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A Quarterly Bulletin of the Pacific El Niño/Southern Oscillation Applications Climate (PEAC) Center
Providing Information on Climate Variability for the U.S.-Affiliated Pacific Islands

www.soest.hawaii.edu/MET/Enso

CURRENT CONDITIONS

According to the U.S. Climate Prediction Center (CPC), weak El Niño conditions continued through September in the tropical Pacific. While oceanic and atmospheric indices of El Niño remain weak, they are anticipated to elevate to moderate levels in the next few months. In contrast to the past two years of tranquil weather throughout most of the USAPI, the shift of the climate to El Niño has brought more extreme weather conditions, including typhoon passages, heavy rain events, and high surf to many of the northern hemisphere islands.

During the 3rd Quarter of 2009, there was a mixed-bag of rainfall anomalies across the USAPI, with some islands very wet (e.g., American Samoa, Guam WSO, and Kapingamarangi, with 3-month rainfall in excess of 125% of normal), and some islands were quite dry (e.g., Woleai, Polowat, Wotje, and Utirik, with 3-month rainfall below 80% of normal) (see Fig. 1). Hawaii was also drier than normal at most stations. Hurricane Felicia brought much needed rainfall in August, but not enough to relieve many leeward regions of the continuing drought situation.

The monsoon of the western North Pacific has been active, with several episodes of westerly winds within Micronesia that extended all the way to the RMI. Some tropical cyclones passed through the region, with two serious island strikes: Ngulu (an atoll in Yap State), and Alamagan (a remote high island in the CNMI). Tropical cyclone activity in the central Pacific was also enhanced, which is typical during an El Niño year.

Near normal rainfall is anticipated throughout much of Micronesia during the next three months, thereafter declining to below normal conditions for the first several months of 2010. Typically it becomes drier than normal throughout Micronesia and Hawaii in the winter and spring months (e.g., January to June 2010) that follow an El Niño year (e.g., 2009). Tropical cyclone activity is expected to be enhanced in Micronesia through January of 2010. Additionally, tropical cyclone activity will likely be enhanced in American Samoa beginning in late November and extending through late April of 2010.

Sea-level variation in the USAPI is sensitive to the ENSO-cycle, with low sea level observed during El Niño years and high sea level during La Niña years. Sea levels have been above normal since early 2007. Current forecasts indicate that sea levels will remain slightly elevated at all USAPI stations for another 1 to 3 months, although sea level at all locations should begin receding considerably toward normal. No further rise is expected.

The following comments from the EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION were posted on the U.S. Climate Prediction Center web site on October 8, 2009:

ENSO Alert System Status: El Niño Advisory

<u>Synopsis:</u> El Niño is expected to strengthen and last through the Northern Hemisphere winter 2009-2010.

"A weak El Niño continued during September 2009, as sea-surface temperature (SST) anomalies remained nearly unchanged across much of the equatorial Pacific Ocean. Since the transition to El Niño conditions during June, the weekly values of the Niño-3.4 index have remained between +0.7C and +0.9C. Subsurface oceanic heat content (average temperatures in the upper 300m of the ocean) anomalies continued to reflect a deep layer of anomalous warmth between the ocean surface and the thermocline, particularly in the central and east-central Pacific."

"The pattern of tropical convection also remained consistent with El Niño, with enhanced convection over the west-central Pacific and suppressed convection over Indonesia. In addition, two westerly wind bursts were observed over the western equatorial Pacific, the first occurring early in the month and the second occurring near the end of the month. These oceanic and atmospheric anomalies reflect an ongoing weak El Niño."

"A majority of the model forecasts for the Niño-3.4 SST index suggest that El Niño will reach at least moderate strength during the Northern Hemisphere fall (3-month Niño-3.4 SST index of +1.0C or greater). Many model forecasts even suggest a strong El Niño (3-month Niño-3.4 SST index in excess of +1.5C) during the fall and winter, but in recent months some models, including the NCEP CFS, have over-predicted the degree of warming observed so far in the 3.4 region. Based on the model forecasts, the seasonality of El Niño, and the continuation of westerly wind bursts, El Niño is expected to strengthen and most likely peak at moderate strength."

"Expected El Niño impacts during October-December 2009 include enhanced precipitation over the central tropical Pacific Ocean and a continuation of drier-than-average conditions over Indonesia."

SEA SURFACE TEMPERATURES

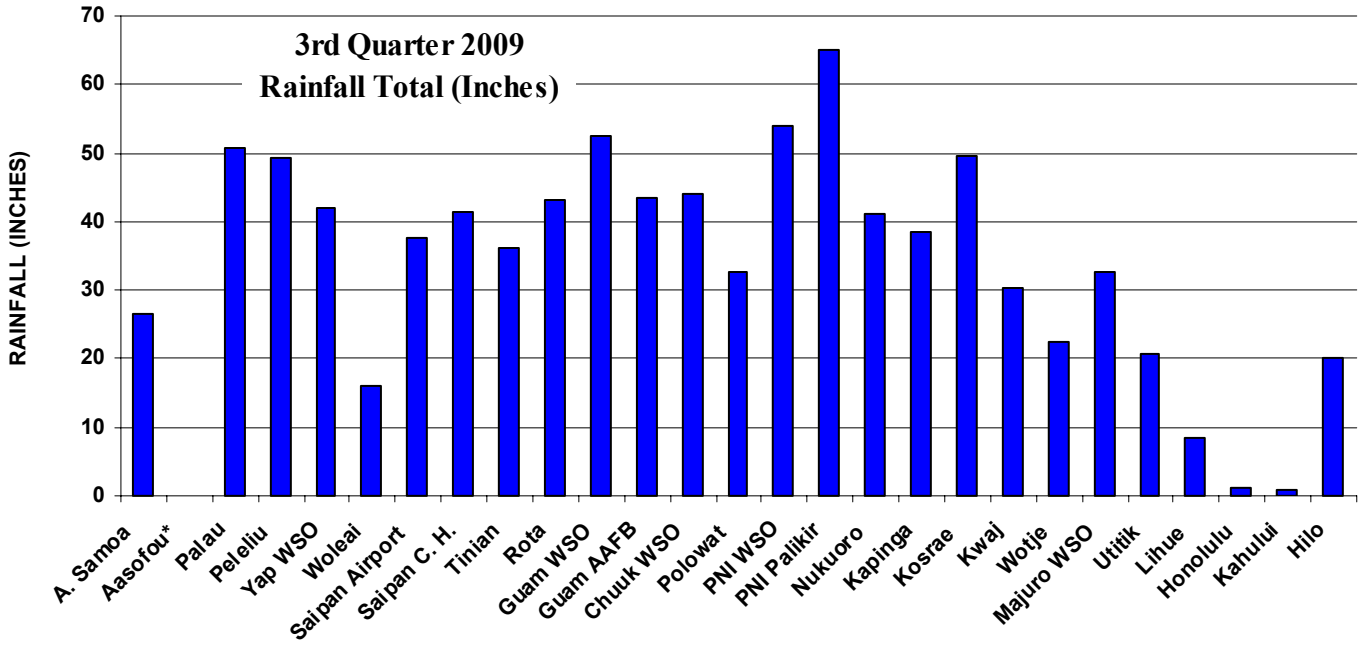
A weak El Niño continued during September 2009, as sea surface temperature (SST) anomalies remained nearly unchanged across much of the equatorial Pacific Ocean. Subsurface oceanic heat content (average temperatures in the upper 300m of the ocean) anomalies continued to reflect a deep layer of anomalous warmth between the ocean surface and the thermocline, particularly in the central and east-central Pacific. The pattern of tropical convection also remained consistent with El Niño, with enhanced convection over the west-central Pacific and suppressed convection over Indonesia. Low-level westerly wind anomalies continued to become better established over parts of the equatorial Pacific Ocean. These oceanic and atmospheric anomalies reflect an ongoing weak El Niño.

SOUTHERN OSCILLATION INDEX

The 3-month average of the Southern Oscillation Index for the 3rd Quarter of 2009 was -0.1, with monthly values of +0.1, -0.7 and +0.3 for the months of July, August and September 2009, respectively. Recent SOI values, which have fluctuated near the long–term average, but are predominantly slightly below normal, are historically consistent with a developing 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, respectively.

1a)



1b)

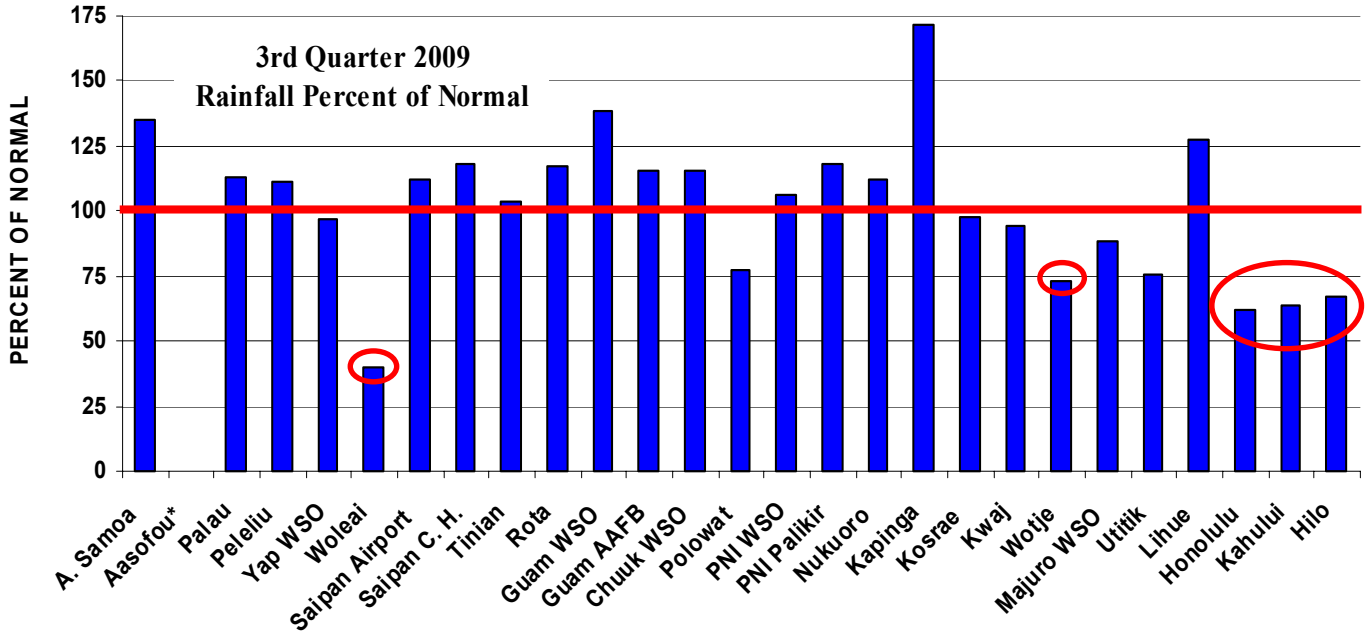


Figure 1: 3rd Quarter 2009 rainfall totals (a) in inches and (b) anomalies (expressed as % of normal). In 1b, solid line indicates normal rainfall (100%) and circles indicate rainfall less than 75% of normal.
* Aasofou 3rd Quarter data not available.

TROPICAL CYCLONE

The PEAC Center 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 United States Air Force and Navy, located at Pearl Harbor, Hawaii. Western North Pacific tropical cyclone names are obtained from warnings issued by the Japan Meteorology 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 pressure, and 10-minute average maximum sustained wind estimates from advisories issued by the Tropical Cyclone Warning Centers (TCWC) at Brisbane, the RSMC Nadi, and the New Zealand Meteorological Center at 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, but JTCW values are given precedence when available.

Tropical Cyclone Summary

In contrast to the near absence of tropical cyclones within Micronesia during 2007 and 2008, there have been several tropical cyclones which have affected the region during 2009. **The tropical cyclone activity in the western North Pacific through October has been typical for an El Niño year; particularly the dramatic eastward expansion of the activity in contrast with the past two years.** Several cyclones have formed to the east of Guam, and increased notable cyclones in the region began as far east as Kosrae. Through mid-October, the JTWC has numbered 22 cyclones in the western North Pacific. This includes 12 typhoons, 9 tropical storms, and 1 tropical depression. Of the 12 typhoons, four were powerful super typhoons. This is roughly on pace with normal values. It is a typical behavior of El Niño for there to be a greater number of the typhoons to become very intense (e.g., the eleven super typhoons of 1997). Additional super typhoons in the western North Pacific through the remainder of 2009 would cause the total count to exceed normal. The central Pacific has also seen enhanced tropical cyclone activity, which is another symptom of a typical of El Niño.

No heavily populated island has yet been severely affected by a typhoon, but some smaller outer islands have had direct strikes by a typhoon. The first of these direct strikes took place on the island of Alamagan, a small remote high island in the CNMI. The second direct strike of a Micronesian island by a typhoon occurred on the atoll of Ngulu in Yap State. See the individual island summaries for more details on the typhoon strikes.

PEAC Center Tropical Cyclone Outlook

The PEAC outlook for tropical cyclones in the western North Pacific basin for the remainder of 2009 (November and December) is for enhanced activity, particularly within Micronesia. The anticipated distribution of tropical cyclones for the remainder of 2009 substantially increases the risk of a damaging tropical storm or typhoon at all islands located eastward of 140ºE. For example, Guam at 145ºE will experience an above-normal risk, and the RMI at 170ºE will have some risk (normally it has almost no risk) of a damaging tropical cyclone. The risk of a damaging tropical cyclone at Yap or Palau (both located to the west of 140ºE) will be close to normal. The upcoming hurricane season for American Samoa is also anticipated to be more active than normal (see island summaries for further details).

The PEAC Center forecast considers input from two seasonal outlooks for tropical cyclone activity in the western North Pacific basin: (1) The City University of Hong Kong Laboratory for Atmospheric Research, under the direction of J. C-L. Chan (http://aposf02.cityu.edu.hk/tc_forecast/2009_forecast_APR.htm), and, (2) The Benfield Hazard Research Centre, University College London, Tropical Storm Risk (TSR) research group, UK, led by Dr Adam Lea and Professor Mark Saunders (http://tsr.mssl.ucl.ac.uk/).

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LOCAL SUMMARY AND FORECAST

American Samoa: The most newsworthy recent natural phenomenon in American Samoa was the deadly tsunami that struck on the morning of September 29. PEAC extends heartfelt condolences to all those who suffered loss in this tragedy. In terms of weather and climate, American Samoa passed through the heart of its dry season with more than normal rainfall (135%).

American Samoa Rainfall Summary 3rd Qtr 2009						
Station		**Jul.**	**Aug.**	**Sep.**	**3rd Qtr**	**Predicted[1]**
Pago Pago WSO	**Inches**	9.96	10.41	6.28	26.65	**18.57**
	% Norm	156%	155%	94%	135%	**95%**
A'asufou	**Inches**	N/A	N/A	N/A	N/A	**N/A**
	% Norm	N/A	N/A	N/A	N/A	**N/A**

[1] Predictions made in 2nd Quarter 2009 newsletter.

Climate Outlook: Computer forecasts and a consensus of outlooks from several regional meteorological centers indicate that rainfall in American Samoa is likely to be slightly above normal for the next few months as the rainy season becomes established.

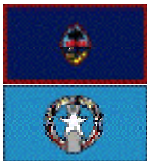
The rainy season and the hurricane season of 2009-2010 in the American Samoa region is about to begin. Anticipated atmospheric circulation anomalies associated with El Niño will favor enhanced tropical cyclone activity in the region of American Samoa. Low level westerly wind anomalies will likely enhance the typical summer excursions of the Australian Northwest Monsoon into areas east of the International Date Line. An active monsoon promotes tropical cyclone activity. In addition to several episodes of gusty northwesterly winds in American Samoa over the course of its upcoming+ rainy season (December 2009 through April 2010), one or two tropical cyclones should pass close enough to the islands to bring offshore gales and high surf. **The threat of a direct strike by a hurricane at some location within American Samoa (on the order of 15-20%), must be taken seriously this coming cyclone season.**

Predicted rainfall from October 2009 through October 2010 is as follows:

Inclusive Period	**% of long-term average / Forecast rainfall (inches) [2]**
Oct - Dec 2009 (Onset of Next Rainy Season)	**120% (41.5 inches - Pago Pago)**
January - March 2010 (Heart of Next Rainy Season)	**120%**
April - May 2010 (Onset of Next Dry Season)	**100%**
June - October 2010 (Heart of Next Dry Season)	**90%**

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

LOCAL SUMMARY AND FORECAST



Guam/CNMI: The 3rd Quarter of 2009 was wetter than normal throughout Guam and the CNMI. August was particularly wet, with recorded rain totals on Guam reaching nearly 30 inches, which was twice the monthly normal. An active monsoon was responsible for several episodes of heavy daily rainfall. Various stations recorded 5-inch rainfall totals on three separate days within the first week of August. During September, the rainfall was also above normal, but not quite as heavy as during August. Several tropical cyclones passed by Guam, but not in close enough proximity to produce any significant winds. Due to wet conditions in July and August, CNMI rainfall was above normal during for the 3rd Quarter. As on Guam, a wet August was responsible for most of the surplus. Typhoon Choi-Wan passed directly over Alamagan on the

Guam and CNMI Rainfall Summary 3rd Qtr 2009						
Station		**Jul.**	**Aug.**	**Sep.**	**3rd Qtr**	**Predicted[1]**
Guam						
GIA (WFO)	**Inches**	10.72	26.14	15.54	52.40	**33.98**
	% Norm	102%	190%	115%	139%	**90%**
AAFB	**Inches**	10.26	21.42	11.76	43.44	**33.98**
	% Norm	94%	160%	88%	115%	**90%**
Dededo (Ypapao)*	**Inches**	13.78	27.33	17.33	58.44	**33.98**
	% AAFB	126%	204%	130%	155%	**90%**
Ugum Watershed **	**Inches**	10.13	23.61	16.49	50.23	**34.0**
	% WSMO	96%	172%	122%	133%	**90%**
Sinajaña ***	**Inches**	13.47	28.90	15.33	57.70	**33.98**
	% WFO	128%	210%	114%	153%	**90%**
CNMI						
Saipan Intl. Airport	**Inches**	10.95	14.64	12.09	37.68	**31.80**
	% Norm	135%	117%	90%	110%	**95%**
Capitol Hill	**Inches**	12.27	18.39	10.72	41.38	**33.39**
	% Norm	136%	147%	79%	118%	**95%**
Tinian Airport	**Inches**	11.05	11.95	13.19	36.19	**33.41**
	% Norm	123%	96%	98%	106%	**95%**
Rota Airport	**Inches**	10.89	17.35	12.70	40.94	**35.21**
	% Norm	104%	132%	95%	111%	**95%**

[1] Predictions made in 2nd Quarter 2009 newsletter.
* % of normal with respect to Andersen AFB.
** % of normal with respect to WSMO Finigayan (now closed), on the northwest side of Guam.
*** % of normal for Sinajaña is with respect to WFO Guam.

LOCAL SUMMARY AND FORECAST

afternoon of 15 September. The island was heavily damaged by the near super typhoon's sustained 125 kt winds which mangled vegetation and totally destroyed the few homes in a small settlement on the northwest coast of the island A news item on the website of the Pacific Disaster Center (link below) shows dramatic pictures of the island after the typhoon.
http://www.pdc.org/PDCNewsWebArticles/2009/AlamaganSupport/alamagan_support.html

On the 3rd of October, another typhoon passed through the CNMI: Typhoon Melor (20W). This typhoon produced storm-force winds on the island of Saipan with some minor wind damage reported (e.g., a few trees uprooted), and accompanied by high surf. Tropical Cyclone Lupit (22 W) passed to the south of Guam on the 15th of October. A squall associated with this cyclone passage caused wind gusts to near 60 mph, but only minor damage to foliage was reported.

Climate Outlook: With El Niño conditions substantially increasing the risk of a damaging typhoon on Guam and in the CNMI, the odds of this type of event are roughly 1-in-4, or 25%, from late October through January 2010. For this time period, Guam and the CNMI face the possibility of two or three tropical cyclones passing within 200 miles.

Rainfall is anticipated to be near normal to slightly below normal for Guam and the CNMI for the remainder of 2009 (unless a typhoon brings an extreme daily rainfall value) and to fall below normal during the first half of 2010. A strong El Niño extends the normal dry season and brings very dry conditions to Guam and the CNMI in the winter and spring of the year that follows; however it is not anticipated that the upcoming dry season will be as dry as during 1983 or 1998. Guam can withstand several months of very dry weather, but CNMI has to go through considerable conservation efforts.

Predicted rainfall for Guam and the Mariana Islands from October 2009 through September 2010 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]	
	Guam/Rota	Saipan/Tinian
Oct – Dec 2009 (End of Rainy Season)	**100% (25.63 Inches)**	**100% (22.06 inches)**
Jan – March 2010 (Onset of Next Dry Season)	**80%**	**70%**
Apr – June 2010 (End of Next Dry Season)	**85%**	**80%**
July - September 2010 (Next Rainy Season)	**90%**	**95%**

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

LOCAL SUMMARY AND FORECAST

Federated States of Micronesia

Yap State: July 2009 was a very wet month throughout most of Yap State. August was quite dry, and then during September an active monsoon accompanied by some tropical disturbances provided abundant rains. Despite abundant rains in July and September, the dry conditions of August resulted in a 3-month total that was slightly below normal at most locations on Yap Island.

On the morning of 30 September, the newly formed Typhoon Parma, made a direct hit on Ngulu Atoll causing some minor damage, but no deaths or injuries. Information obtained by a Yap main-island resident, and passed through Bruce Best at the UOG Telecommunications and Distance Education Office, was received shortly after the typhoon passage: " … *The storm did little damage on Yap [main island] … I spoke with a young man from Ngulu yesterday and he said … they are all O.K. All gathered in the men's house, and all O.K. Two houses were knocked down though. There will be a ship going to Ngulu this afternoon*."

Yap State Rainfall Summary 3rd Qtr 2009						
Station		**Jul.**	**Aug.**	**Sep.**	**3rd Qtr**	**Predicted[1]**
Yap Island						
Yap WSO	**Inches**	17.57	7.76	16.61	41.94	**45.31**
	% Norm	121%	51%	123%	97%	**110%**
Dugor*	**Inches**	19.49	6.51	19.75	45.75	**45.31**
	% WSO	147%	45%	146%	106%[2]	**110%**
Gilman*	**Inches**	19.53	10.53	14.82	44.88	**45.31**
	% WSO	147%	73%	110%	104%[2]	**110%**
Luweech*	**Inches**	17.21	6.73	20.09	44.03	**45.31**
	% WSO	130%	47%	148%	101%[2]	**110%**
Maap*	**Inches**	12.02	5.35	14.79	32.16	**45.31**
	% WSO	91%	37%	109%	74%[2]	**110%**
North Fanif*	**Inches**	14.61	7.11	13.17	34.89	**45.31**
	% WSO	110%	49%	97%	80%[2]	**110%**
Rumung*	**Inches**	14.24	7.28	16.01	37.53	**45.31**
	% WSO	107%	51%	118%	86%[2]	**110%**
Tamil*	**Inches**	15.00	8.13	20.50	43.63	**45.31**
	% WSO	113%	56%	152%	100%[2]	**110%**
Outer Islands						
Ulithi	**Inches**	**m**	**m**	5.03[3]	**N/A**	**45.31**
	% Norm	**%**	**%**	**%**	**N/A**	**110%**
Woleai	**Inches**	7.56	4.08	4.32	15.96	**41.19**
	% Norm	76%	42%	38%	40%	**100%**

1 Predictions made in 2nd Quarter 2009 newsletter.
2 With respect to WSO normal rainfall.
3 New observer starts.

LOCAL SUMMARY AND FORECAST

Climate Outlook: Based on an expected continuation of the current tranquil weather pattern, rainfall should be near normal throughout most of Yap State for the next few months.

There is a slight risk (roughly a 5-10% chance) of a damaging tropical cyclone in Yap State or its northern atolls in November 2009 through January 2010. This risk is near normal.

Yap can be very dry in the first few months that follow El Niño, but severe conditions such as those occurring the first half of 1998 are not anticipated. However, the upcoming dry season will be slightly drier than normal and may extend through June of 2010. **Residents of Yap should start considering precautionary water conservation methods in response to possible dry conditions more severe than anticipated.**

Predicted rainfall for Yap State from October 2009 through September 2010 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]	
	Yap and Ulithi	Woleai
October – December 2009 (End of Rainy Season)	**95% (28.89 inches)**	**90% (32.27 inches)**
January – April 2010 (Next Dry Season)	**85%**	**80%**
May – June 2010 (Onset of Next Rainy Season)	**90%**	**85%**
July – September 2010 (Heart of Next Rainy Season)	**100%**	**95%**

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

Chuuk State: Rainfall was abundant during the 3rd Quarter of 2009, with some large monthly and island variations. The east moving monsoon trough passed north of Pohnpei and Kosrae. In result, westerly winds and tropical disturbances brought some heavy and highly variable rainfall to every island in the Chuuk State. A general pattern of a wet July, a dry August, and a wet September was noted and 3-month rainfall totals ranged from 30 inches to 53 inches.

Chuuk State Rainfall Summary 3rd Qtr 2009						
Station		Jul.	Aug.	Sep.	3rd Qtr	Predicted[1]
Chuuk Lagoon						
Chuuk WSO	**Inches**	16.24	11.18	16.72	44.14	**43.43**
	% Norm	134%	77%	145%	116%	**120%**
Piis Panew*	**Inches**	10.53	9.55	9.92	30.00	**43.43**
	% WSO	87%	76%	86%	79%*	**120%**

[1] Predictions made in 2nd Quarter 2009 newsletter.
* Long term normal is not established for these sites.

LOCAL SUMMARY AND FORECAST

Chuuk State Rainfall Summary 3rd Qtr 2009						
Station		Jul.	Aug.	Sep.	3rd Qtr	Predicted[1]
Southern Mortlocks						
Lukunoch*	**Inches**	19.03	2.92	12.53	34.48	**39.81**
	% WSO	157%	23%	109%	90%*	**110%**
Ettal*	**Inches**	30.02	8.64	13.89	52.55	**39.81**
	% WSO	248%	67%	121%	138%*	**110%**
Ta*	**Inches**	23.98	3.32	15.75	43.05	**39.81**
	% WSO	198%	26%	137%	113%*	**110%**
Namoluk*	**Inches**	17.64	5.49	7.46	30.59	**39.81**
	% WSO	146%	44%	65%	80%*	**110%**
Northern Atolls						
Fananu*	**Inches**	20.89	10.36	11.59	42.84	**39.81**
	% WSO	173%	82%	101%	112%*	**110%**
Onoun*	**Inches**	16.60	16.38	13.07	46.05	**39.81**
	% WSO	137%	130%	114%	121%*	**110%**
Northern Mortlocks						
Losap*	**Inches**	21.14	11.14	14.64	46.92	**43.43**
	% WSO	175%	88%	127%	123%*	**120%**
Nama*	**Inches**	12.89	11.11	13.27	37.27	**43.43**
	% WSO	106%	88%	115%	98%*	**120%**
Western Atolls						
Polowat	**Inches**	15.27	6.55	10.87	32.69	**32.57**
	% WSO	109%	44%	82%	77%	**90%**

[1] Predictions made in 2nd Quarter 2009 newsletter.
* Long term normal is not established for these sites.

Climate Outlook: Drier than normal conditions are expected for the upcoming dry season and could continue through May 2010. Therefore, residents should consider precautionary water conservation methods.

November 2009 through January 2010 brings an enhanced risk (25%) of a tropical cyclone passing through Chuuk. Episodes of heavy rain and gusty westerly winds will continue through December, after which northeast winds and drier conditions should prevail.

Predicted rainfall for Chuuk State from October 2009 through September 2010 are as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]			
	Chuuk Lagoon, Northern Mortlocks	Polowat	Northern Atolls and Islands	Southern Mortlocks
Oct – Dec 2009	**100% (35.55 inches)**	**90% (32.0 in)**	**95% (35.77 in)**	**100% (35.55 in)**
Jan – Mar 2010	**85%**	**80%**	**80%**	**90%**
Apr – June 2010	**90%**	**85%**	**85%**	**90%**
Jul – Sep 2010	**100%**	**100%**	**100%**	**100%**

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

LOCAL SUMMARY AND FORECAST

Pohnpei State: The 3rd Quarter rainfall was abundant everywhere across Pohnpei State, especially during July. The 38.63 inches of rainfall recorded at Palikir (twice the normal July value) was the wettest recorded value anywhere in Micronesia for the 3rd Quarter. The pattern of a very wet July, then a dry August, followed by a wet September was seen in many locations across Micronesia as a manifestation of the monsoon trough and the passage of several tropical disturbances through the region. For example, Kapingamarangi typically enters its 3-month dry season in August and even though August was typical of dry season conditions, a very wet July and abundant rainfall in September pushed the quarterly rainfall up to172% of normal.

Pohnpei State Rainfall Summary 3rd Qtr 2009						
Station		**Jul.**	**Aug.**	**Sep.**	**3rd Qtr**	**Predicted[1]**
Pohnpei Island						
Pohnpei WSO	**Inches**	23.83	13.93	16.18	**53.54**	**48.03**
	% Norm	130%	84%	101%	**106%**	**100%**
Palikir	**Inches**	38.63	8.84	17.50	**64.97**	**50.98**
	% WSO	194%	49%	100%	**117%**	**100%**
Kolonia Airport	**Inches**	19.19	16.46	17.48	**53.13**	**42.88**
	% WSO	127%	121%	132%	**126%**	**100%**
Atolls of Pohnpei State						
Nukuoro	**Inches**	21.10	4.29	15.86	**41.25**	**36.75**
	% Norm	147%	38%	144%	**112%**	**100%**
Pingelap	**Inches**	11.52	6.15	18.86	**36.33**	**45.76**
	% Norm	72%	41%	125%	**79%**	**100%**
Mwoakilloa	**Inches**	16.39	12.74	14.95	**44.08**	**41.38**
	% WSO	108%	93%	113%	**105%**	**100%**
Kapingamarangi	**Inches**	20.17	5.54	12.89	**38.60**	**22.48**
	% Norm	193%	90%	219%	**172%**	**100%**

[1] Predictions made in 2nd Quarter 2009 newsletter.

Climate Outlook: Only the very strongest of El Niño events (e.g., 1982-83 and 1997-98) caused major water problems for Pohnpei. The current El Niño may cause the rainfall to be moderately below normal during January through March, with recovery to normal conditions expected thereafter.

The monsoon trough will episodically extend through the Pohnpei State in the last two months of this year bringing one or two periods of gusty west and southwest wind with rough seas on the western side of the island. These events may accompany the development of tropical disturbances north of Pohnpei Island that may move westward towards Guam and become cyclones. A slight risk (5%) exists for a direct strike of a tropical storm or typhoon of any Pohnpei location.

LOCAL SUMMARY AND FORECAST

Predicted rainfall for Pohnpei State from October 2009 through September 2010 is as follows:

Inclusive Period	**% of long-term average / Forecast rainfall (inches)[2]**	
	Pohnpei Island and atolls	**Kapingamarangi**
Oct - Dec 2009	**95% 45.29 inches)**	**120% (26.11 inches)**
Jan - Mar 2010	**85%**	**100%**
Apr - Jun 2010	**100%**	**100%**
Jul - Sep 2010	**100%**	**100%**

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

Kosrae State: The pattern of a wet July, then a dry August followed by a wetter September was also seen at Kosrae. A particularly dry August drove the 3rd Quarter totals below normal.

Kosrae State Rainfall Summary 3rd Qtr 2009						
Station		**Jul.**	**Aug.**	**Sep.**	**3rd Qtr**	**Predicted[1]**
Airport (SAWRS)	**Inches**	22.74	7.78	18.96	**49.48**	**50.70**
	% Norm	134%	47%	110%	**98%**	**100%**
Utwa*	**Inches**	14.17	4.80	15.54	**34.51**	**50.70**
	% WSO	83%	29%	90%	**68%**	**100%**
Nautilus Hotel*	**Inches**	18.08	8.20	13.36	**39.64**	**50.70**
	% WSO	106%	50%	78%	**78%**	**100%**
Tofol*	**Inches**	N/A	N/A	N/A	N/A	**50.70**
	% WSO	N/A	N/A	N/A	N/A	**100%**

[1] Predictions made in 2nd Quarter 2009 newsletter.
* Long term normal rainfall based on SAWRS site.

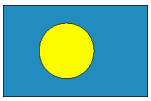
Climate Outlook: The UOG PEAC team (Dr. Mark Lander and Dr. Shahram Khosrowpanah) provided an El Niño outreach visit to Kosrae in early October. El Niño brings the potential for two or three very dry months at the beginning of 2010, and an elevated risk of further episoddes of gusty southwesterly wind in association with tropical disturbances for November and December. A direct strike to Kosrae by a tropical storm or typhoon is very rare, but tropical storms or typhoons passing well north of Kosrae are common in the latter months of an El Niño year. Monthly rainfall could fall moderately below normal for the next 4 to 5 months, then returning to near normal.

Forecast rainfall for Kosrae State from October 2009 through September 2010 is as follows:

Inclusive Period	**% of long-term average / Forecast rainfall (inches)[2]**
October – December 2009	**90% (41.94 inches)**
January – March 2010	**80%**
April – June 2010	**95%**
July - September 2010	**100%**

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

LOCAL SUMMARY AND FORECAST



Republic of Palau: The same general pattern of rainfall (wet July-dry August-wet September) which occurred throughout much of Micronesia also occurred for Palau. The monsoon trough was north of Palau and the winds were westerly for most of the 3rd Quarter. Several tropical cyclones en route to the Philippines passed north of Palau resulting in gusty westerly winds and periods of heavy showers. July was particularly wet, with over 30 inches of rain at the airport and at Nekken. Palikir on Pohnpei was the only other location in Micronesia to record over 30 inches in one month for this quarter.

Republic of Palau Rainfall Summary 3rd Qtr 2009						
Station		**Jul.**	**Aug.**	**Sep.**	**3rd Qtr**	**Predicted[1]**
WSO Koror	**Inches**	28.70	8.22	13.72	**50.64**	**43.11**
	% Norm	159%	55%	116%	**113%**	**100%**
Nekken	**Inches**	30.10	10.07	16.41	**56.58**	**43.11**
	% WSO	177%	70%	141%	**126%***	**100%**
Intl. Airport	**Inches**	34.55	10.04	16.80	**61.39**	**43.11**
	% WSO	203%	69%	144%	**137%***	**100%**
Peleliu	**Inches**	28.00**	5.80	15.63	**49.43**	**43.11**
	% WSO	165%	40%	134%	**110%***	**100%**

1 Predictions made in 2nd Quarter 2009 newsletter.
* Compared to WSO normal values.
** Estimated

Climate Outlook: There is only a slight risk of a damaging tropical cyclone in the Republic of Palau in November or December of 2009. More likely, a typhoon passing near Guam will move to the north or northeast of Palau and bring yet another episode of gusty westerly winds and some heavy showers.

During an El Niño year, Palau is usually the first place in Micronesia to start drying out. The rainfall during the next few months should begin to fall moderately short of normal, but recover by April or May of 2010.

Predicted rainfall for Palau from October 2009 through October 2010 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]
October – December 2009	**95% (35.49 inches)**
January – March 2010	**85%**
April – June 2010	**95%**
July – October 2010	**100%**

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

For more information on Palau's weather and climate go to
http://www.prh.noaa.gov/koror/

LOCAL SUMMARY AND FORECAST

Republic of the Marshall Islands (RMI): The rainfall throughout most of the atolls of the Republic of the Marshall Islands was below normal during the 3rd Quarter of 2009. The 3-month total of 32.36 inches at Majuro WSO, 88% of normal. Kwajalein received 94% of normal rainfall, while Wotje and Utirik were drier with only 73% and 75% of normally recorded values. Only Laura with 20.77 inches of rain received in September had an above normal 3rd Quarter rainfall total. Because we are in the wetter months of the year, the municipal water supply on Majuro remains adequate.

RMI Rainfall Summary 3rd Qtr 2009						
Station		**Jul.**	**Aug.**	**Sep.**	**3rd Qtr**	**Predicted[1]**
RMI Central Atolls (6º N - 8º N)						
Majuro WSO	**Inches**	9.12	8.05	15.19	**32.36**	**36.32**
	% Norm	70%	70%	122%	**88%**	**100%**
Laura*	**Inches**	7.02	8.79	20.77	**40.59**	**36.32**
	% WSO	54%	76%	167%	**110%**	**100%**
Arno*	**Inches**	6.15	9.32	6.39	**21.86**	**36.32**
	% WSO	47%	81%	51%	**59%**	**100%**
Aling-laplap*	**Inches**	8.61	9.25	13.31	**31.17**	**36.32**
	% WSO	73%	85%	110%	**90%**	**100%**
RMI Southern Atolls (South of 6º N)						
Jaluit*	**Inches**	6.34	6.54	13.09	**25.97**	**36.32**
	% WSO	58%	44%	67%	**70%**	**100%**
RMI Northern Atolls (North of 8º N)						
Kwajalein	**Inches**	11.03	8.93	10.47	**30.43**	**30.86**
	% Norm	106%	88%	89%	**94%**	**95%**
Wotje*	**Inches**	11.54	5.10	5.92	**22.56**	**30.86**
	% Norm	116%	53%	53%	**73%**	**95%**
Utirik*	**Inches**	5.88	7.35	7.52	**20.75**	**30.86**
	% Norm	66%	86%	75%	**75%**	**95%**

[1] Predictions made in 2nd Quarter 2009 newsletter.
* Normal values are estimated based on WSO Majuro, Kwajalein and satellite-derived precipitation distribution.

Climate Outlook: The rainy season in the RMI extends through December, with the onset of dry season in January. Below normal rainfall is anticipated through April or May, especially in the northern atolls. Due to concern over these upcoming dry conditions, the UOG PEAC team provided an El Niño visit with Majuro water resource managers, the President of RMI, and the public. PEAC gives special thanks to Meteorologist in Charge, Mr. Reginald (Reggie) White for paving the way for a successful visit.

LOCAL SUMMARY AND FORECAST

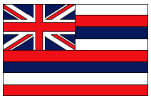
Majuro residents, already living with some degree of water restrictions do not want to hear of future dry conditions; however, they are well-prepared to deal with the conditions.

At the end of some El Niño years, tropical cyclones affect the Marshall Islands (e.g., Typhoon Zelda in December 1991, Typhoon Axel in early January 1992, and Typhoon Paka in December 1997). There is a 10% risk that a tropical cyclone could pass through the RMI from November 2009 through January 2010. For ENSO-neutral years and La Niña years, the tropical cyclone risk is zero in the RMI.

Predicted rainfall for the RMI from October 2009 through September 2010 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]		
	South of 6ºN	6ºN to 8ºN	North of 8ºN
Oct – Dec 2009 (End of Rains)	**95% (36.14 inches)**	**90% (34.23 in)**	**90% (27.13 in)**
Jan – March 2010 (Dry Season)	**90%**	**85%**	**80%**
April – June 2010 (Onset of Rains)	**95%**	**90%**	**90%**
July – Sept 2010 (Rainy Season)	**100%**	**100%**	**95%**

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



Hawaii: Drier than normal conditions continued to worsen the drought situation on every island in the state during the 3rd Quarter. Even though some islands are not currently under a drought classification, they are facing voluntary or mandatory water use restrictions. All islands except Oahu reported at least moderate drought, with severe drought conditions affecting leeward areas of Big Island, Maui, and Molokai, and extreme drought in South Kohala of the Big Island.

The month of July was dry; however, a surface trough moving westward across the state caused minor flooding over the windward slopes Maui and Kauai. Conditions remained dry over leeward areas of the state. In July, the Maui County Board of Water Supply extended its request for cut-backs in water use for Upcountry and Central Maui residents. Dry conditions in the leeward areas of the Big Island caused deterioration of pasture lands and adversely impacted livestock operations.

Hurricane Felicia brought the most significant weather event in August as its remnant circulation moved across the state The abundant low-level moisture helped produce much needed rainfall from Maui to Kauai. Heavy rainfall over windward Oahu on August 13 caused flash flooding in Waikane Stream and a temporary closure of Kamehameha Highway. Enhanced windward rainfall on Kauai

LOCAL SUMMARY AND FORECAST

caused water levels in Hanalei River to rise but not enough to force the closure of Kuhio Highway at the Hanalei Bridge. Unfortunately, no significant amount of rain fell on drought-stricken leeward areas on the Big Island. All islands remained below average in rainfall for the month of August, except for Lihue, Kauai which had 22 days of precipitation. Molokai had a large brush fire this month due to the moderate to severe drought conditions.

Trade winds dominated the weather pattern over and around the State of Hawaii during the month of September and all Hawaii stations received below normal rainfall. As of October 8, water restrictions and conservation notices are in place for all islands.

The presence of El Niño conditions means that probabilities favor below normal precipitation during the 2009-2010 winter season. El Niño conditions may also produce more frequent and larger episodes of high surf, mainly along north and west facing shores, during the winter months.

For up-to-date information about hydrology in Hawaii, please visit:
http://www.prh.noaa.gov/hnl/pages/hydrology.php

State of Hawaii Rainfall Summary 3rd Qtr 2009					
Station		**July**	**Aug.**	**Sep.**	**3rd Qtr**
Lihue Airport	**Inches**	4.40	3.24	0.90	**8.54**
	% Norm	208%	170%	33%	**127%**
Honolulu Airport	**Inches**	0..35	0.55	0.15	**1.05**
	% Norm	70%	120%	20%	**62%**
Kahului Airport	**Inches**	0.10	0.70	0.11	**0.91**
	% Norm	20%	132%	28%	**65%**
Hilo Airport	**Inches**	8.14	4.92	6.94	**20.00**
	% Norm	76%	50%	76%	**67%**

Climate Outlook: The following comments are from the US Climate Prediction Center's Seasonal Outlook Discussion:

"NCEP tools give no indication of either above or below median precipitation for Hawaii for November 2009. NCEP models also predict equal chances for Above-Normal-and Below for temperature for Hawaii for November 2009. NCEP models predict a tendency for below normal temperature for Hawaii from DJF to MAM 2010. **Below median precipitation for Hawaii is expected from DJF to MAM 2010 based on the El Nino composite and NCEP forecast tools."**

For more information on weather and climate in Hawaii go to
http://www.prh.noaa.gov/pr/hnl/
or
www.cpc.noaa.gov/products/predictions/long_range/fxhw40.html

Seasonal Sea-Level Outlook for the US-Affiliated Pacific Islands

The following sections describe: (i) the *Canonical Correlation Analysis* (*CCA*)-based forecasts of sea-level deviations for forthcoming seasons OND, NDJ and DJF 2009-10; (ii) the observed monthly mean and maximum sea-level deviations for the season JAS 2009, and (iii) forecast verifications (observed/forecast values) for the previous season JAS 2009. All units are in inches. *Note that 'deviation' is defined here as 'the observed or forecast difference between the monthly mean [or maximum] and the climatological monthly mean values (from the period 1975- 1995) computed at each station'. Also, note that the forecasting technique adapted here does not account for sea-level deviations created by other atmospheric or geological conditions such as tropical cyclones, storm surges or tsunamis.*

(i) Seasonal Sea-Level Forecast *(deviations with respect to climatology*) **for OND, NDJ and DJF 2009-10** (**Table 1**). See Figure 2 for locations of tide stations.

Table 1: **Forecasts of sea-level deviation (in inches) for Oct-Nov-Dec, Nov-Dec-Jan, and Dec-Jan-Feb 2009-010.**

	Seasonal Mean Deviations [1]				Seasonal Max Deviations [2]					
Tide Gauge Station	**OND**	**NDJ**	**DJF**	**Forecast Quality [3]**	**OND**	**NDJ**	**DJF**	**Forecast Quality [3]**	***Return Period [4] for OND Season***	
Lead Time [5]	*0*	*1M*	*2M*		*0*	*1M*	*2M*		*20 Year*	*100 Year*
Marianas, Guam	0	0	0	Good	**+17**	+16	+16	Good	*6.5*	*9.1*
Malakal, Palau	0	-2	-2	V. Good	**+37**	+35	+34	V. Good	*6.1*	*6.4*
Yap, FSM	0	-2	-1	V. Good	**+27**	+26	+25	V. Good	*8.2*	*11.0*
Chuuk, FSM**	0	0	0	n/a		+29	+28	n/a	*n/a*	*n/a*
Pohnpei, FSM	+1	+1	+1	V. Good	**+32**	+32	+32	V. Good	*9.1*	*11.8*
Kapingamarangi, FSM	+3	+3	+2	Good	**+32**	+31	+31	Fair	*5.7*	*6.4*
Majuro, RMI	+2	+1	+1	Good	**+42**	+42	+43	Good	*6.6*	*8.4*
Kwajalein, RMI	+1	0	0	Good	**+38**	+38	+39	V. Good	*4.9*	*6.1*
Pago Pago, Am. Samoa	+3	+3	+1	Good	**+26**	+27	+27	Good	*3.0*	*3.7*
Honolulu, Hawaii	+3	+2	+2	Fair	**+21.6**	+23	+22	Fair	*3.2*	*5.2*
Hilo, Hawaii	+4	+2	+2	Fair	**+24.4**	+28	+29	Fair	*5.5*	*6.8*

Remarks: The sea-level deviations (Table 1, above) for the OND, NDJ, DJF seasons indicate that sea levels will remain slightly elevated for a number of USAPI stations while most of the USAPI stations will record a fall. No further rise is expected. The forecasted values provide a clear indication of considerable fall in all USAPI stations. The Hawaiian stations, on the other hand, are likely to be elevated (2 to 3 inches) during the same time period. This trend is supportive of a moderate El Niño condition. However, if the strength of El Nino increases, then we might see a more pronounced fall. **PEAC is constantly monitoring the on-going El Niño event and will report the outcome in bulletin format if a need arises.**

Note: (-) indicates negative deviations (fall of sea level from the mean), and (+) indicates positive deviations (rise of sea level from the mean); N/A: data not available. Deviations from -1 to +1 inch are considered negligible (***), and deviations 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.

Seasonal Mean Deviations (1) is defined as the difference between the mean sea level for the given month and the 1975-1995 mean sea-level value at each station. Likewise, **Seasonal Maximum Deviations (2)** is defined as the difference between the maximum sea level (calculated from hourly data) for the given month and the 1975-1995 mean sea-level value at each station.

Forecast Quality (3) is a measure of the expected CCA cross-validation correlation skill. Higher skills correspond to greater expected accuracy of the forecasts. In general terms, these kinds of forecasts are thought to be of useful (but poor) skill if the CCA cross-validation value lies between 0.3~0.4. Skill levels greater than 0.4 and 0.6 are thought to be fair and good skills. Skill level greater than 0.7 is thought to be very good. Refer to **www.soest.hawaii.edu/MET/Enso/peu/2009_4th/Sea_Level.htm** for cross-validation skills.

Return period (RP) (4) of extreme values are calculated from hourly sea-level data. For example, the predicted rise of 6.5 inches at 20-year RP at Marianas, Guam indicates that this station may experience an extreme tide event once every 20 years that could result in sea-level rise of up to 6.5 inches **above the median of seasonal maxima** during the OND season. Likewise, about once every 100 years we can expect the highest OND tide at Marianas, Guam to be as high as 9.1 inches above the median of seasonal maxima. During some seasons some stations display alarmingly high values at the 20 and 100 year RP. *These high values are due to large and significant increases in the tidal range caused by the passage of past storm events during that season.*

Lead time (5) is the time interval between the end of the initial period and the beginning of the forecast period. For example, lead-0, lead-1M, and lead-2M means 'sea level' of target season 0 (OND), 1 (NDJ), and 2 (DJF) month leads based on SSTs of JAS 2009.

Seasonal Sea-Level Outlook for the US-Affiliated Pacific Islands

(ii) Observed Monthly Sea-Level Deviation in July-August-September (JAS) 2009 Season

The monthly time series (July—September) for sea-level deviations have been taken from the UH Sea Level Center. The full time series (in mm) is available at ftp://ilikai.soest.hawaii.edu/islp/slpp.deviations. See **Figure 2** (below) for location of these stations.

Table 2 : Monthly observed max/mean sea level deviations in inches (year to year standard deviation in parentheses)

Tide Gauge Station	Monthly Mean Deviations[1]				Monthly Max Deviations[2]			
	July	Aug.	Sept.	Standard Deviations	July	Aug.	Sept.	Standard Deviations
Marianas, Guam	+8.2	+5.9	+4.7	3.3	+23.8	+21.3	+18.9	3.5
Malakal, Palau	+5.7	+4.3	+5.1	4.1	+39.4	+41.6	+40.4	4.3
Yap, FSM	+4.1	+4.3	+2.7	4.4	+31.6	+32.4	+29.8	4.2
Chuuk, FSM**	*	*	*	(*)	*	*	*	(*)
Pohnpei, FSM	+3.9	*	*	2.8	+33.6	*	*	3.2
Kapingamarangi, FSM	*	*	*	2.4	*	*	*	2.6
Majuro, RMI	+2.0	*	*	2.3	+43.5	*	*	3.1
Kwajalein, RMI	+2.7	+2.0	+1.1	2.2	+40.9	+38.9	+37.2	2.8
Pago Pago, American Samoa	*	*	+4.2	2.8	*	*	+27.2	3.3
Honolulu, Hawaii	+0.7	+2.8	+2.4	1.9	+22.6	+23.2	+17.7	2.4
Hilo, Hawaii	+0.6	+5.1	+1.6	1.8	+26.8	+27.7	+18.8	2.4

Note: - indicate negative deviations (fall from the mean), and + indicate positive deviations (rise from the mean); N/A: data not available; Data for Chuuk (**) is estimated subjectively based on information from WSO Chuuk and observations from neighboring stations. Standard deviations describe how widely spread the values are in the dataset. **See Table 1 for other notes.**

Remarks: The observed values for seasonal mean/maxima displayed positive deviations in all the USAPI and Hawaii stations during the July - August - September 2009 season (based on 1975-95 mean). This trend is consistent with the strengthening effect of El Niño conditions.

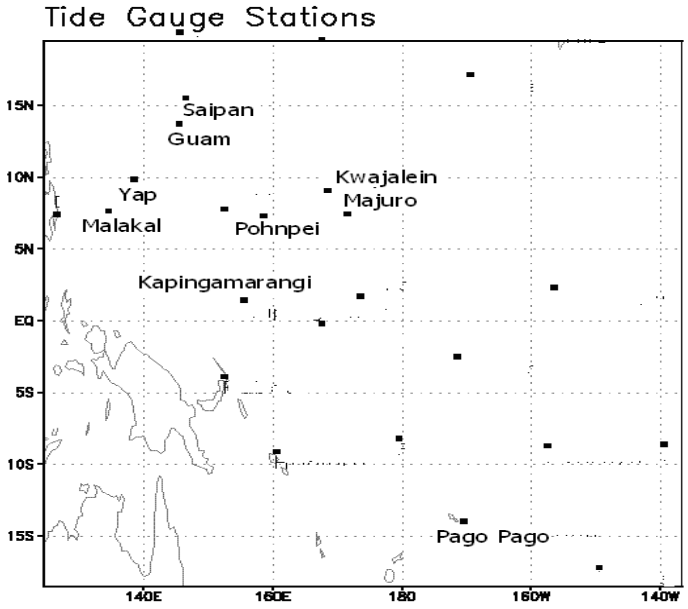


Figure 2: Locations of USAPI tide gauge stations.

(iii) Forecast Verification (Seasonal Mean) for JAS 2009

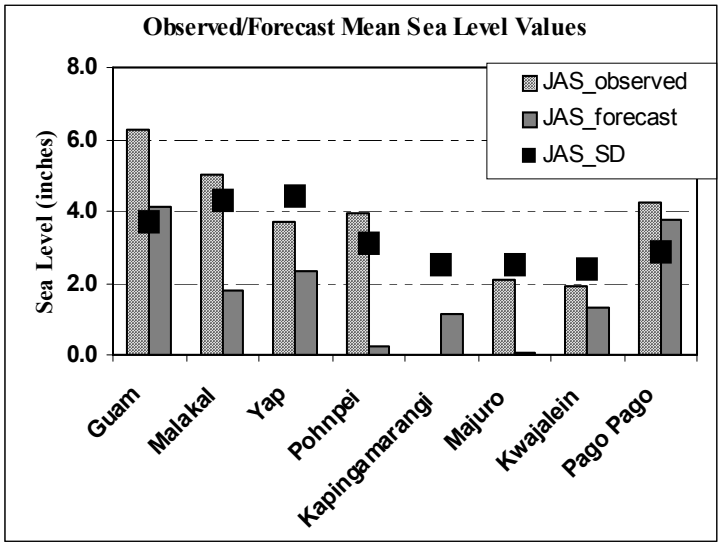


Figure 3: The observed and forecast values for the previous season JAS is presented above. Forecasts were in general skillful; however, all locations were under-forecast by 1 to 3 inches.

Pacific ENSO Update

Excerpts from El NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION
Issued by NOAA NWS Climate Prediction Center - 8 October 2009
http://www.cpc.noaa.gov/products/analysis_monitoring/enso_advisory/index.shtml

ENSO Alert System Status: El Niño Advisory

Synopsis: **El Niño is expected to strengthen and last through the Northern Hemisphere winter 2009-2010.**

A weak El Niño continued during September 2009, as sea surface temperature (SST) anomalies remained nearly unchanged across much of the equatorial Pacific Ocean. Since the transition to El Niño conditions during June, the weekly values of the Niño-3.4 index have remained between +0.7°C and +0.9°C. **).** Subsurface oceanic heat content (average temperatures in the upper 300m of the ocean) anomalies continued to reflect a deep layer of anomalous warmth between the ocean surface and the thermocline, particularly in the central and east-central Pacific. The pattern of tropical convection also remained consistent with El Niño, with enhanced convection over the west-central Pacific and suppressed convection over Indonesia. In addition, two westerly wind bursts were observed over the western equatorial Pacific, the first occurring early in the month and the second occurring near the end of the month. These oceanic and atmospheric anomalies reflect an ongoing weak El Niño.

A majority of the model forecasts for the Niño-3.4 SST index suggest that El Niño will reach at least moderate strength during the Northern Hemisphere fall (3-month Niño-3.4 SST index of +1.0°C or greater). Many model forecasts even suggest a strong El Niño during the fall and winter, but in recent months some models, have over-predicted the degree of warming observed so far in the Niño-3.4 region Based on the model forecasts, the seasonality of El Niño, and the continuation of westerly wind bursts, El Niño is expected to strengthen and most likely peak at moderate strength.

Expected El Niño impacts during October-December 2009 include enhanced precipitation over the central tropical Pacific Ocean and a continuation of drier-than-average conditions over Indonesia. For the contiguous United States, potential impacts include above-average precipitation along the Gulf Coast, from Texas to Florida, and below-average precipitation for the Pacific Northwest.

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 Sarah Jones, 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 author(s) and do not necessarily reflect the views of NOAA, any of its sub-agencies, or cooperating organizations.

ACKNOWLEDGEMENTS AND FURTHER INFORMATION

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for information on ENSO and sea-level variability in the USAPI.
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