PACIFIC ENSO UPDATE

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

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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

During 2014, large month-to-month differences in rainfall were observed at many locations in the U.S.-Affiliated Pacific Islands (US-API), with all islands following a similar general temporal distribution of wet and dry months (Fig. 1, Right Column). Wetter than average rainfall (and in some cases, much wetter than average rainfall) was observed at most islands during January through April. This was consistent with an anticipated onset of El Niño. Then, May and June were particularly dry. Following these two dry months, a see-saw of wet and dry months commenced, with a widespread pattern of a very wet July, a dry August, and a wet September/early October followed by moderate dryness again in the last two months of the year. Likewise, concurrent large fluctuations were observed in tropical cyclone activity in the western North Pacific (see the Tropical Cyclone Discussion). The 2014 Annual rainfall was above normal at a majority of reporting locations, with only Woleai Atoll in Yap State reporting less than 75% of annual average rainfall (see Figs. 2A and 2B– Page 12).

Sea level fell dramatically across most of Micronesia during 2014, from higher than average stands early in the year, to values that were near normal by the latter months of the year. In fact, the sea level residuals in the Micronesian region of the western North Pacific during October (and continuing to present) are at their lowest value for the past decade (Fig. 3, Right Column). The behavior of the sea level across all of Micronesia was typical for a weak to moderate El Niño event. See the discussion of sea level for more details.

Six typhoons formed within the boundaries of Micronesia during 2014. All of these passed within a few hundred miles of Guam, Saipan, Yap and/or Palau at some point in their lives. The eyewall of Typhoon Vongfong passed over Rota on the night of 05 October, with only minor damage reported. Both Guam and Hawaii had more close passages of tropical cyclones during 2014 than in any year over the past decade.

Many of the weather patterns occurring in the USAPI during 2014, as discussed above, typically occur during El Niño, while a few other aspects of the tropical Pacific, such as surface winds, rainfall and the distribution of the equatorial SST were not strongly indicative of El Niño. The index of El Niño that is used by the CPC hovered near or just below the critical +0.5 C anomaly threshold in the Niño 3.4 region. Other ENSO indexes such as the Multivariate ENSO Index (MEI), and some international meteorological agencies, indicated that El Niño conditions (albeit weak) occurred during 2014. Here summarized is a sample opinion from the *World Meteorological Organization (WMO)* (04 December 2014).

"Steady warming of the tropical Pacific Ocean over the past two months has resulted in ocean surface temperatures reaching weak El Niño levels. However, the overlying atmosphere is showing a mix of responses, with some indicators exceeding El Nino thresholds, while others remain neutral. … Some El Nino-like impacts have already been observed in several countries, and impacts in other areas may develop regardless of whether an El Nino becomes fully established. …"

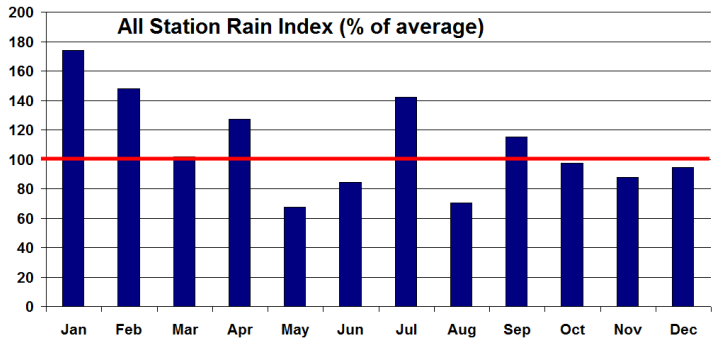


Figure 1. A composite index of the 2014 annual rainfall (% of average) for 58 stations (all of Micronesia, and including American Samoa).

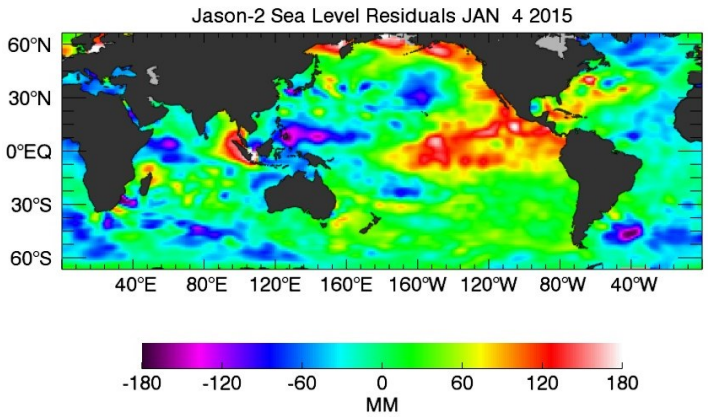


Figure 3. This image was created with data collected by the U.S./European OSTM/Jason-2 satellite during a 10-day period centered on January 04, 2015. It shows a red and yellow area in the central and eastern equatorial Pacific, indicating that the ocean surface is about 4 to 6 inches (10 to 12 centimeters) above normal. Green indicates near-normal conditions. These regions contrast with the western equatorial Pacific, where sea levels (blue and purple areas) are 3 to 6 inches (8 to 15 centimeters) lower than normal (red arrow).

SEA SURFACE TEMPERATURES

For the past Quarter (November, December, and January), ENSO-neutral conditions persisted under an El Niño Watch Status. Overall, across the Pacific representative conditions of El Niño were present however, the atmospheric and oceanic coupling never evolved. Although decreasing, above-average SSTs remained across the equatorial Pacific; except for Niño Region 1+2 which dropped to 0.0 in January. The subsurface heat content warmed slightly, then decreased in response to an upwelling equatorial oceanic Kelvin wave. Low-level winds remained average with the occasional westerly wind anomalies. Upper-level winds prevailed in the central and eastern tropical Pacific. The combined atmospheric and oceanic state remained ENSO-neutral for the fist quarter of 2015.

SOUTHERN OSCILLATION INDEX

The 3-month average of the Southern Oscillation Index for the 1st Quarter of 2015 including November, December, and January remained negative at –1.3. The respective monthly values were –1.5, -0.9, and –1.4. Consecutive periods of negative SOI values and warm ocean waters across the eastern tropical Pacific are indicative of El Niño.

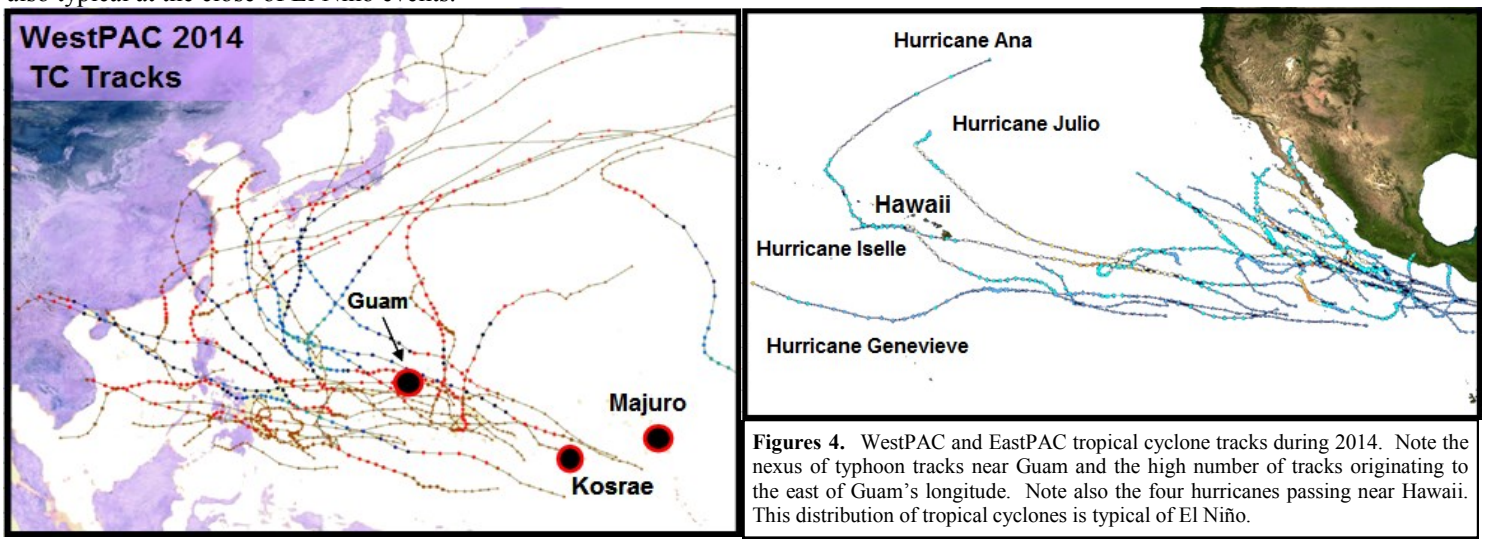
Normally, positive SOI values in excess of +1.0 are associated with La Niña conditions, and negative SOI values below -1.0 are associated with El Niño conditions. Low SOI values suggest a weak coupling between the ocean and the atmosphere. The SOI is an index representing the normalized sea level pressure 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 statistics (e.g., storm maximum intensity) for a given tropical cyclone among the agencies that are noted in this summary.

Tropical Cyclone Summary

During the calendar year 2014, the JTWC numbered 23 significant tropical cyclones. Twenty one of these were named by the JMA. The JMA named an additional tropical storm (Mitag) that JTWC declared to be sub-tropical, and thus, did not provide warnings. Eleven cyclones became typhoons as per JTWC estimates. An additional cyclone (Hurricane/Super Typhoon Genevieve (07E) moved into the western North Pacific after a long track across the eastern and central North Pacific. Several tropical cyclones formed within Micronesia and a nexus of tracks is clustered near Chuuk, Guam and the CNMI (see Fig. 4). Four of the basin's TCs formed near or east of Kosrae. Such eastward displacement of TC formation is typical during El Niño. An abundance of early season tropical cyclones as was seen during 2014 is also a typical response to El Niño onset in the western North Pacific. The typhoon season of 2014 was extended into January 2015 with the formation of Typhoon Mekkhala near the equator (3.5° N) south of Chuuk. January typhoons are also typical at the close of El Niño events.



Figures 4. WestPAC and EastPAC tropical cyclone tracks during 2014. Note the nexus of typhoon tracks near Guam and the high number of tracks originating to the east of Guam's longitude. Note also the four hurricanes passing near Hawaii. This distribution of tropical cyclones is typical of El Niño.

The annual count of 23 tropical cyclones numbered by the JTWC during 2014 was 8 below the average of 31. The annual count of 21 tropical storms and typhoons was 7 below average, and the annual count of only 12 typhoons was 6 below normal. These low numbers make 2014 one of the quietest years of the historical record (Figures 6 and 7). The low basin number of tropical cyclones during 2014 continues a general drop-off of tropical cyclone activity seen since the middle of the 1990s. Additional highlights of the 2014 typhoon season include:

(1) a remarkable temporal clustering of cyclone activity, with 5 of the year's typhoons occurring during July through early August, then a long quiet period with no further typhoon occurrence until Kalmaegi became a typhoon near the Philippines in mid-September; and, (2) another late-season (early December) low-latitude super typhoon (Hagupit) that behaved remarkably similar to super typhoons Bopha (2012) and Haiyan (2013).

The eastern and central North Pacific had a bumper crop of tropical cyclones during 2014. The NHC (Miami) named 20 storms

TROPICAL CYCLONE ACTIVITY

(four above average), with an additional two named by the CPHC (Honolulu). Four hurricanes affected the Hawaiian island chain: Iselle, Julio, Genevieve, and Ana. Iselle made landfall on the Big Island of Hawaii during the early morning of 08 August. Hurricane Ana passed just offshore to the south of the Hawaiian Island chain during 18-21 October, with heavy rainfall the most notable effect. iño events.

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. It is still too early for there to be forecasts available for 2015 western North Pacific cyclone activity.

American Samoa is now in the heart of its hurricane season. To date, only one named cyclone (Cyclone Niko – 07P) has formed anywhere in the South Pacific. Cyclone Niko formed well east of American Samoa and tracked through the islands of French Polynesia. Ahead of the 2014-2015 South Pacific cyclone season, RSMC Nadi, TCWC Wellington, the Australian Bureau of Meteorology (BoM), the New Zealand National Institute of Water and Atmospheric Research (NIWA) and various other Pacific Meteorological services, all contributed towards the Island Climate Update (ICU) tropical cyclone outlook that was released during October 2014. They predicted that the South Pacific region as a whole (142.5°E to 120°W) would likely have near average cyclone activity, but that the eastern portion of the South Pacific between 165°E and 120°W would experience above average cyclone activity (with a 55% chance of it being above average). The forecast was consistent with the expectation of an El Niño event.

The PEAC has no basis at this time to provide a seasonal outlook for the upcoming 2015 western North Pacific typhoon season. Based on available guidance from the ICU and the anticipation of the continuation of borderline El Niño conditions for another month or two, the PEAC concurs with the ICU outlook for an elevated risk of a tropical cyclone in American Samoa. See the American Samoa local summary for more details.

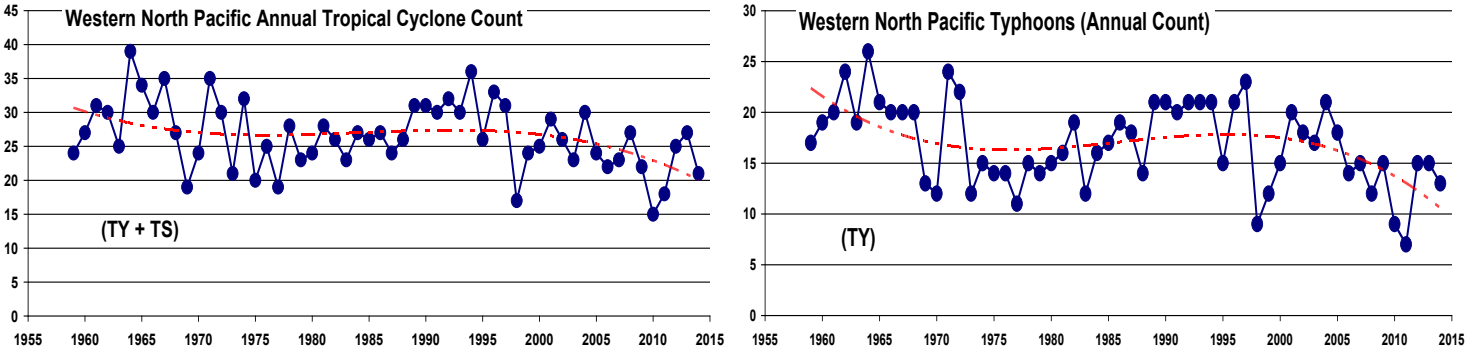


Figure 5A (left) and Figure **5B** (right) show a time series of the annual count of tropical storms and typhoons (TS + TY), and a time series of the annual count of only typhoons (TY). Data is based on the JTWC historical archive. A third-order polynomial was fit to each time series to highlight the long-term trends, in particular, the recent drop-off of TC activity (dashed (red) line).

Hawaii

Hawaii was affected by an above-average number of tropical cyclones during 2014. This was foreseen by Hawaii forecasters. Higher-than normal cyclone activity in the central Pacific region has two sources: (1) hurricanes moving into the central Pacific region from the eastern North Pacific, and (2) enhanced formation in the region itself. Both these factors were in-play during 2014. Such a distribution of tropical cyclones is common during El Niño.

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 January-February-March (JFM), February-March-April (FMA), and March-April-May (MAM) of 2015, (ii) JFM return values at 20 and 100-yr period, (iii) the observed monthly mean and maximum sea-level anomalies for the previous season OND 2014, 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 JFM, FMA, and MAM 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 OND of 2014, the resulting CCA model has been used to forecast the sea level of three consecutive seasons: JFM, FMA, and MAM (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 .

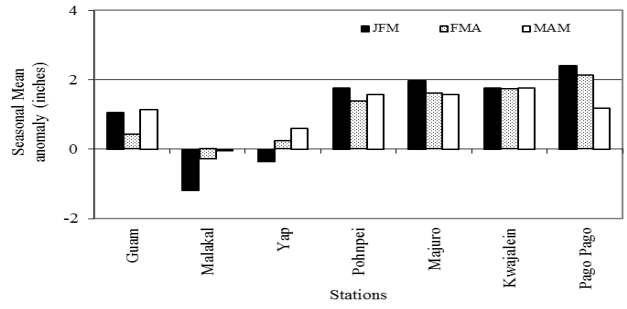
The current sea level forecasts indicate that most of north Pacific stations are likely to be normal (normal and average are synonymously used throughout the sea level section) in the forthcoming JFM, FMA, and MAM seasons. Palau, Yap, and Chuuk are

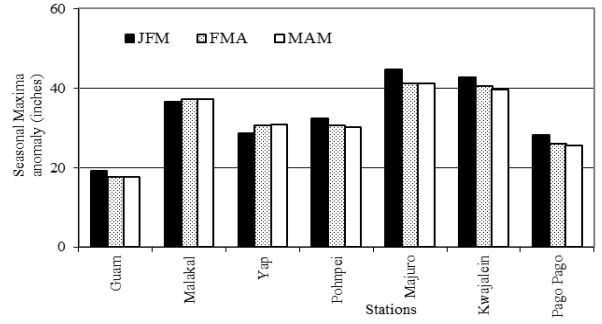
SEASONAL SEA LEVEL OUTLOOK FOR THE US-AFFILIATED PACFIC ISLANDS

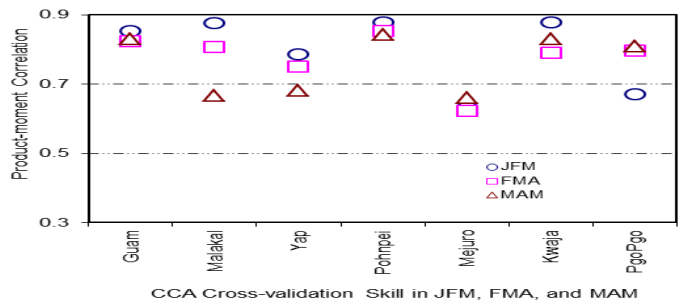
expected to be marginally below (-1 inches) while Pohnpei, Majuro, and Kwajalein are expected to be slightly higher (+ 2 inches) than normal. In Hawaii, both Honolulu and Hilo are likely to be slightly elevated, but still close to normal. This trend is very supportive to the on-going ENSO neutral state; several features across the tropical Pacific are characteristic of borderline El Niño conditions or ENSO -neutral condition. So, any major variations of sea level are unexpected in the forthcoming seasons (JFM, FMA, and MAM). However, while the current forecasts show a very nominal decline when compared to the previous quarter, it is still very significant fall (3 to 4

Table 1: Forecasts of sea level anomalies in inches (JFM, FMA, and MAM)

	Seasonal Mean Deviations [1]				Seasonal Max Deviations [2]					
Tide Gauge Station	JFM	FMA	MAM	Forecast Probability	JFM	FMA	MAM	Forecast Probability	JFM: Return Period[4]	
Lead Time [5]	*0M*	*1M*	*2M*	Outlook[3]	*0*	*1M*	*2M*	Outlook[3]	20- YR	100-YR
Marianas, Guam	+1	+1	+1	Average	+19	+18	+18	Average	5.6	6.7
Malakal, Palau	-1	-1	0	Average	+37	+37	+37	Average	9.6	14.3
Yap, FSM	-1	0	0	Average	+28	+30	+30	Average	16.7	33.0
Chuuk, FSM**	-1	0	0	Average	+28	+30	+30	Average	n/a	n/a
Pohnpei, FSM	+2	+2	+2	Marginal Above	+32	+31	+32	Average - Above	5.8	7.1
Majuro, RMI	+2	+2	+2	Marginal Above	+45	+41	+41	**Above**	4.1	5.1
Kwajalein, RMI	+2	+2	+2	Marginal Above	+43	+41	+40	Marginal Above	4.5	5.9
Pago Pago, Am. Samoa	+2	+2	+2	Average ***	+28	+26	+26	Marginal Above	3.9	5.4
Honolulu, Hawaii	+1	+1	+1	Average	+21	+20	+20	Average - Above	4.1	5.9
Hilo, Hawaii	+2	+1	+1	Average	+26	+24	+24	Marginal Above	7.9	11.4







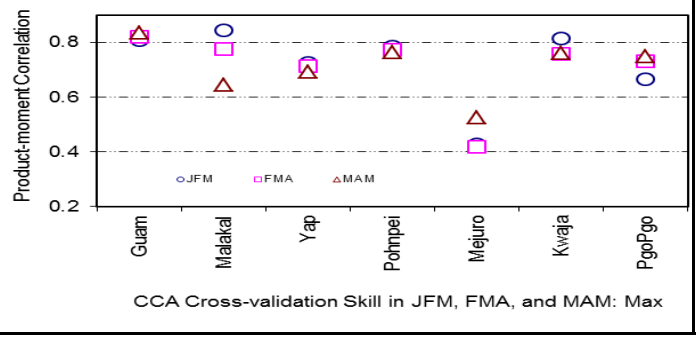


Table 1 and Supporting Statistics: : (-) indicate negative anomalies (fall of sea level from the mean), and (+) indicate positive anomalies (rise of sea level from the mean), n/a: data not available. Anomalies from -1 to +1 inches are considered negligible and anomalies from -2 to +2 inches are unlikely 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.

SEASONAL SEA LEVEL OUTLOOK FOR THE US-AFFILIATED PACFIC ISLANDS

Observed Monthly Mean Sea Level Anomalies (with respect to climatology) for OND 2014

The monthly time series (October to December) 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.

The monthly time series (July to September) 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. As compared to previous months, the monthly mean sea level in September recorded fall in some stations while others remained stable. Only Pago Pago and Guam recorded a rise again. A comparative perspective of seasonal sea level variability of Palau is given in (Fig. 4). Sea level fall in 2014 is clearly visible; it is quite significant when compared to 2013 and the average values of 2004-2013. However, 1997 values were much lower than the current state of sea level in Palau. All stations, except Kapingamarangi and Pago Pago, are either normal or very close to normal (+/- 1inch). Honolulu and Hilo are also stable, but slightly elevated. The monthly maximum values remained static for most of the stations**.** The recent falling trend of sea level is very supportive to the on-going El Nino state. Normally sea level is lower than normal during an El Nino year.

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

Tide Gauge Station	Monthly Mean Deviations[1]				Monthly Max Deviations[2]			
	July	Aug	Sept	Standard Deviations	July	Aug	Sept	Sea level Trend
Marianas, Guam	-1	+1.4	**	4.1	+14	+18	+20	3.6
Malakal, Palau	-1.4	0	+1.5	4.3	+36	+36	+37	4.4
Yap, FSM	-1.6	+0.4	+3.5	4.6	+25	+25	+54	5.1
Chuuk, FSM*	**	**	**	**	**	**	**	**
Pohnpei, FSM	**	**	**	4.7	+27	+31	**	4.9
Majuro, RMI	+1.7	-1	***	3.5	+42	+39	**	3.7
Kwajalein, RMI	+1.5	-1	-1	3.6	+39	+36	+39	3.8
Pago Pago, American Samoa	+10*	+8.7*	+7.9*	3.1	+35	+32	+31	3.3
Honolulu, Hawaii	+3.4	+1	+1	1.7	+20	+20	+21	2.5
Hilo, Hawaii	+2	+2.5	0	1.8	+22	+27	+25	2.2

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.

As compared to October and November, the monthly mean sea level in December remained stable in most of the stations. However, Palau, Yap, and Kapingamarangi recorded slight rise. Currently, Kwajalein is marginally below normal (- 1 inch). Honolulu and Hilo are also normal. The monthly maximum values registered rise for most of the stations. The rise in Yap is quite significant. The recent static trend of sea level is very supportive to the on-going weak El Nino /or ENSO-neutral state. Normally sea level is lower than normal during an El Nino year, higher than normal in a La Niña year, and normal or close to normal (with +/- 2 inches variations) in any ENSO-neutral year. Most of the islands recorded a considerable fall (3 to 6 inches) when compared to the sea level of OND 2013. 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 Niña type trend". Currently all stations are close to normal (+/- 2 inches variation) which is a "neutral or slightly El Niño type trend".

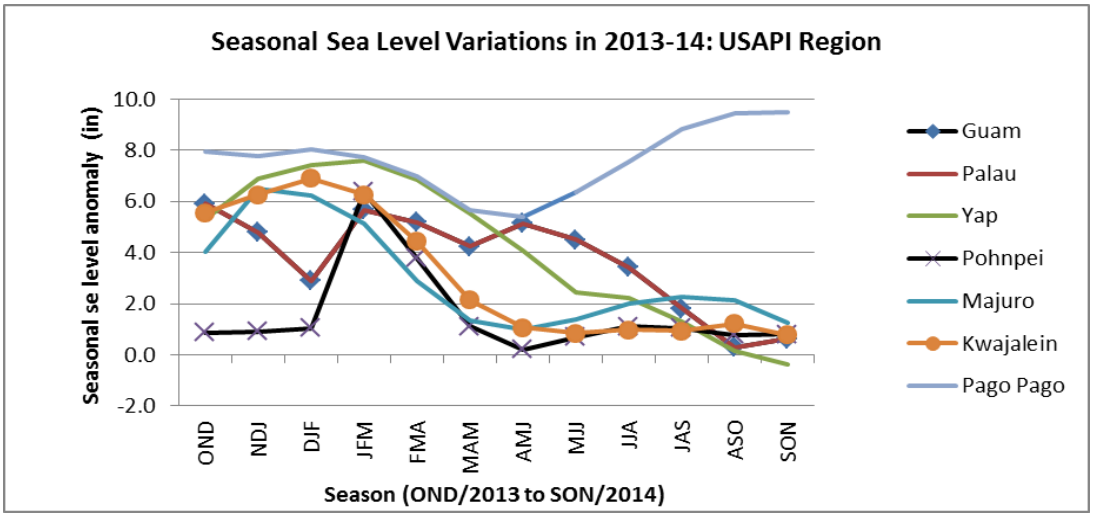


Figure 6. A comparative perspective of Island-wise seasonal sea level variations (OND 2013 to SON 2014)

LOCAL SUMMARY AND FORECAST

American Samoa: There was high variability in the monthly rainfall at American Samoa during 2014. There were three months with over 18 inches of rainfall (January, July and December) and two months with less than 4 inches of rainfall (August, September and October). A major weather story of 2014 was an extreme rainfall event at the end of July (in the heart of the normal dry season) that caused damaging floods and landslides. Subsequent dry conditions over the following three months produced brown grass, but no problems with water supply were reported. Four inches of rainfall during a month is a typical threshold in the USAPI below which desiccation of lawns, road-side vegetation and some forest trees becomes widespread. Abundant rainfall returned to American Samoa during November and December and alleviated any concerns over persistent dryness. Sea level remained relatively high, but it has been noted that the measurements from the tide gauge at American Samoa have read a few inches too high since the station elevation was affected by the strong earthquake in September 2009 As a result, the Pago Pago data needs to be adjusted with respect to the new datum. In order to generate a seal level outlook for Pago Pago, we are subjectively deducting 3 inches from the tide-gauge values received from the UHSLC. Since January 2014, the monthly mean sea level in Pago Pago remained above normal and in May it was reading + 4.5 inch above normal. Currently, it is +7.9 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: 2014 4th Quarter and Annual.

Station		Oct	Nov	Dec	4th Qtr	Annual
Pago Pago (WSO)	Inches	2.68	13.76	18.13	34.57	127.36
	% Avg	25%	127%	125%	96%	105%

Climate Outlook: American Samoa is now in the heart of its 2014-2015 rainy season. Climate models favor average to above average rainfall over the next 3-month period. Factors leading to a wet November and December of 2014 are still in-play, including strong incursions of the Australian Northwest Monsoon into the area. American Samoa lies in an area of the Pacific where the relationship between rainfall and ENSO is complex, with few consistent relationships that can be used to make a reliable long-range forecast. Rainfall in American Samoa is closely tied to the location of the South Pacific Convergence Zone (SPCZ), which is itself, difficult to predict for long periods of time. Only during the mature phase of a strong El Niño does American Samoa typically experience a prolonged period of well-below average rainfall extending a month or two on either side of March. In the absence of strong El Niño, an extended period of dry weather is not anticipated for the foreseeable future at American Samoa, and is so-indicated in the rainfall outlooks below.

It is arguable that the climate system is now transitioning from borderline El Niño to ENSO-neutral. This scenario is anticipated to allow the Northwest Monsoon and its accompanying tropical cyclone activity to episodically push eastward to American Samoa and beyond, even into French Polynesia, over the next few months. For this reason, there is,

LOCAL SUMMARY AND FORECAST

through April 2015, a higher than average risk of a tropical cyclone adversely affecting the islands or regional waters from American Samoa into French Polynesia. Forecasts for the next three seasons in sea level indicate close to normal .

Predicted rainfall for American Samoa from January 2015 through December 2015 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]
January - March 2015 (Heart of Rainy Season)	110% (41.04 - Pago Pago)
April - June 2015 (Onset of Next Dry Season)	100%
July - September 2015 (Heart of Next Dry Season)	95%
October - December 2015 (Onset of Next Rainy Season)	95%

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

Guam/CNMI: The year 2014 was wet at Guam and in the CNMI, with the 2014 total annual rainfall near or over 120% of average at most recording sites. The 2014 annual total of 114.83 inches at AAFB was the wettest annual total since 2004, and was the 11th wettest year in AAFB's 62-year time series. This places the annual rainfall during 2014 within the top quintile for that station. The 2014 annual total of 99.36 inches at the Saipan International Airport (SIA) was also the wettest annual total since 2004, and was the 6th wettest year in SIA's 61 -year time series. This places the annual rainfall during 2014 at the threshold of the top decile for that station. The wet conditions during 2014 were largely a result of several passages of tropical cyclones through the region. Some notable high 24-hour rainfall events include 8.27 inches at Saipan International Airport on 25 September, 11.66 inches at the Guam International Airport during 29-30 July, and 6.93 inches at AAFB Guam on 05 October. Each of these high rainfall events occurred during the nearby passages of tropical cyclones.

The close passage just to the north of Rota of Typhoon Vongfong on the night and early morning of 04-05 October was the most serious of the 2014 tropical cyclone threats to Guam and the CNMI. Minor damage to vegetation was noted on both Guam and Saipan, with a bit heavier damage to trees and property occurring on Rota where the eye passage was closest. High surf from the year's crop of tropical cyclones markedly eroded and reshaped the beaches on some of the coastal areas on the west side of Guam. December 2014 was dry throughout the region, but during January 2015, abundant rainfall returned. The passage to the southwest of Guam during the period 12-14 January 2015 of Tropical Storm Mekkhala was associated with a period of heavy rain showers on Guam. Other heavy rain shower episodes were associated with the passage of shear lines. Early in 2014, the PEAC successfully forecast the overall abundant rainfall, the high month-to-month variability of the rainfall, the enhanced tropical cyclone activity and the drop in sea level that would be experienced on Guam and in the CNMI during the rest of the year. The PEAC also correctly anticipated the formation of a tropical cyclone during January 2015 that would track through the region.

LOCAL SUMMARY AND FORECAST

Since January 2014, unlike other north Pacific stations, the monthly mean sea level in Guam is rather steady and staying above normal. This station remained above normal up to June (+5.9 in). It started to fall from July and fell approximately 6 inches when compared to the values in OND of 2014.

Guam and CNMI Rainfall Summary: 2014 4th Quarter and Annual.

Station		Oct	Nov	Dec	4th Qtr	Annual
GUAM						
GIA (WFO)	Inches	18.77	5.51	3.87	28.15	115.49
	% Avg	156%	67%	72%	110%	127%
AAFB	Inches	18.29	4.88	5.03	28.20	114.83
	% Avg	142%	54%	84%	101%	117%
Southern Mountains	Inches	24.31	6.52	5.57	36.40	117.13
	% Avg	189%	72%	93%	130%	119%
CNMI						
Capitol Hill	Inches	13.39	11.47	2.69	27.55	106.91
	% Avg	112%	157%	56%	114%	128%
Saipan Intl. Airport	Inches	11.15	14.87	1.81	27.83	99.36
	% Avg	103%	256%	47%	136%	134%
Tinian Airport	Inches	10.95	10.30	2.21	23.46	92.56
	% Avg	91%	141%	46%	97%	111%
Rota Airport	Inches	14.10	7.81	5.35	27.26	98.72
	% Avg	111%	90%	94%	101%	104%

Climate Outlook: Although the status and the near-term evolution of ENSO are still somewhat uncertain, it is thought that the likeliest scenario would be a retreat of the climate system from at least borderline El Niño to ENSO-neutral during the first three months of 2015. Normally after an El Niño event, there is a 3 to 6-month period of dryness on Guam and in the CNMI. This dryness is usually deeper and longer-lasting after a moderate or strong El Niño. With January already known to be relatively wet on Guam, near normal rainfall during February and March would not offset the January wetness, so the 1st Quarter of 2015 should end-up above normal at that site. During April through June there may be some dryness region-wide in response to the shift of the climate system away from El Niño. High month-to-month variability in the rainfall is certainly possible. Forecast predictions are for normal sea level for the next three seasons.

Predicted rainfall for the Mariana Islands from January 2015 through December 2015 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]	
	Guam/Rota	Saipan/Tinian
January – March 2015 (First Half of Dry Season)	120% (13.4in)	110% (8.52in)
April – June 2015 (Second Half of Dry Season)	90%	85%

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Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]	
	Guam/Rota	Saipan/Tinian
July - September 2015 (Heart of Rainy Season)	100%	95%
October - December 2015 (Transition to Rainy Season)	100%	100%

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

Federated States of Micronesia

Yap State: Yap Island and Ulithi Atoll to its northeast had above-normal annual rainfall totals. Woleai Atoll, located to the southeast of Yap Island, was much drier, with below average rainfall reported during 10 of the 12 months of 2014. Very large month-to-month variation in rainfall was observed throughout 2014, with a distribution similar to that seen at other locations within Micronesia: a very wet January; some dry months in the spring; a wet July; and a dry August followed by a wet September. The year 2014 ended with high rainfall (15-20 inches) across the several recording sites on Yap Island. Much of the monthly variation of rainfall in Yap State occurred in association with the notable clustering of tropical cyclone activity in the western Pacific Basin.

A recent weather highlight for Yap State was the passage of three tropical cyclones through regional waters late in the typhoon season: two cyclones (Hagupit and Jangmi) during December 2014; and one cyclone (Mekkhala) during mid-January 2015. During the local evening of 03 December 2014, Typhoon Hagupit (TC22W) passed about 60 miles to the south of Yap Island, and near or over Ngulu Atoll. Yap Island had minor wind damage,only a few fallen trees and torn leaves, twigs, coconuts, and coconut fronds littered the roads as the 100 kt typhoon passed by to the south, with a peak observed wind gust of 56 mph at the Yap International Airport. Minor sea inundation was experienced as surging water tossed debris onto low-lying roads, and inundation reached knee-depth on near-shore roadways in some villages. Further south, Ngulu Atoll had a direct hit. There were reports there of significant damage, but no deaths or injuries among the six people on-island at the time. On Ulithi, to the northeast of Yap Island, many banana and breadfruit trees were damaged or blown down. On the day of Christmas Eve 2014, the tropical depression that would later become tropical storm Jangmi (TC23W) passed to the south of Yap Island and caused only a period of unremarkable rain showers and typical gusty winds in the showers. During the night of 14 January 2014, Tropical Storm Mekkhala passed approximately 60 miles to the north of Yap Island, and less than 30 miles to the south of Ulithi. The peak wind gust on Yap Island was 36 mph accompanied by about 0.5 inch of rainfall. TS Mekkhala was highly asymmetric at this time, with most of its rain on the north side. It is thus not surprising that the reported rainfall at Ulithi during this time was over 4 inches.

The monthly mean sea level in Yap displayed a considerable fall in the last couple of months. It was below normal in October and November; currently it is slightly elevated.

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Yap State Rainfall Summary: 2014 4th Quarter and Annual.						
Station		Oct	Nov	Dec	4th Qtr	Annual
Yap State						
Yap WSO	Inches	9.34	7.40	16.77	33.51	135.79
	% Norm	78%	82%	187%	112%	113%
Ulithi	Inches	12.69	10.25	6.39	29.33	114.36
	% Norm	125%	133%	84%	115%	112%
Woleai	Inches	8.40	4.31	7.09	19.80	83.99
	% Norm	62%	40%	62%	55%	60%

Climate Outlook: With the state of the climate now hovering near the threshold of El Niño, and likely moving into ENSO-neutral over the next few months, we anticipate near normal rainfall throughout Yap State for the foreseeable future. There could be a month or two of unusual dryness during any of the months March through June, but no prolonged severe dry conditions are expected. Forecasts for the next three seasons indicate slightly below or near normal sea level.

Predicted rainfall for Yap State from January 2015 through December 2015 is:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]	
	Woleai	Yap & Ulithi
January – March 20145 (Heart of Dry Season)	90% (23.83in)	100% (18.83in)
April – June 2015 (End of Dry Season)	85%	90%
July – September 2015 (Heart of Next Rainy Season)	90%	100%
October – December 2015 (End of Next Rainy Season)	90%	100%

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

Chuuk State: The 2014 annual rainfall was above average throughout most of Chuuk State. Abundant rainfall during the first 9 months of the year more than made-up for a dry 4th Quarter. As observed elsewhere in Micronesia, there was very high month-to-month variability in the rainfall across Chuuk State. September 2014 was particularly rainy and windy as several tropical cyclones were spawned in the monsoon trough in the vicinity of Chuuk State. On several occasions, heavy rains produced minor road flooding, impeding traffic flow. An extreme daily rainfall of 5.96 inches occurred at the Chuuk WSO on 21 September, and another extreme daily rainfall of nearly 6 inches occurred there during the 2nd week of January 2015 as Typhoon Mekkhala was forming. During the first week of December 2014, a tropical disturbance brought heavy rains to the south portion of the State, which is reflected by the 16.30 inches of rain at Ta Atoll in the southern Mortlock Islands during December.

On its way through Chuuk State on 01 December 2014, the developing Typhoon Hagupit passed close to Ta Atoll with serious damage reported. On 11 December, Arthur Atin, Mayor

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of Ta Municipality, wrote a letter to Chuuk's Governor Johnson Elimo to inform him of the storm damage on 01 December, and to request the assistance of the State for the more than 300 residents of the atoll. The letter lists the following adverse effects of the storm:

(1) Waves crossed the island at the runway, depositing coral, trees and other objects that damaged the runway before washing to the lagoon side of the island; (2) Salt water and strong winds damaged and removed some houses on the island; (3) Most taro patches were severely damaged by salt water inundation; (4) Strong winds and waves damaged other staple crops such as banana, breadfruit trees, and other edible crops; and, (5) The Ta Elementary School campus and buildings were flooded, with damage to school books and other school supplies.

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.

Chuuk State Rainfall Summary: 2014 4th Quarter and Annual.						
Station		Oct	Non	Dec	4th Qtr	Annual
Chuuk Lagoon						
Chuuk WSO	Inches	13.78	6.99	6.46	27.23	162.02
	% Avg	103%	68%	60%	79%	121%
Southern Mortlocks						
Ta	Inches	9.09	7.89	16.30	33.28	146.03
	% Avg	88%	72%	127%	97%	102%
Northern Mortlocks						
Nama	Inches	12.01	4.57	5.93	22.51	132.95
	% Avg	89%	44%	55%	65%	99%
Northern Atolls						
Ounoun	Inches	8.92	9.32	6.86	25.10	153.86
	% Avg	66%	90%	63%	73%	115%
Western Atolls						
Polowat	Inches	9.05	4.04	5.40	18.49	84.88
	% Avg	75%	44%	59%	61%	70%
	XmACIS	96%	44%	59%	61%	70%

Climate Outlook: Westerly winds and heavy rainfall will continue episodically through February or mid-March near and along the equator to the south and east of Chuuk State. This is in response to an active and extended Australian northwest monsoon system occasionally expanding to the Northern Hemisphere side of the equator. Some of this activity may occasionally affect the southern portions of Chuuk State, the southern Mortlocks). Unless some unforeseen factors set-up the climate for El Niño in 2015, the rainfall should fall back to average or slightly below average across Chuuk State, with the greatest chance of below average rainfall in the north of the State (e.g., the Hall Islands). The PEAC correctly foresaw the elevated risk for at least one named tropical cyclone moving

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through the region through January 2015. The past decade has seen a reduction of typhoons across all of Micronesia, and this trend could be a factor that lowers the risk of a damaging tropical cyclone in Chuuk State during 2015. At this early date, there are now no other obvious indicators that would allow us to make a reliable prediction of tropical cyclone activity during 2015.

Predicted rainfall for Chuuk State for January 2015 through December 2015:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]			
	Chuuk Lagoon, and Nama	Polowat	Northern Atolls	Mortlocks
Jan – Mar 2015	110% (28.35in)	95% (24.48in)	100% (25.76in)	120% (30.92in)
Apr – Jun 2015	100%	85%	90%	100%
Jul – Sep 2015	95%	85%	95%	100%
Oct – Dec 2015	100%	90%	100%	100%

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

Pohnpei State: The annual rainfall throughout most of Pohnpei State was above average during 2014, with particularly heavy rainfall during the 4th Quarter and with greatest departures above average on atolls located closest to the equator, Nukuoro and Kapingamarangi. This distribution of rainfall would be expected during an El Niño year, and is itself another piece of evidence in favor of identifying 2014 as an El Niño year. The monthly rainfall was much more evenly distributed at some locations in Pohnpei State than elsewhere in Micronesia. For example, 9 of the 12 months of 2014 were within plus-or-minus 2 inches of 16 inches at the WSO in Kolonia. Annual rainfall across Pohnpei Island was average (~100%) at the WSO and at Palikir (not shown). Relative dryness persisted at Pingelap, in stark contrast to the abundant rainfall elsewhere. This is certainly plausible in a region where concentrated rainfall of convective origin is the norm. Several notable thunderstorms occurred on Pohnpei Island during the 4th Quarter. One in October was witnessed by the visiting UOG PEAC researcher (spectacular lightning!), and another two were reported during December. An extreme 24-hour rainfall of 5.08 inches was recorded at the WSO on 23 December. Two weather-related deaths occurred on Pohnpei Island during 2014: one person was killed by a mudslide triggered by an extreme 24-hour rain event on the 5th of October; and, earlier in the year a fisherman was struck and killed by lightning while fishing from a small boat in the waters off of the reef around Pohnpei Island. Very heavy rains have continued across the southern atolls of Pohnpei State through January 2015, with near average amounts elsewhere (another behavior in the plus column for El Niño).

The monthly mean sea level in Pohnpei displayed a rapid fall in the last couple of months. While the sea level anomaly in January was +8.2 inches above normal, it represents a 6 inch fall when compared to OND or 2014.

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Pohnpei State Rainfall Summary: 2014 4th Quarter and 2014 Annual

Station		Oct	Nov	Dec	4th Qtr	Annual
Pohnpei Island						
Pohnpei WSO	Inches	15.32	15.97	16.67	47.96	189.03
	% Norm	92%	101%	110%	101%	100%
Atolls of Pohnpei State						
Nukuoro	Inches	15.03	16.40	13.14	44.57	173.91
	% Norm	140%	137%	110%	128%	116%
Pingelap	Inches	6.13	12.27	6.81	25.21	96.65
	% Norm	41%	86%	51%	59%	54%
	xmACIS	49%	94%	53%	66%	63%
Kapinga-marangi	Inches	10.64	13.02	11.37	35.03	124.46
	% Norm	221%	159%	130%	161%	113%

Climate Outlook: With warm SST along the equator to the south and east of Pohnpei State, the mature El Niño-like rainfall distribution should continue for the next three months; that is: near average for Pohnpei Island, and above average for Nukuoro and Kapingamarangi. Thereafter, a forecast of equal chances for below-, near-, or above-average rainfall is an acceptable default. In any case, a call for near-average rainfall on Pohnpei Island during the spring (AMJ) with a concurrent relaxation to near or slightly above-average rainfall at the southern atolls. There are no strong climate signals present at this time to make a reliable forecast of the tropical cyclone distribution for 2015. Forecasts for the next three seasons indicate slightly above or near normal sea level for Pohnpei.

Predicted rainfall for Pohnpei State from January 2015 through December 2015 is:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]	
	Pohnpei Island and Atolls	Kapingamarangi
Jan - Mar 2015	110% (37.32in)	125% (61.78in)
Apr - Jun 2015	95%	105%
Jul - Sep 2015	100%	100%
Oct - Dec 2015	100%	100%

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

Kosrae State: Annual rainfall was below normal at all Kosrae reporting sites during 2014. Apart from very high monthly rainfall totals during April and July, most of the other 10 months of the year were below normal. The climate and weather at Kosrae was unusual during 2014 in that there was an early appearance of the monsoon during April, which is a typical sign of impending El Niño. Following a retreat of the monsoon during May and June, the monsoonal westerlies returned again during July, bringing abundant rainfall from its associated

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tropical disturbances. During August, there was a prolonged break in the monsoon across most of Micronesia as enhanced rainfall and tropical cyclone development shifted into the central and eastern Pacific. August was an unusually dry month on Kosrae, with only 8.32 inches at the airport. Two tropical cyclones (Phanfone and Vongfong) formed in the Marshall Islands and passed close-by to the north of Kosrae in their developmental stages on the 27th of September and the 2nd of October, respectively. These storm passages were uneventful for Kosrae.

Kosrae State Rainfall Summary: 4th Quarter 2014 and Annual

Station		Oct	Nov	Dec	4th Qtr	Annual
Airport (SAWRS)	Inches	12.51	9.38	13.80	35.69	182.01
	% Avg	77%	59%	95%	77%	88%
Nautilus Hotel *	Inches	10.09	9.18	12.25	31.52	175.28
	% Avg	62%	58%	84%	68%	85%

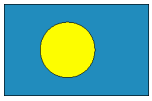
* Percent based on Airport monthly and annual averages.

Climate Outlook: Warm SSTs on the equator to the south of Kosrae will likely keep convection and accompanying heavy rainfall mainly to the south of Kosrae for the next three months. Heavy showers should episodically push northward to Kosrae keeping rain totals at or above average. Thereafter we will forecast a general near to slightly above average rainfall at Kosrae for the spring months of April, May and June. Damaging tropical cyclones at Kosrae occur almost exclusively during El Niño. Unless the climate system moves into El Niño during 2015, a damaging tropical cyclone on Kosrae is unlikely to occur.

Predicted rainfall for Kosrae State from January 2015 through December 2015 is:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]
January – March 2015	110% (54.35in)
April – June 2015	100%
July - September 2015	95%
October - December 2015	95%

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



Republic of Palau: The 2014 annual rainfall amounts recorded at the Koror WSO and at the Palau International Airport (PIA) were near average. Very high rainfall in the months of January, April, July, and September was balanced by low rainfall during the other months to result in the near-average total. For the two stations (WSO and PIA), the total rainfall during the wet months mentioned above, was 52% and 46% of the annual total.

The PIA is usually wetter than the WSO, and the PEAC will soon generate a new set of rainfall averages for this station. It is thought that the location of the PIA on the downwind side of the island with respect to the summer southwest monsoon could account for that station's higher rainfall. This is similar to Guam, where the predominant easterly winds tend to focus showers and thunderstorms just offshore of the central west side of the island. This is true on Pohnpei Island as well, where the rain on the downwind west side is much greater than on the upwind east side. On Pohnpei and on Guam, there is also a rainfall maximum in their central mountains, but it is not known if this is true on the large Palauan island of Babeldaub where the elevations are lower than on the other two islands.

Despite the passage of several tropical cyclones to the north of Palau during 2014, there were no reports of any severe impacts from gusty winds or heavy rain. Typhoon Hagupit passed uncomfortably close to Palau on the morning of 04 December. This was the third major typhoon to threaten Palau in as many years. During late 2013, the Palauan northern atoll of Kayangel was severely damaged by a direct hit of Super Typhoon Haiyan. During the post-Haiyan reconstruction on Kayangel, the Kayangel wind sensor indicated wind gusts of nearly 50 mph during the passage of Hagupit to the north, but the atoll seems to have fared well.

The monthly mean sea level in Malakal displayed a rapid fall in the last couple of months. While the sea level anomaly in January was +7.6 inches above normal, Palau touched the normal value in April. Currently, it is slightly below normal in comparison to the values from OND 2014.

Republic of Palau Rainfall Summary: 4th Quarter 2014 and Annual

Station		Oct	Nov	Dec	4th Qtr	Annual
Koror (WSO)	Inches	7.45	6.12	13.14	26.71	139.54
	% Norm	54%	54%	110%	72%	94%
Intl. Airport	Inches	14.05	7.81	16.34	38.20	150.88
	% Norm	101%	69%	136%	103%	102%

Climate Outlook: Near-average to below-average rainfall is anticipated across the Republic of Palau over the next few months. We anticipate a high likelihood of monthly rainfall less than 6 inches (less than 65% of average) during any one or two of the months in the period February 2015 through May 2015. Severe drought conditions are not foreseen at this time. It is now too early to reliably predict the character of the upcoming typhoon season. Forecasts for the next seasons (JFM, FMA, and MAM) indicate slightly below or near normal sea level (-1 to +1 in) for Palau and, when compared to forecasts from the first quarter 2014, this is about a 3-4 inches fall.

Predicted rainfall for Palau from January 2015 through December 2015 is:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]
January – March 2015	80% (23.71in)
April – June 2015	75%
July – September 2015	95%
October – December 2015	100%

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

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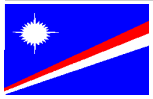


Republic of the Marshall Islands:

Most recording sites among the atolls of the RMI had above-average annual rainfall during 2014. Jaluit and Utirik were the only atolls of the RMI with recording stations that had below-average rainfall during 2014. Heavy rainfall at many RMI atolls during the spring (particularly during April) was one of the factors entering into the decision by the Climate Prediction Center to issue an alert for the possible onset of El Niño by the late summer of 2014. As discussed in the Current Conditions section of this newsletter, the subsequent evolution of the climate system had some very unusual behaviors not typically seen during El Niño, such as the collapse of the monsoon in the western North Pacific during August. This made it difficult to unambiguously declare El Niño, even though many of the climate behaviors, such as the heavy spring rain in the RMI, were typical of El Niño.

Two tropical disturbances formed in the RMI in late September that were the seeds for typhoons Phanfone and Vongfong. On August 7, Hurricane Genevieve crossed the 180° meridian into the western North Pacific basin and intensified to a dangerous Category 5 (> 135 kt) super typhoon. Genevieve tracked at a safe distance from the populated atolls of the RMI. At closest approach it was about 700 n mi to the northeast of Kwajalein/Ebeye and 500 n mi to the northeast of Utirik.

Majuro suffered two serious inundations by the sea during 2014. The first event on 03 March 2014 was one of the worst in recorded history, rivaling the destructive power of the inundation event of December 1979. Arno also was severely affected by the March inundation. The worst conditions of the second inundation event occurred on the 9th of October that saw moderate inundations (estimated at 2 feet) along the south facing shores of Majuro. Areas affected included Delap Point, Batkan Bridge, Jable and Rairok.

RMI Rainfall Summary: 2014 4th Quarter and Annual

Station		Oct	Nov	Dec	4th Qtr	Annual
RMI Central and Southern Atolls						
Majuro WSO	Inches	11.14	10.80	7.68	29.62	145.12
	% Avg	80%	84%	65%	77%	110%
Mili	Inches	20.39	7.12	5.41	32.92	168.54
	% Avg*	136%	66%	163%	124%	128%
Aling-laplap	Inches	12.19	14.23	9.68	36.10	118.25
	% Avg*	95%	121%	97%	104%	101%
Arno	Inches	12.18	14.51	5.05	31.74	144.69
	% Avg*	88%	113%	43%	82%	110%
RMI Northern Atolls						
Kwajalein	Inches	17.17	8.85	4.54	30.56	118.16
	% Avg	144%	83%	56%	100%	116%
Wotje	Inches	5.80	2.67	0.64	9.11	65.93
	% Avg	70%	39%	15%	47%	108%
Utirik	Inches	3.54	6.06	2.68	12.28	51.53
	% Avg	46%	96%	66%	68%	91%

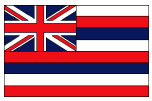
* Station percents based on Majuro WSO averages

Climate Outlook: Climate models indicate a divided rainfall pattern across the RMI for at least the next three months. Atolls in the northern RMI (e.g., Kwajalein, Wotje and Utirik) are predicted to have below average rainfall, while atolls from Majuro and southward are predicted to have above normal rainfall. This is a pattern consistent with a climate state falling away from prior El Niño conditions. The normal progression of El Niño-related rainfall is for wet conditions to persist through October of an El Niño year (arguably 2014, but not with unanimous acclamation), with high month-to-month variability, and then toward the end of the year, dry conditions arrive and persist through the early part of the following year. Indeed, most atolls of the RMI became dry in the 4th Quarter of 2014. The northern-most atolls of the RMI are one of the few locations within Micronesia where the PEAC identifies a high risk for moderate drought conditions and a moderate risk of a more severe drought anytime during the period March through June of 2015. This is reflected in the outlooks below.

Predicted rainfall for the RMI from January 2015 through December 2015 is:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [1]		
	South of 6°N	6°N to 8°N	North of 8°N
Jan – March 2015 (Dry Season)	110% (25.72in)	100% (23.34in)	60% (7.6in)
April – June 2015 (Onset of Rains)	100%	90%	70%
July – Sept 2015 (Rainy Season)	100%	95%	95%
Oct – Dec 2015 (Start of Dry Season)	100%	95%	95%

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



Hawaii: The wet season for the Hawaiian Islands runs from October through April. Above average rainfall occurred in October, followed by a historical high frequqency of flash floods in November. December finished out relatively dry (for December standards).

Hawaii Rainfall Summary: 2014 4th Quarter and Annual

Station		Oct	Nov	Dec	4th Qtr	Annual
Lihue Airport	Inches	2.91	2.20	1.40	6.51	32.08
	%Norm	88%	62%	44%	65%	120%
Honolulu Airport	Inches	5.51	1.43	1.07	8.01	20.82
	%Norm	437%	105%	81%	203%	228%
Kahului Airport	Inches	0.89	1.00	4.24	6.13	22.49
	%Norm	162%	54%	159%	121%	175%
Hilo Airport	Inches	14.96	9.03	6.10	30.09	115.24
	%Norm	174%	79%	60%	100%	107%

Climate Outlook: The U.S. Climate Prediction Center's Seasonal Outlook Discussion, posted on January 15, 2015, can be obtained from the following website: http://www.cpc.ncep.noaa.gov/products/predictions/90day/hw40.html.

SEASONAL RAINFALL OUTLOOK FOR THE US-AFFILIATED PACFIC ISLANDS

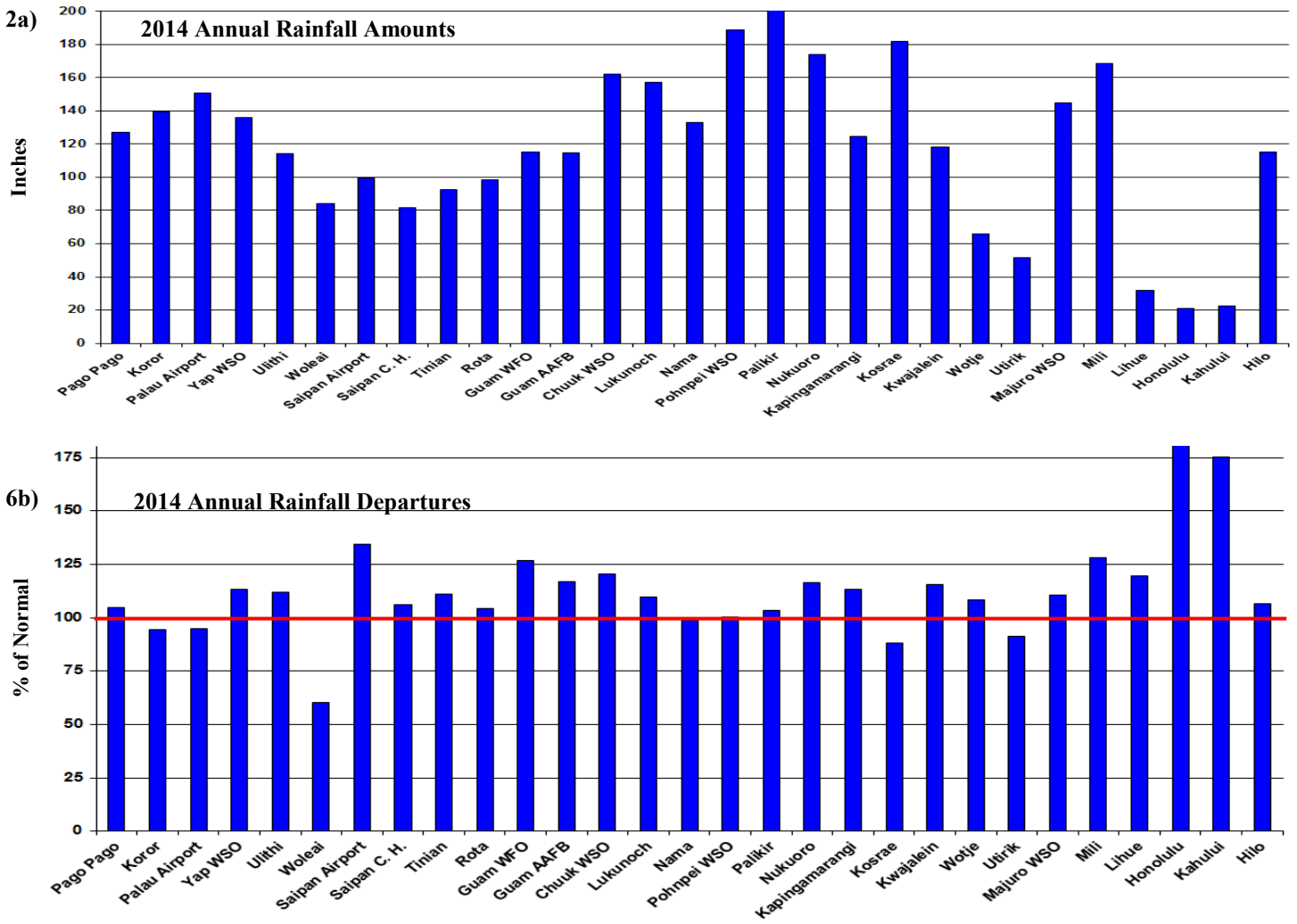


Figure 2a and 2b, 2014 Annual rainfall amounts in inches at the indicated locations and rainfall departure from average (in percent) at the indicated locations.

ACKNOWLEDGEMENTS AND FURTHER INFORMATION

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HIG #340, 2525 Correa Road, Honolulu, Hawai'i 96822
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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.

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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.

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