month variability of rainfall will be high, with several daily extremes of over 4 inches contributing to high monthly rainfall totals and the high monthly variability. The monsoon trough will likely continue to stretch across the northern half of Chuuk State for at least the next three months. The monsoon trough (with its associated disturbances) is inherently episodic, with periods of gusty southwesterly winds and heavy rainfall lasting for two or

LOCAL SUMMARY AND FORECAST

three weeks, interspersed with one- or two-week breaks when winds become light, rainfall abates and daytime temperatures approach 90°F. Overall, the rainfall should be abundant across Chuuk State at least through November, and then begin to lessen, particularly if El Niño becomes firmly established in the Pacific Basin. A longer term climate risk is the drought conditions that typically follow El Niño. This dryness could become a serious problem in early 2016. The depletion of rainfall and its duration is dependent on the strength of El Niño, with a strong El Niño causing a greater reduction of rainfall for a more prolonged time period (through May for a strong El Niño and only through March or April for a weaker El Niño).

Predictions for Chuuk State for April 2015 through March 2016:

Inclusive Period	**% of long-term average / Forecast rainfall (inches)** [1]			
	Chuuk Lagoon, and Nama	**Polowat**	**Northern Atolls**	**Mortlocks**
Apr – Jun 2015	**120%**	**100%**	**120%**	**120%**
Jul – Sep 2015	**120%**	**100%**	**120%**	**120%**
Oct – Dec 2015	**100%**	**95%**	**100%**	**100%**
Jan – Mar 2016	**80%**	**80%**	**75%**	**80%**

[1] Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

Pohnpei State: January through April saw near average rainfall for Pohnpei. February was dominated by a pattern of local convergence and showers that produced sufficient rainfall for the main and surrounding islands. Tropical systems developed in the area producing some thunderstorms but no damage during the month. March was even more active in terms of tropical systems, most of which passed towards the north of the state and produced high winds and high rainfall amounts for the northern islands. A high rainfall event was reported during April 10th, with a total 24hour rainfall of just above 15 inches and wind gusts of up to 55 knots. Some tree damage was reported for this event and flash floods where reported in some rivers but no inundation damage occurred.

The monthly mean sea level in Pohnpei displayed a rapid fall (about 6 inches fall) in the last couple of months. However, missing data for the last three months made it difficult to make any accurate latest assessment.

Pohnpei State Rainfall Summary: 2015 1st Qtr					
Station		**Jan**	**Feb**	**Mar**	**1st Qtr**
Pohnpei Island					
Pohnpei WSO	**Inches**	**10.24**	**9.58**	**18.14**	**37.96**
	% Norm	**78%**	**100%**	**138%**	**106%**

Climate Outlook: For Pohnpei, the coming months should bring near average rainfall with episodes of westerly winds increasing their frequency as the ongoing El Niño

LOCAL SUMMARY AND FORECAST

matures. Drought conditions are likely at the beginning of 2016 lasting through the middle of the year. Forecasts for the next seasons (AMJ, MJJ, and JJA) indicate near normal sea level and, when compared to the forecasts of first quarter 2014, this is still 3 inches further fall.

Predicted rainfall for Pohnpei State from April 2015 through March 2016:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]
	Pohnpei Island and Atolls
Apr - Jun 2015	120%
Jul - Sep 2015	100%
Oct - Dec 2015	90%
Jan - Mar 2016	80%

[1] Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

Kosrae State: Kosrae had a relatively wet January through April. During February and March, the island reported a few episodes of high surf, not uncommon for this time of year, that caused minor damage along the East and north shores of the island. During early April, Tropical Storm Haishen developed to the South of Kosrae producing southerly winds over the island and high surf, but with little impacts. April saw near average total rainfall, but was full of eventful weather with high surf, thunderstorms and flash floods reported during the month. There were some reports roofs being blown away. Winds reached 44kts and damaged some banana trees.

Kosrae State Rainfall Summary: 2015 1st Qtr					
Station		Jan	Feb	Mar	1st Qtr
Airport (SAWRS)	Inches	19.28	14.73	14.57	48.58
	% Avg	116%	114%	91%	106%

* Percent based on Airport monthly and annual averages.

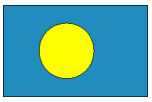
Climate Outlook: The coming months should bring near average rainfall for Kosrae with episodes of westerly winds increasing their frequency as the ongoing El Niño matures. Drought conditions are likely at the beginning of 2016 lasting through the middle of the year.

Predicted rainfall for Kosrae State from April 2015 through March 2016:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]
April – June 2015	95%
July - September 2015	95%
October - December 2015	95%
January – March 2016	80%

[1] Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

LOCAL SUMMARY AND FORECAST



Republic of Palau: January to April have been dry in Palau. February, before the current El Niño started to develop, was dominated by a dry trade wind patter over the westernmost islands, leaving Palau with below average rainfall. As the current El Niño conditions became more developed during March and April, tropical storm activity shifted east as expected, leaving Palau dry as storms tracked to the north of the island. In general weather over Palau in the past months has been hot and dry with few exceptional events.

The monthly mean sea level in Malakal displayed rapid fall in the last couple of months. In March 2015, the sea level fell to 4 inches below normal. This is a very significant fall.

Republic of Palau Rainfall Summary: 2015 1st Qtr					
Station		Jan	Feb	Mar	1st Qtr
Koror (WSO)	Inches	7.45	6.12	13.14	26.71
	% Norm	54%	54%	110%	72%

Climate Outlook: As the current El Niño conditions develop, dry conditions are expected to develop in Palau slightly earlier than in the other Pacific Islands, with below average rainfall possibly starting as early as late fall 2015 and extending into the first half of 2016. Tropical cyclone risk will be below average since storms are expected to form farm to the east of Palau and track westward passing far to the north. Palau also should see persistent gusty monsoon through October, with hazy days and very choppy seas in the Rock Islands and other coastal waters.. Forecasts for the next seasons (AMJ, MJJ, and JJA) indicate about 4-5 inches below normal sea level for Palau and, when compared to the forecasts of the previous quarter (JFM) of 2015, this is still 3-4 inches further fall.

Predicted rainfall for Palau from April 2015 through March 2016 is:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]
April – June 2015	80%
July – September 2015	90%
October – December 2015	85%
January – March 2016	80%

[1] Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

Republic of the Marshall Islands: With the anticipation in early 2015 of the easing of borderline El Niño conditions in late 2014, dryness was expected throughout the RMI during early 2015. This did occur for the first two months of the year at most atolls, with some very low rainfall totals reported at Utirik and Wotje in the northern RMI. However, instead of easing into ENSO-neutral, El Niño conditions strengthened in January and February of 2015, and rainfall throughout the RMI had a dramatic rebound to very wet conditions during March and April of 2015. Even at the usual driest of the atolls in the north (e.g., Kwajalein, Utirik and Wotje) enormous amounts of rainfall were experienced. This was a striking repeat of conditions in early

LOCAL SUMMARY AND FORECAST

2014 when record and near-record rainfall soaked many of the atolls of the RMI during February and again during April. Heavy rainfall in the RMI in the first few months of the year is typical of incipient El Niño.

A rare tropical cyclone had serious impact in the RMI during the second week of March 2015. During the first week of March, a westerly wind burst (WWB) slowly gained strength along the equator at the longitudes of the RMI (e.g., 150°E to 170°E) and led to the development of tropical cyclone twins symmetrical with respect to the equator (Fig. 9). The southern member, Cyclone Pam, was very intense and caused catastrophic damage in Vanuatu. The northern member was Tropical Storm Bavi. Bavi was not as intense as Pam, but it had a very large wind field, particularly on its north side, where a long fetch of gales generated large swell. The wind and swell of Bavi caused an estimated $400,000 in damage on islets of the Kwajalein atoll, particularly on Ebeye where high surf caused damaging inundation and gales damaged structures with weaker tin roofs and plywood walls. At the missile test range on Kwajalein, there was 10.65 inches of rain during the 3-day passage of Bavi, with an extreme of 6.35 inches on the 10th of March. A peak wind gust to 51 mph was recorded on the 11th. The lowest sea level pressure during the event of 997.2 mb was the 3rd lowest pressure recorded at Kwajalein, with only two other tropical cyclones bringing lower pressure: Roy (1988) and Zelda (1991) with minimum SLP of 991.5 and 990.1, respectively. At other locations in the RMI, Bavi's large waves coupled with high-tide caused flooding across the expansive Majuro Atoll. A yacht struck a reef within the atoll due to the rough seas, though no injuries resulted. Gusty winds and heavy rain impacted much of the Marshall Islands.

The monthly mean sea level in Majuro continued to fall rapidly in the last couple of months. Currently, it is slightly elevated, but indicates a 3 inches fall with respect to JFM of 2015. The monthly mean sea level in Kwajalein continued to fall. Currently it is marginally below normal. This indicates a further 2 inches fall with respect to AMJ of 2014.

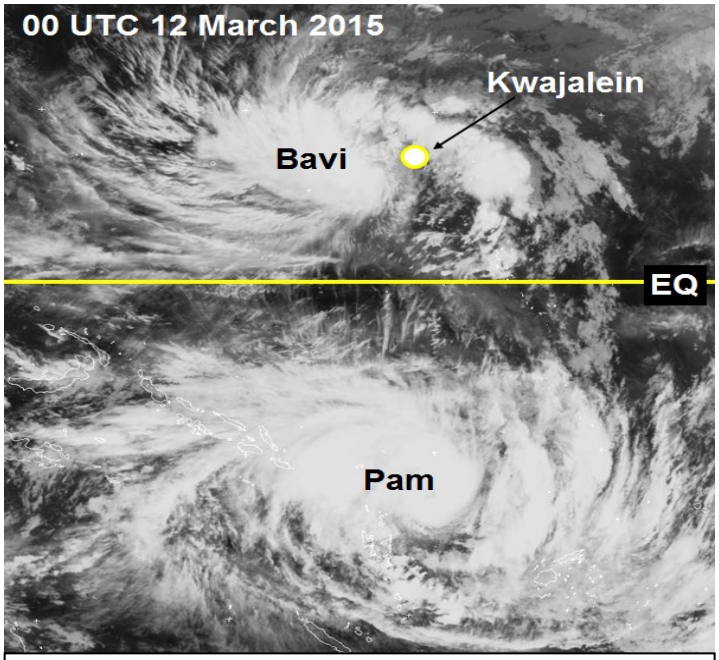


Figure 9. High-contrast infrared satellite image of twin cyclones Bavi and Pam.

LOCAL SUMMARY AND FORECAST

RMI Rainfall Summary: 2015 1st Qtr						
Station		**Jan**	**Feb**	**Mar**	**Apr**	**1st Qtr**
RMI Central and Southern Atolls						
Majuro WSO	**Inches**	**8.24**	**4.32**	**21.65**	**15.23**	**34.21**
	% Avg	**98%**	**70%**	**261%**	**148%**	**150%**
Mili	**Inches**	**9.55**	**4.50***	**17.08**	**N/A**	**31.13**
	% Avg*	**113%**	**73%**	**206%**		**136%**
Aling-laplap	**Inches**	**4.52**	**3.90**	**7.70**	**10.28**	**16.12**
	% Avg*	**70%**	**83%**	**124%**	**115%**	**93%**
Arno	**Inches**	**3.80**	**4.13**	**32.60**	**13.69**	**40.53**
	% Avg*	**45%**	**67%**	**394%**	**133%**	**177%**
RMI Northern Atolls						
Kwajalein	**Inches**	**2.33**	**3.94**	**23.37**	**16.94**	**29.64**
	% Avg	**51%**	**122%**	**570%**	**224%**	**249%**
Wotje	**Inches**	**0.12**	**1.51**	**24.68**	**6.69**	**26.31**
	% Avg	**3%**	**52%**	**633%**	**93%**	**236%**
Utirik	**Inches**	**0.32**	**0.57**	**4.76**	**19.89**	**5.65**
	% Avg	**8%**	**21%**	**136%**	**310%**	**56%**

* Estimated

Climate Outlook: EL Niño has large effects on the climate of the RMI. Rainfall, sea level and the typhoon distribution are substantially altered. Assuming 2015 to be an El Niño year of moderate to strong intensity, fairly reliable long-term outlooks for the climate can be made. Rainfall during El Niño is greater than average during the first half of the year. After September, the monthly rainfall begins a steady decline, sinking to well below average in during the first few months of the year following El Niño (see Fig.10). Tropical cyclone activity in the RMI is almost exclusively restricted to El Niño (EN) years, with the highest risk occurring at two critical times: Feb-Mar-Apr-May of the EN year and then Nov-Dec of the EN year into January of the year following EN. The formation and passage of TS Bavi through the RMI in March 2015 is a case in point. The northernmost atolls of the RMI are most at risk of severe drought in early 2016 Lastly, the sea level forecasts for the next seasons (AMJ, MJJ, and JJA) indicate close to normal sea level; when compared to the forecasts of first quarter 2014, this is about a 2-3 inch fall.

Predicted rainfall for Palau from April 2015 through March 2016 is:

Inclusive Period	**% of long-term average / Forecast rainfall (inches) [1]**		
	South of 6ºN	**6ºN to 8ºN**	**North of 8ºN**
April – June 2015 (Onset of Rains)	**140%**	**140%**	**150%**
July – Sept 2015 (Rainy Season)	**120%**	**120%**	**120%**
Oct – Dec 2015 (Start of Dry Season)	**90%**	**90%**	**85%**
Jan – March 2016 (Dry Season)	**70%**	**50%**	**50%**

[1] Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

SEASONAL RAINFALL OUTLOOK FOR THE US-AFFILIATED PACFIC ISLANDS

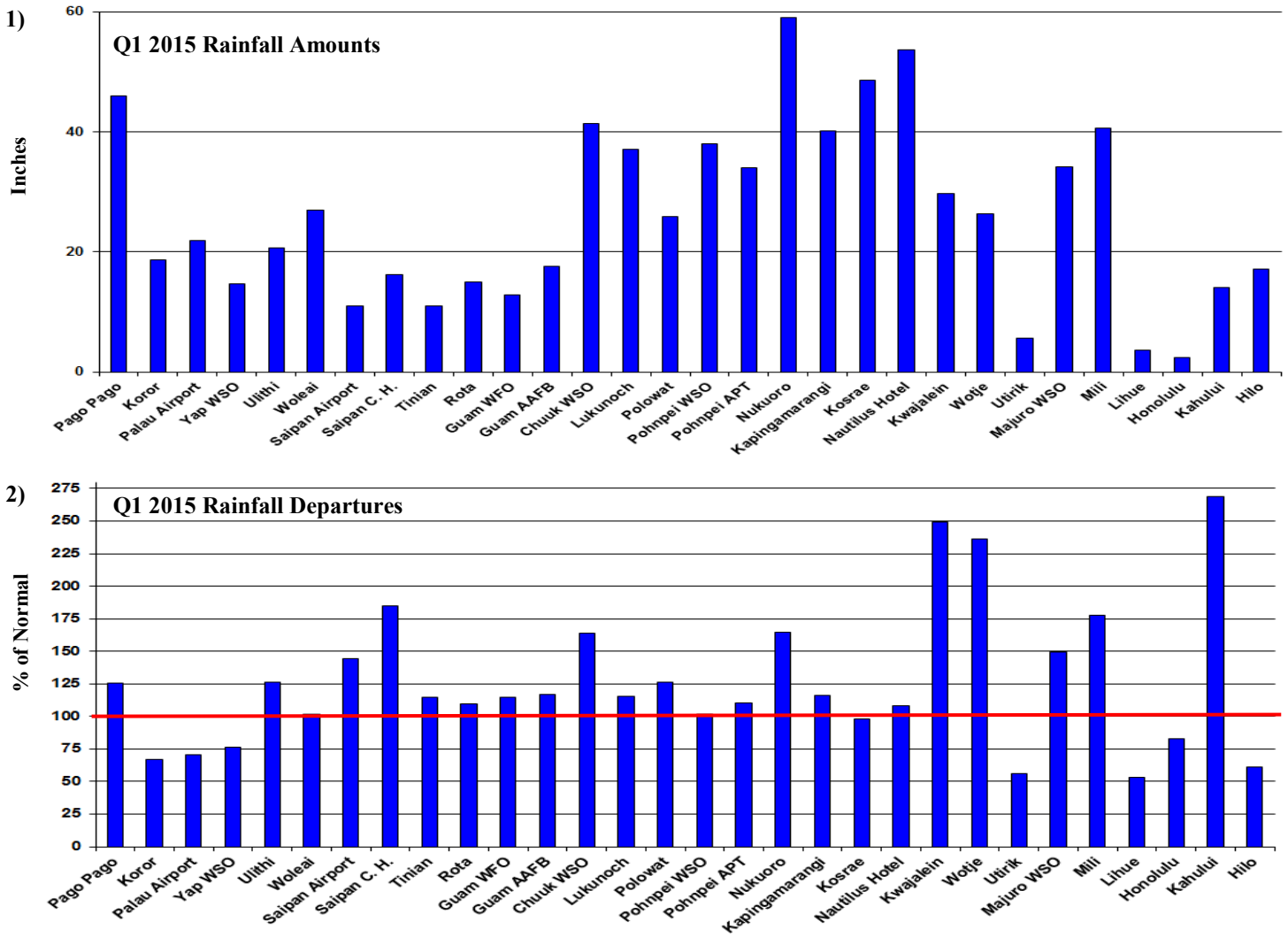


Figure 1 and 2, 2015 First Quarter Percent of Average rainfall amounts in inches at the indicated locations and rainfall departure from average (in percent) at the indicated locations.

ACKNOWLEDGEMENTS AND FURTHER INFORMATION

Pacific ENSO Applications Climate (PEAC) Center:
HIG #340, 2525 Correa Road, Honolulu, Hawai'i 96822
LTJG G. Carl Noblitt IV, Pacific Region Climate Officer, at 808-956-2324: for information on PEAC, the Pacific ENSO Update and ENSO-related climate data for the Pacific Islands.
Dr. Rashed Chowdhury, Principal Research Scientist, at 808-956-2324: for information on ENSO and sea level variability in the USAPI.
Alejandro Ludert, Graduate Research Assistant and Webmaster, at 808-956-2324 for: information related to the PEAC website.

University of Hawai'i - Joint Institute of Marine and Atmospheric Research (JIMAR), School of Ocean and Earth Science and Technology (SOEST), Department of Oceanography:
MSB #317, 1000 Pope Road, Honolulu, Hawai'i 96822
Dr. Mark Merrifield, PEAC Principal Investigator at 808-956-6161: for more information on sea level and climate in Hawai'i.

NOAA National Weather Service
Weather Forecast Office (WFO) Honolulu:
HIG #250, 2525 Correa Rd., Honolulu, HI, 96822
Tom Evans, PEAC Director, at 808-973-5270: for information related to NWS.

NOAA National Weather Service
Weather Forecast Office (WFO) Guam:
3232 Hueneme Road, Barrigada, Guam, 96913
Chip Guard, Warning Coordination Meteorologist, at 671-472-0900: for information on tropical cyclones and climate in the USAPI.

University of Guam - Water and Environmental Research Institute (WERI):
UOG Station, Mangilao, Guam 96913
Dr. Mark Lander, PEAC Meteorologist, at 671-735-2685 for: information on tropical cyclones and climate in the USAPI.

The Pacific ENSO Update is a bulletin of the Pacific El Niño-Southern Oscillation (ENSO) Applications Climate (PEAC) Center. PEAC conducts research & produces information products on climate variability related to the ENSO climate cycle in the U.S. Affiliated Pacific Islands (USAPI). This bulletin is intended to supply information for the benefit of those involved in such climate-sensitive sectors as civil defense, resource management, and developmental planning in the various jurisdictions of the USAPI.

The Pacific ENSO Update is produced quarterly both online and in hard copy, with additional special reports on important changes in ENSO conditions as needed. For more information about this issue please contact the editor, LTJG G. Carl Noblitt IV, at peac@noaa.gov or at the address listed below.

PEAC is part of the Weather Forecast Office (WFO) Honolulu's mission and roles/responsibilities. All oversight and direction for PEAC is provided by the Weather Forecast Office Honolulu in collaboration with the Joint Institute for Marine and Atmospheric Research (JIMAR) at the University of Hawaii. Publication of the Pacific ENSO Update is supported by the National Oceanic and Atmospheric Administration (NOAA), National Weather Service-Pacific Region Climate Services. The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA, any of its sub-agencies, or cooperating organizations.