pacific ENSO update

2nd Quarter, 2008 Vol. 14, No. 2 ISSUED: April 21, 2008

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), **the present oceanic and atmospheric anomalies are consistent with the continuation of moderate La Niña conditions in the tropical Pacific.** Typically, many of the islands of Micronesia are slightly wetter than normal during a La Niña year; however, if the La Niña event follows directly after an El Niño year, most islands tend to be drier than normal (particularly during the first half of the year). The month-to-month variability of rainfall is not as great during La Niña as it is during El Niño, primarily as a result of the westward shift of tropical cyclone development during La Niña. The typhoon threat during La Niña is reduced at most islands, especially for islands east of 145° E longitude (Guam and eastward).

During the 1st Quarter of 2008, most of the islands of Micronesia reported near normal rainfall totals (see Figure 1). Several heavy daily rainfall events helped push Guam and the CNMI above their normal rainfall, although conditions there have become dry in recent weeks. All Yap locations were drier than normal, but no problems with water supply were reported. Most of Chuuk, Pohnpei, and Kosrae states were near normal or slightly wetter than normal. Although the rainfall throughout the Marshall Islands was generally near normal for the 1st Quarter of 2008, persistent dryness commenced in March and extended into the first two weeks of April at Majuro and atolls to the north (including Kwajalein, Wotje, and Utirik). After several years of mostly above normal rainfall, Kapingamarangi became progressively drier in the 1st Quarter, and the 2.74 inches of rain received in March 2008 marked only 20% of normal. Kapingamarangi often becomes dry during La Niña episodes as anomalous easterly winds drive the equatorial cold tongue of water to its longitude. American Samoa became hot and dry during the 1st Quarter of 2008, which typically occurs during La Niña as the South Pacific Convergence Zone (SPCZ) and the Australian northwest monsoon retreat to the west.

Near normal rainfall is anticipated throughout much of Micronesia during the next 3 to 6 months. Tropical cyclone activity, which was very quiet in Micronesia (and throughout the entire western North Pacific) during 2007, should be near normal for the remainder of the 2008 calendar year. (See the Tropical Cyclone section for the latest typhoon outlook for 2008, and refer to each island's summary for the definition of "normal" tropical cyclone threat).

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 began rising in early 2007, and have been above normal for many months. Current forecasts indicate that sea levels will remain elevated at all USAPI stations for another 1 to 3 months. This trend of elevated sea level is consistent with the on-going La Niña conditions; however, as La Niña conditions weaken, the sea-level is expected to begin receding toward normal levels.

Collectively, the present oceanic and atmospheric anomalies are consistent with the continuation of La Niña conditions in the equatorial Pacific. There have recently been some early signs of weakening of the current La Niña, but most climatic trends and model guidance support the continuation of La Niña through the Northern Hemisphere's spring months of 2008.

The following comments from the EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION were posted on the U.S. Climate Prediction Center web site on April 10, 2008:

Synopsis: La Niña is expected to continue for the next 3 months.

"La Niña declined to moderate-strength during March 2008 as negative sea surface temperature (SST) anomalies weakened across the central and east-central equatorial Pacific... In the central Pacific, the subsurface temperature anomalies also lessened (averaging - 1°C to - 4°C at thermocline depth), and became increasingly confined to the surface region. This evolution led to a significant weakening of the negative ocean heat content anomalies (average temperatures in the upper 300m of the ocean). Despite this oceanic trend, the atmospheric conditions continue to strongly reflect La Niña. Enhanced low-level easterly winds and upper-level westerly winds persisted across the central equatorial Pacific, convection remained suppressed throughout the central equatorial Pacific, and enhanced convection covered the far western Pacific. Collectively, these atmospheric and oceanic conditions indicate an ongoing, but weaker, La Niña.

The recent dynamical and statistical SST forecasts indicate La Niña will become weak and persist through May-June-July 2008. Thereafter, nearly one-half [of the models] indicate La Niña could continue well into the second half of the year. Based on current atmospheric and oceanic conditions and recent trends, La Niña is expected to continue for the next 3 months. "

SEA SURFACE TEMPERATURES

SST (Sea Surface Temperatures)

La Niña conditions declined from strong to moderate-strength during March 2008 as negative sea surface temperature (SST) anomalies weakened across the central and east-central equatorial Pacific. The latest weekly SST values remain more than 1.0°C below average in areas between 160°E and 120°W. All of the NIÑO indices experienced warming during March, with only the westernmost NIÑO-4 and NIÑO-3.4 regions having values nearly 1.0°C below average. SSTs in the far eastern equatorial Pacific remained above average in association with a significant warming trend that began in mid-December. In the eastern equatorial Pacific, positive SST anomalies have been present near the South American coast since February. The latest weekly SST values are more than 1ºC above average between the South American coast and 110ºW. Subsurface warming in the central Pacific has led to a significant weakening of the cold anomalies in the upper 300m of the ocean. Despite this warming trend, the collective atmospheric and oceanic conditions continue to indicate an ongoing, but weaker, La Niña.

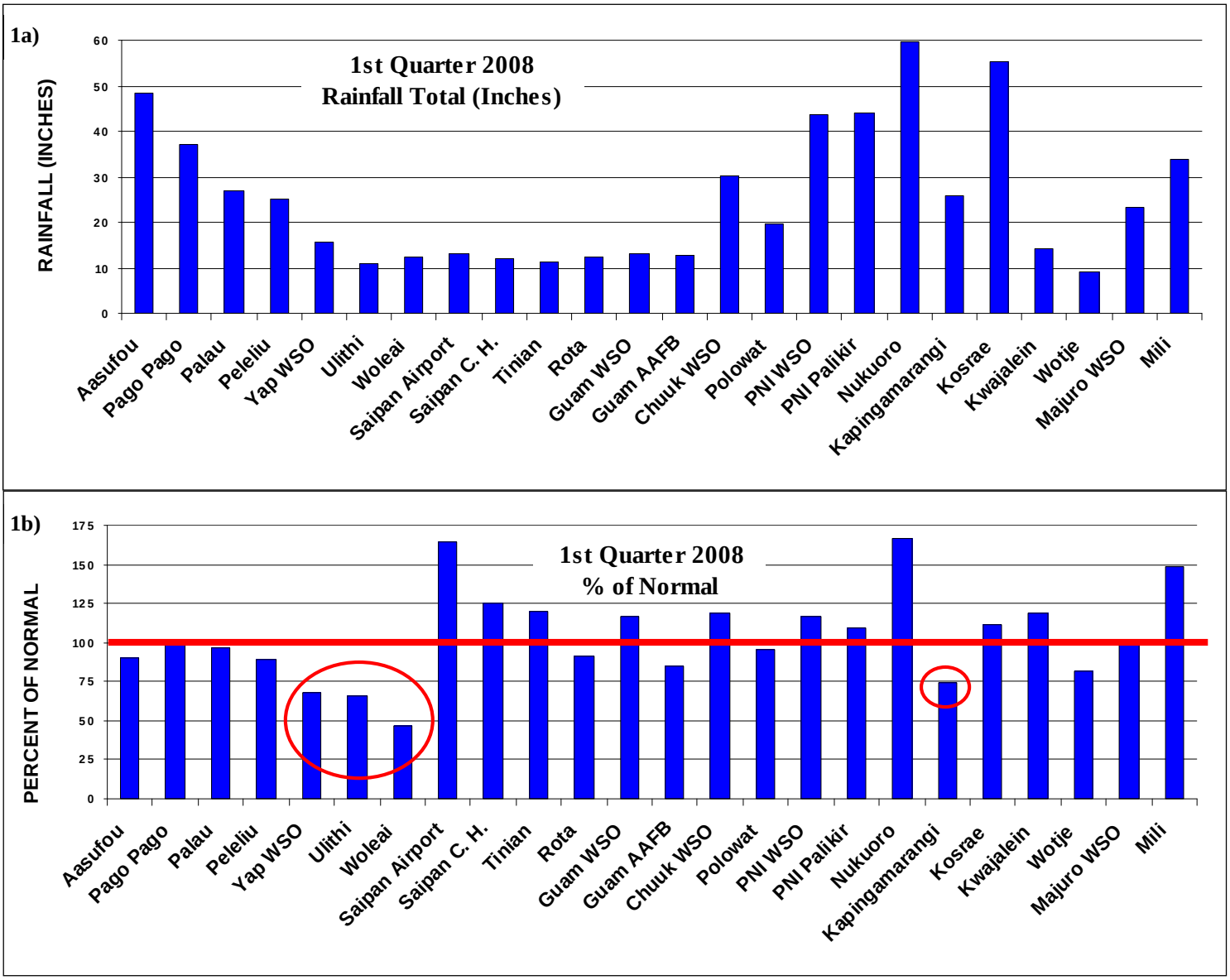
SOUTHERN OSCILLATION INDEX

(Southern Oscillation Index) (SOI)

The 3-month average of the Southern Oscillation Index for the 1st Quarter of 2008 was +3.1, with monthly values of +3.1, +4.4 and +1.9 for the months of January, February and March 2008, respectively. The SOI has had a positive sign since August 2007. SOI values are expected to remain positive as La Niña conditions, although weakening, are expected to continue through the next three months.

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. The SOI is an index representing the normalized sea level pressure difference between Darwin, Australia and Tahiti, respectively.

Figure 1, below. 1st Quarter 2008 rainfall totals (a) in inches and (b) anomalies (expressed as % of normal). In 1b, solid line indicates normal rainfall and circles indicate rainfall less than 75% of normal. Saipan average values are very low during these months and just a little extra rain can greatly affect the percentages. The above normal rainfall for Nukuoro, Kosrae and Mili is normal for La Niña periods due to the persistence of the trade wind trough between 4 - 6º N especially in the eastern part of the basin.



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 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 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 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

The 2007 - 2008 South Pacific tropical cyclone season has been near normal. Through April 15, the JTWC numbered 7 tropical cyclones. Of these, 5 were named by the respective Southern Hemisphere agencies. Normally the annual total of numbered tropical cyclones in the southwest Pacific is approximately 9, with 6 attaining hurricane intensity and 2 attaining major hurricane status (i.e., 1-minute sustained wind speed of 100 kt or more). Of the seven numbered cyclones to-date, 4 have been of at least hurricane intensity (65 kt), and three of these attained an intensity of 100 kt or more. Typical of La Niña, the distribution of South Pacific tropical cyclones has been mostly west of the International Date Line, with a focus of activity between New Caledonia and Fiji. American Samoa was not adversely affected by any tropical cyclone this cyclone season. While there may yet be one or two more cyclones in the southwest Pacific through June of 2008, they are not likely to affect American Samoa.

Tropical cyclone activity in the western North Pacific has gotten off to a slow start. The JTWC numbered one cyclone in January, and another just recently in mid-April that became the year's first typhoon. The JMA named TC 02W, Neoguri, their first named TC of 2008. Both TC 01W and TC 02W began as weak disturbances passing through the region of Palau and Yap, and then became numbered cyclones while passing through the central portions of the Philippine archipelago.

PEAC Center Tropical Cyclone Outlook

The PEAC outlook for tropical cyclones in the western North Pacific basin for the remainder of 2008 (April through December) is for near-normal activity in every category (e.g., number of typhoons and number of intense typhoons). The 2007 tropical cyclone season of the western North Pacific basin was unusually quiet, and the activity was shifted westward. Cyclone activity during 2008 will most certainly be higher than it was in 2007 and there may still be a westward bias to the typhoon distribution, albeit not quite as pronounced as during 2007. The anticipated distribution of tropical cyclones for 2008 reduces the risk of a damaging tropical storm or typhoon at all islands located eastward of 140ºE. For example, Guam (at 145ºE) will experience a slightly below normal risk while the RMI (at 170ºE) will have a very low 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 near normal (see island summaries for further details).

The PEAC forecast considered 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/2008_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/).

The Hong Kong Center calls for slightly above normal tropical cyclone activity in the western North Pacific basin for 2008; specifically: 2 more named cyclones than average and one more typhoon than average. Their forecast is a balance of ENSO factors that suggest near normal activity with some recent regional weather patterns in February and March that suggest above average activity. The TSR consortium, anticipates that the 2008 Northwest Pacific typhoon season will see below average activity. The TSR group is expecting a fairly large (20%) reduction in most categories: annual number of tropical cyclones, annual number of intense typhoons, and the accumulated cyclone energy (ACE). ACE is a measure of the total energy expended by a tropical cyclone during its life, and is therefore dependent on the intensity of a storm as well as its total lifetime. These forecasts span the full Northwest Pacific season from January to December. The activity so far in 2008 has been below normal and displaced to the west.

LOCAL SUMMARY AND FORECAST

American Samoa: Monthly rainfall in American Samoa varied greatly within the 1st Quarter of 2008. The year started out quite wet, with January rainfall totals of 22.17 inches at Pago Pago International Airport (158% of normal) and 25.05 inches at A'asufou (135% of normal). February brought markedly drier conditions to the islands, with both A'asufou and Pago Pago recording less than 50% of normal rainfall for the month. Near-normal rainfall returned in March, bringing the 1st Quarter totals for Pago Pago and A'asufou to near normal (100% and 90% of normal, respectively). Tropical cyclone activity in the American Samoa region has been low, most likely because of La Niña conditions. — WFO Pago Pago

American Samoa Rainfall Summary 1st Qtr 2008

Station		Jan.	Feb.	Mar.	1st Qtr	Predicted[1]
Pago Pago WSO	Inches	22.17	4.90	10.08	37.15	**41.04**
	% Norm	158 %	40%	90%	100%	**110%**
A'asufou	Inches	25.05	7.73	15.41	48.19	**58.76**
	% Norm	135%	43%	91%	90%	**110%**

[1] Predictions made in 4th Quarter 2007 newsletter.

Climate Outlook: With continued La Niña conditions expected, computer forecasts and a consensus of outlooks from several regional meteorological centers indicate that **rainfall in American Samoa is likely to be slightly below normal for the next few months.** As the rainy season comes to a close, month to month rainfall will vary greatly depending on the establishment of the South Pacific Convergence Zone (SPCZ) and the continued establishment and placement of the monsoonal trough originating out of Australia.

Tropical cyclones are possible in the South Pacific through June, and the PEAC Center is anticipating one or two more to occur in this basin. **However, no tropical cyclone is expected to adversely affect American Samoa until late November or December of the next cyclone season of 2008-09.**

Predicted rainfall from May 2008 through April 2009 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]
May - June 2008 (Onset of Next Dry Season)	**90% (14.73 inches - Pago Pago)**
July - Sept 2008 (Heart of Next Dry Season)	**100%**
Oct - Dec 2008 (Onset of Next Rainy Season)	**100%**
Jan - April 2009 (Heart of Next Rainy Season)	**100%**

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

LOCAL SUMMARY AND FORECAST

Guam/CNMI: Overall the 1st Quarter of 2008 was wetter than normal at most Guam and CNMI locations. The month-to-month variability was high, however, with a very wet February followed by a dry March. February's rainfall was 8 to 10 inches across all of Guam, keeping the island green and its streams running full. After the occurrence of roughly 2 inches of rainfall on Guam during a 24-hour period spanning the 8th and 9th of March, the rest of the month was very dry. Grasslands became desiccated to such a point that frequent grass fires erupted. Stream flow slowly declined, with seasonal algal growth matting the stream beds and choking-up popular swimming holes. The highest 1st Quarter rainfall on Guam fell on locations in the central and northern part of the island, where a nearly 3-inch 24-hour extreme event helped push February's total over 8 inches. Three-month rainfall totals at all Guam locations ranged from approximately 13 inches in drier locations to nearly 15 inches at the wetter locations.

Guam and CNMI Rainfall Summary 1st Qtr 2008

Station		Jan.	Feb.	Mar.	1st Qtr	Predicted[1]
Guam						
GIA (WFO)	Inches	3.07	8.02	1.99	13.08	**11.17**
	% Norm	69%	214%	67%	117%	**100%**
AAFB	Inches	5.95	5.23	1.56	12.74	**11.17**
	% Norm	104%	100%	38%	85%	**100%**
Dededo (Ypapao)*	Inches	2.99	8.81	2.28	14.08	**11.17**
	% WSMO	N/A	N/A	N/A	94%	**100%**
Ugum Watershed *	Inches	4.86	6.21	2.34	13.41	**14.93**
	% WSMO	N/A	N/A	N/A	89%	**100%**
Sinajaña **	Inches	3.58	7.79	2.25	13.62	**11.17**
	% WFO	N/A	N/A	N/A	122%	**100%**
CNMI						
Saipan Intl. Airport	Inches	3.53	3.91	5.54	12.98	**7.35**
	% Norm	106%	156%	266%	164%	**95%**
Capitol Hill	Inches	3.55	4.65	3.70	11.90	**7.35**
	% Norm	89%	155%	148%	125%	**95%**
Tinian Airport	Inches	3.18	4.44	3.73	11.35	**7.35**
	% Norm	89%	148%	149 %	119%	**95%**
Rota Airport	Inches	2.80	6.59	3.02	12.41	**11.17**
	% Norm	53%	141%	82%	91%	**100%**

[1] Predictions made in 4th Quarter 2007 newsletter.
* % of normal with respect to WSMO Finigayan (now closed).
** % of normal for Sinajaña is with respect to WFO Guam.

LOCAL SUMMARY AND FORECAST

Persistent showers yielded 3 to 5 inches of rainfall each month of the 1st Quarter in the CNMI. Though not excessive amounts of rain, these values were generally above the typical values of rainfall for the heart of the dry season. For example, the 12.98 inches of rainfall at the Saipan Coast Guard Station during the 1st Quarter of 2008 was 164% of the 3-month normal. Due to their unique geology, the islands of the CNMI retain a green and well-watered appearance, whereas on Guam, the dry conditions of March and early April have resulted in a noticeable browning of the grasslands and partial defoliation of some of the tangan-tangan trees that are the dominant cover in much of Guam's extensive shrub lands.

Climate Outlook: During La Niña years the tropical cyclone season in the western North Pacific basin is often delayed, and the number of tropical cyclones through mid-July is typically below normal. Also during La Niña years, the site of formation of the basin's tropical cyclones is shifted to the west. These effects of La Niña can already be seen in this year's tropical cyclone distribution: below normal activity and a westward shift of that activity (both of the 2008 Tropical Cyclones to date have been in the South China Sea). For the remainder of 2008, two or three tropical storms and one typhoon may pass within 200 miles of any location within Guam and the CNMI. This represents an overall slightly lower than normal risk of adverse impact by a tropical storm or typhoon as compared to normal years. As La Niña wanes in the latter half of 2008, **the typhoon activity may return to near normal in the western North Pacific basin, providing Guam and the CNMI with the greatest threat of a damaging tropical cyclone in the fall. Rainfall is anticipated to be near normal to slightly above normal for Guam and the CNMI for the remainder of 2008** (including the rest of the 2008 dry season and the upcoming rainy season), and be near normal through the dry season of 2009.

Predicted rainfall for Guam and the Mariana Islands from May 2008 through April 2009 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]	
	Guam/Rota	Saipan/Tinian
May – June 2008 (End of Dry Season)	**110% (13.77 inches)**	**110% (6.90 inches)**
Jul – Sept 2008 (Heart of Next Rainy Season)	**100%**	**100%**
Oct – Dec 2008 (End of Next Rainy Season)	**110%**	**120%**
Jan – Apr 2009 (Next Dry Season)	**100%**	**100%**

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

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

LOCAL SUMMARY AND FORECAST

Federated States of Micronesia

Yap State: During the 1st Quarter of 2008, the rainfall throughout most of Yap State was below normal with amounts ranging from half to two-thirds of the normal 3-month total. Most locations on Yap Island received approximately 12 to 16 inches of rain with a low of 11.49 inches at Rumung and a high of 15.58 inches at Luweech. No month during the 1st Quarter of 2008 had more than 10 inches of rain at any Yap recording site, and all locations had at least one month with total rainfall below 5 inches. At Ulithi, all three months of the 1st Quarter of 2008 had totals below 5 inches, and the 3-month total of 10.75 inches was 66% of normal. Woleai had been dry for several months, and continued its string of very dry months through January and February 2008. Finally, during March 2008, abundant rains returned to Woleai with 8.50 inches reported. Despite the relative dryness, there were no problems with water supplies reported at Yap Island and its outer atolls.

Yap State Rainfall Summary 1st Qtr 2007

Station		Jan.	Feb.	Mar.	1st Qtr	Predicted[1]
Yap Island						
Yap WSO	Inches	6.63	6.45	2.68	15.76	**18.83**
	% Norm	90%	86%	32%	68%	**100%**
Dugor*	Inches	4.57	2.84	5.35	12.76	**18.83**
	% Norm	N/A	N/A	N/A	55%*	**100%**
Gilman*	Inches	5.81	3.17	7.12	16.10	**18.83**
	% Norm	N/A	N/A	N/A	70%*	**100%**
Luweech*	Inches	6.28	3.81	5.49	15.58	**18.83**
	% Norm	N/A	N/A	N/A	67%*	**100%**
Maap*	Inches	7.45	4.54	3.46	15.45	**18.83**
	% Norm	N/A	N/A	N/A	67%*	**100%**
North Fanif*	Inches	6.11	2.82	3.16	12.09	**18.83**
	% Norm	N/A	N/A	N/A	52%*	**100%**
Rumung*	Inches	4.50	2.76	4.23	11.49	**18.83**
	% Norm	N/A	N/A	N/A	50%*	**100%**
Tamil*	Inches	5.95	2.81	4.40	13.16	**18.83**
	% Norm	N/A	N/A	N/A	57%*	**100%**
Outer Islands						
Ulithi	Inches	4.79	3.83	2.13	10.75	**16.29**
	% Norm	77%	75%	42%	65%	**100%**
Woleai	Inches	1.62	2.14	8.50	12.26	**26.65**
	% Norm	15%	29%	102%	49%	**100%**

[1] Predictions made in 4th Quarter 2007 newsletter.
* Long term normal is not established for these sites.

Climate Outlook: During mid-April, the tropical disturbance that later became Typhoon Neoguri in the South China Sea passed through Yap State providing some welcome rainfall. This La Niña pattern of tropical disturbances episodically passing through Yap State and the Republic of Palau should continue through June until the monsoon trough (and subsequent typhoon formation) shifts northward. **The tropical cyclone threat at Yap for the remainder of 2008 should be near normal. The greatest risk will occur in May and June, and then again in the late fall. There is roughly a 50% chance that one of these**

LOCAL SUMMARY AND FORECAST

disturbances passing westward through Yap State in May or June will become a tropical storm within the waters of Yap State; a full-fledged typhoon, however, is unlikely. Any tropical storm forming near Yap would bring welcome rains and possibly a day of near-gale force winds to any one of the islands or its territorial waters. **There is a secondary risk of a damaging tropical cyclone in Yap State or its northern atolls in the fall of 2008. The level of threat (5 to 10% chance) of a direct strike by a typhoon at Yap Island and at Ulithi, however, is still relatively low, and is roughly one-half to two-thirds that of Guam and the CNMI.** The threat is even less to the south at Woleai. While we expect no direct strikes by a typhoon of any island or atoll of Yap State during the rest of the calendar year of 2008, residents should always be prepared for the possibility.

Because of La Niña weather patterns, rainfall should recover from its present dryness within the next few weeks to be slightly above normal throughout Yap State for the remainder of 2008.

Predicted rainfall for Yap State from May 2008 through April 2009 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]	
	Yap and Ulithi	Woleai
May – June 2008 (End of Dry Season)	**110% (23.77 inches)**	**100% (24.25 inches)**
July – September 2008 (Heart of Rainy Season)	**100%**	**110%**
October – December 2008 (End of Next Rainy Season)	**120%**	**100%**
January – April 2009 (Next Dry Season)	**100%**	**100%**

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

LOCAL SUMMARY AND FORECAST

Chuuk State Rainfall Summary 1st Qtr 2008

Station		Jan.	Feb.	Mar.	1st Qtr	Predicted[1]
Chuuk Lagoon						
Chuuk WSO	**Inches**	13.34	8.32	8.36	30.02	**25.77**
	% Norm	125%	133%	100%	119%	**100%**
Piis Panew*	**Inches**	8.95	4.41	9.09	22.45	**25.77**
	% Norm	N/A	N/A	N/A	89%*	**100%**
Xavier H. School*	**Inches**	9.05	N/A	N/A	N/A	**25.77**
	% Norm	N/A	N/A	N/A	N/A	**100%**
Southern Mortlocks						
Lukunoch*	**Inches**	10.08	12.87	8.00	30.95	**27.70**
	% Norm	N/A	N/A	N/A	123%*	**110%**
Ettal*	**Inches**	7.70	6.78	12.90	27.38	**27.70**
	% Norm	N/A	N/A	N/A	109%*	**110%**
Ta*	**Inches**	8.49	9.96	15.64	34.09	**27.70**
	% Norm	N/A	N/A	N/A	135%*	**110%**
Northern Atolls						
Fananu*	**Inches**	16.86	4.66	7.64	29.16	**23.90**
	% Norm	N/A	N/A	N/A	116%*	**95%**
Onoun*	**Inches**	10.46	8.35	6.66	25.47	**23.90**
	% Norm	N/A	N/A	N/A	101%*	**95%**
Northern Mortlocks						
Losap*	**Inches**	10.26	9.13	11.43	30.82	**25.77**
	% Norm	N/A	N/A	N/A	122%*	**100%**
Nama*	**Inches**	14.33	9.21	10.49	34.03	**25.77**
	% Norm	N/A	N/A	N/A	135%*	**100%**
Western Atolls						
Polowat	**Inches**	3.90	3.56	12.20	19.66	**19.45**
	% Norm	N/A	N/A	N/A	96%*	**95%**

[1] Predictions made in 4th Quarter 2007 newsletter.
* Long term normal is not established for these sites.

Chuuk State: The 1st Quarter of 2008 brought relatively wet conditions to most of Chuuk State. Three-month rainfall totals ranged from 25 inches to 35 inches across the state, with the lower amounts of 25 to 30 inches occurring across Chuuk Lagoon and in the Northern atolls and 30 to 35 inches occurring in the Mortlocks. Most recording locations in Chuuk State had at least one month in the 1st Quarter with rainfall above 10 inches, with some locations in the Mortlocks receiving 10 or more inches in two out of the three months. To the west, Polowat was much drier with less than 20 inches of rainfall recorded in the 1st Quarter. Polowat and Woleai have both experienced a regional dryness in response to a persistent dry area in the larger pattern of tropical Pacific rainfall distribution. Just as at Woleai, however, abundant rainfall returned to this region in March.

Climate Outlook: The threat of a direct strike by a strong tropical storm or typhoon on any of the islands of Chuuk State should be slightly below normal for the remainder of 2008. Because of La Niña-related weather patterns, any tropical cyclones that form near Chuuk throughout most of 2008 will likely be in their disturbance state of development, and should only become tropical storms after passing out of Chuuk State. Some heavy rainfall events (more than 2 inches of rainfall in one day) may occur episodically in association with tropical disturbances in the area. **Based on a continuation of La Niña conditions through at least the first half of 2008, rainfall at islands and atolls of the Chuuk Lagoon and on the other atolls of Chuuk State should be above normal for most months of the rest of calendar year 2008.**

Predictions for Chuuk State from May 2008 through April 2009 are as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]			
	Chuuk Lagoon, Northern Mortlocks	Polowat	Northern Atolls and Islands	Southern Mortlocks
May – Jun 2008	**120% (28.97 inches)**	**100%**	**100%**	**110%**
Jul – Sept 2008	**110%**	**100%**	**110%**	**110%**
Oct – Dec 2008	**110%**	**100%**	**120%**	**100%**
Jan – April 2009	**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: With the notable exception of Kapingamarangi, rainfall was generally above normal throughout all of Pohnpei State during the 1st Quarter of 2008. On Pohnpei Island, the three-month totals were approximately 35 to 45 inches at all recording locations around the coastal perimeter of the island. The 43.63 inches at the WSO Kolonia was 117% of the normal 37.41 inches typically experienced there during the 1st Quarter. The outer atolls of Pohnpei State had a wide variety of rainfall amounts during the 1st Quarter of 2008, with Nukuoro recording 59.60 inches (the highest 3-month total at any recording site in Micronesia). Pingelap's 1st Quarter total of 34.37 inches was 88% of its normal. Meanwhile, La Niña-related dryness was finally felt at Kapingamarangi, where rainfall has been above normal for many months. After an above normal total of 15.16 inches recorded there during January 2008, the rainfall at Kapingamarangi steadily dropped to 7.95 inches (77% of normal) in February and then to only 2.74 inches (20% of normal) in March. The three-month total of 25.85 inches recorded at Kapingamarangi was 75% of normal.

Pohnpei State Rainfall Summary 1st Qtr 2008

Station		Jan.	Feb.	Mar.	1st Qtr	Predicted[1]
Pohnpei Island						
Pohnpei WSO	**Inches**	19.27	8.98	15.38	**43.63**	**36.26**
	% Norm	147%	83%	114%	**117%**	**100%**
Palikir	**Inches**	18.57	9.51	15.94	**44.02**	**40.38**
	% Norm	N/A	N/A	N/A	**109%**	**100%**
Kolonia Airport	**Inches**	13.71	7.41	13.25	**34.37**	**30.69**
	% Norm	N/A	N/A	N/A	**112%**	**100%**
Atolls of Pohnpei State						
Nukuoro	**Inches**	25.20	20.27	14.13	**59.60**	**35.06**
	% Norm	214%	192%	104%	**170%**	**100%**
Pingelap	**Inches**	7.86	8.59	15.93	**34.37**	**42.43**
	% Norm	64%	70%	110%	**81%**	**100%**
Mwoakilloa	**Inches**	10.05	10.60	7.75	**28.40**	**41.16**
	% Norm	N/A	N/A	N/A	**69%**	**100%**
Kapingamarangi	**Inches**	15.16	7.95	2.74	**25.85**	**34.46**
	% Norm	145%	77%	20%	**75%**	**95%**

[1] Predictions made in 4th Quarter 2007 newsletter.

Climate Outlook: Because of weather patterns associated with La Niña, the risk of a damaging tropical storm or typhoon is very unlikely at any island in Pohnpei State through all of 2008. In the fall of 2008, as the tropical cyclone activity of the western North Pacific makes its typical shift eastward, the very early stages of some developing tropical cyclones may bring some episodes of heavy rain to Pohnpei Island; however, these systems should not become tropical storms or typhoons until they are well away from Pohnpei.

Based on the continuation of La Niña conditions for the next few months, rainfall at Pohnpei Island and the atolls of Pohnpei State should be near normal for the foreseeable future. **The only exception to the expectation of overall normal rainfall in Pohnpei State will be at Kapingamarangi, where La Niña-related weather patterns may cause conditions to remain drier than normal over the next few months. For this reason it may be prudent for residents of Kapingamarangi to continue voluntary conservation measures of drinking water.**

LOCAL SUMMARY AND FORECAST

Predicted rainfall for Pohnpei State from May 2008 through April 2009 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]	
	Pohnpei Island and atolls	**Kapingamarangi**
May – June 2008	**110% (40.11 inches)**	**75%**
July – Sept 2008	**110%**	**90%**
Oct - Dec 2008	**100%**	**90%**
Jan - April 2009	**100%**	**90%**

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

Kosrae State: Rainfall was slightly above normal during the 1st Quarter of 2008 at all recording locations around Kosrae. The 3-month totals ranged from 55.87 inches at the Nautilus Hotel to 49.39 inches at Utwa. Normal rainfall at Kosrae for the 3-month period of January - March is approximately 49 inches.

Climate Outlook: Because of weather patterns associated with La Niña, the risk of a damaging tropical storm or typhoon affecting Kosrae in 2008 is very unlikely. The very early stages of some developing tropical cyclones may bring some episodes of heavy rain to Kosrae, especially during the months of October through December, but these systems should not become tropical storms or typhoons until they are well west of Kosrae State. Based on the continuation of La Niña conditions for the next few months, **rainfall at Kosrae should be near normal to slightly above normal for the next three months, and then remain near normal for the remainder of the calendar year.**

Kosrae State Rainfall Summary 1st Qtr 2008

Station		Jan.	Feb.	Mar.	1st Qtr	Predicted[1]
Airport (SAWRS)	**Inches**	13.38	24.85	16.87	**55.10**	**49.41**
	% Norm	93%	152%	90%	**112%**	**100%**
Utwa*	**Inches**	16.64	20.94	11.81	**49.39**	**49.41**
	% WSO	N/A	N/A	N/A	**100%**	**100%**
Nautilus*	**Inches**	13.70	23.64	18.53	**55.87**	**49.41**
	% WSO	N/A	N/A	N/A	**113%**	**100%**

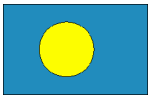
[1] Predictions made in 4th Quarter 2007 newsletter.
* Long term normal is not established for these sites.

Forecast rainfall for Kosrae State from May 2008 through April 2009 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]
May – June 2008	**110% (41.58 inches)**
July – September 2008	**100%**
October – December 2008	**100%**
January – April 2009	**110%**

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

LOCAL SUMMARY AND FORECAST



Republic of Palau: Palau had near normal rainfall during the 1st Quarter of 2008. The 26.94 inches recorded at the WSO Koror was 96% of the long-term average. The Palau International Airport, with a 3-month total of 33.40 inches (119% of normal), is establishing a trend of being generally wetter than the nearby WSO Koror. Further south at Peleliu, the 25.09 inches of rainfall was slightly lower than the 1st Quarter total recorded at the WSO. Peleliu has a fairly long-standing trend of being slightly drier than northern parts of Palau.

Republic of Palau Rainfall Summary 1st Qtr 2008

Station		Jan.	Feb.	Mar.	1st Qtr	Predicted[1]
WSO Koror	Inches	11.43	9.68	5.83	**26.94**	**32.60**
	% Norm	N/A	N/A	N/A	**96%**	**110%**
Nekken	Inches	8.14	7.52	5.12	**20.78**	**32.60**
	% WSO	N/A	N/A	N/A	**74%**	**110%**
Intl. Airport	Inches	14.23	11.23	7.94	**33.40**	**32.60**
	% WSO	N/A	N/A	N/A	**119%**	**110%**
Peleliu	Inches	7.66	9.16	8.27	**25.09**	**32.60**
	% WSO	72%	102%	101%	**92%**	**110%**

[1] Predictions made in 4th Quarter 2007 newsletter.

Climate Outlook: Because of a continuation of La Niña-related climate anomalies, much of the tropical cyclone formation in the western North Pacific basin will remain shifted farther westward than normal during 2008. This shift will allow Palau and Yap to experience episodes of heavy showers within the southern portions of tropical disturbances and developing tropical cyclones (especially from September through December 2008). In addition, abundant rainfall is expected from June through the end of the year in association with the monsoon trough of the western North Pacific. **During the latter half of 2008, there should be several episodes of heavy rainfall as well as 2 or 3 occurrences of gusty westerly winds and rough seas from tropical cyclones passing to the north of Palau.** The rainfall throughout the Republic of Palau should be near normal or slightly wetter than normal for the foreseeable future.

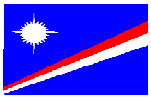
Predicted rainfall for Palau from May 2008 through April 2009 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]
May – August 2008 (Main Rainy Season)	**120% (72. 32 inches)**
September – October 2008 (Monsoon Break in Rainy Season)*	**100%**
November 2008 – January 2009 (End of Rainy Season)	**120%**
Feb – April 2009 (Dry Season)	**100%**

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

* Palau has a complex mix of rainy and dry months. The wettest months are typically June - August. During September, the monsoon trough and tracks of typhoons move far to the north, lowering Palau's September average rainfall to below that of both August and October.

LOCAL SUMMARY AND FORECAST



Republic of the Marshall Islands (RMI): Overall, the rainfall throughout most of the atolls of the RMI was close to normal during the 1st Quarter of 2008. The 3-month total of 23.38 inches at Majuro WSO was 102% of its normal. This does not reveal the whole story, however, as dryness in the latter half of March through the first 2 weeks of April prompted calls for emergency water restrictions on Majuro. The municipal water supply on Majuro is derived from two primary sources: rainwater collected on the runway of the International Airport, and well water pumped from Laura. The runway water is stored in a reservoir that holds up to 33 million gallons of water. Upwards of 400,000 gallons per day can be extracted from wells on Laura and pumped eastward to the population centers of Majuro. At the end of the first week of April, the airport reservoir was drawn down to 9 million gallons, and only a tenth of an inch of rain had fallen that week. More stringent restrictions on water use were almost certain if the dry weather continued. One inch of rainfall can yield 3 million gallons of water for the reservoir, but through the second week of April, only about one-half inch of rain had fallen. The PEAC Center forecast is for the trade wind trough to build-in within the next few weeks to bring near normal rainfall to Majuro and alleviate their water emergency.

Elsewhere, the northern atolls of the RMI (Kwajalein, Utirik and Wotje) were among the driest of locations in Micronesia

RMI Rainfall Summary 1st Qtr 2008

Station		Jan.	Feb.	Mar.	1st Qtr	Predicted[1]
RMI Central Atolls (6º N - 8º N)						
Majuro WSO	Inches	9.53	7.58	6.27	**23.38**	**22.21**
	% Norm	113%	123%	76%	**102%**	**95%**
Laura*	Inches	12.18	7.79	8.50	**28.47**	**22.21**
	% WSO	N/A	N/A	N/A	**125%**	**95%**
Arno*	Inches	8.96	7.00**	4.87	**20.83**	**22.21**
	% WSO	N/A	N/A	N/A	**91%**	**95%**
Aling-laplap*	Inches	6.50	3.53	11.79	**21.82**	**22.21**
	% WSO	N/A	N/A	N/A	**95%**	**95%**
RMI Southern Atolls (South of 6º N)						
Mili*	Inches	15.74	9.11	9.10	**33.95**	**23.38**
	% WSO	N/A	N/A	N/A	**149%**	**100%**
RMI Northern Atolls (North of 8º N)						
Kwajal-ein	Inches	5.35	5.46	3.36	**14.17**	**11.40**
	% Norm	117%	169%	82%	**119%**	**90%**
Wotje*	Inches	3.20	3.94	2.03	**9.17**	**10.18**
	% Norm	74%	135%	52%	**87%**	**90%**
Utirik*	Inches	3.27	1.56	2.00**	**6.86**	**9.08**
	% Norm	84%	57%	57%	**66%**	**90%**

[1] Predictions made in 4th Quarter 2007 newsletter.

* Normal values are estimated based on WSO Majuro, Kwajalein and satellite-derived precipitation distribution.

** Estimated.

LOCAL SUMMARY AND FORECAST

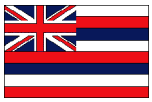
during the 1st Quarter of 2008 (Fig. 1), with 3-month rainfall totals of less than 10 inches in some locations. These islands are now in their dry season, and a normal seasonal increase of rainfall is anticipated over the next month or two. Meanwhile, further south, Mili recorded a relatively high value (33.95 inches) for the 1st Quarter rainfall. **It may be prudent for residents of Majuro and the northern atolls of the RMI to begin voluntary conservation measures to ensure adequate supplies of drinking water. Inadequate rainfall may lead to mandatory emergency water restrictions on Majuro over the next few weeks.**

Climate Outlook: A typical increase in seasonal rainfall is anticipated to occur in the RMI, especially for those northern islands that are now locked in the heart of their dry season. Normal monthly rainfall totals jump to over 10 inches at Majuro commencing in April and lasting through December. While Majuro may not reach its normal April quota, it is anticipated that rainfall will gradually return to normal by mid-May or early June. **The worst-case scenario is that the rainfall during May and June continues to be substantially below normal, pushing Majuro into a more serious water emergency. Given the underlying climate pattern, it is reasonable to expect that near normal rainfall will resume within the next month or two and continue as such for the remainder of 2008.** With anticipation of La Niña conditions persisting for at least the next three months, the RMI has a very low risk of a typhoon during the foreseeable future.

Predicted rainfall for the RMI from May 2008 through April 2009 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) [2]		
	South of 6ºN	6ºN to 8ºN	North of 8ºN
May – June 2008 (Onset of Rains)	**100% (22.62 inches)**	**90% (20.36 in)**	**90% (15.73 inches)**
July – Sept 2008	**100%**	**95%**	**95%**
Oct – Dec 2008	**100%**	**100%**	**100%**
January – April 2009 (Dry Season)	**100%**	**95%**	**90%**

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



Hawaii: Following a wet December 2007, the first month of 2008 started off with drier conditions over most of the state. Strong thunderstorms over the Hana area of east Maui on January 18 prompted a flash flood warning, but no significant damages or injuries were reported. Heavy showers fell again over the windward slopes of Maui and the Big Island on January 29 and 30, producing minor flooding problems. These showers helped saturate the ground and set the stage for much more significant flooding in the Hilo area of the Big Island, as an upper level trough destabilized the underlying moist trade winds in early February. For the east Big Island residents, the early February deluge was the most significant flood event since the intense November 1-2, 2000 severe flood event. Initial assessments by Hawaii County officials indicated 100 to 150 homes were damaged, primarily due to the

LOCAL SUMMARY AND FORECAST

State of Hawaii Rainfall Summary 1st Qtr 2008

Station		Jan.	Feb.	Mar.	1st Qtr
Lihue Airport	**Inches**	4.59	3.26	3.58	**11.43**
	% Norm	26%	41%	5%	**24%**
Honolulu Airport	**Inches**	2.73	2.35	1.89	**6.97**
	% Norm	8%	18%	4%	**10%**
Kahului Airport	**Inches**	3.74	2.36	2.35	**8.45**
	% Norm	38%	2%	0.5%	**17%**
Hilo Airport	**Inches**	9.74	8.86	14.35	**32.95**
	% Norm	146%	441%	36%	**178%**

overflow of Waiakea Stream and nearby drainage ditches. Fortunately, officials reported no significant injuries or deaths due to the storm. Heavy rains over Kauai on February 3 forced the closure of both the Wainiha and Hanalei Bridges along Kuhio Highway. The USGS gage on the Makaweli River indicated a new (unofficial) record water level of 15.56 ft., just beating the previous record of 15.51 ft set on January 31, 1975. High water levels in Hanapepe River forced the evacuation of some residents in Hanapepe Valley and came close to overflowing a levee protecting Hanapepe town. On February 6, Oahu received its turn when thunderstorms generated heavy rains over the central Koolau Range during the evening hours. Substantial runoff from afternoon thunderstorms over central and southwest Oahu on February 7 resulted in 3 to 4 feet of water in the west-bound lanes of the H-1 Freeway near Makakilo during peak afternoon traffic hours. Activity later shifted to east Molokai where heavy rains and flooding briefly forced the closure of the Kamehameha V Highway. A final burst of heavy rains occurred over the South Kona slopes of the Big Island on the afternoon of February 8. A flash flood warning was issued, but fortunately only minor flooding problems were reported.

An overall dry, stable weather pattern that started on February 9 continued through March 11 with a low level ridge of high pressure near the island chain keeping winds light and rainfall sparse. The ridge shifted northward on March 12, bringing windward showers and some needed relief, especially to those residents relying on water catchment systems. On March 17 and 18, thunderstorms over the Big Island and east Maui produced 1 to 2 inches of rain but no flooding problems. Enhanced shower activity over Kauai on March 20 and 21 elevated water levels in the Hanalei River, although no flooding occurred. The remainder of March, — normally one of the wettest months of the year for windward locations — was relatively tranquil, with daily rain gage totals of mostly less than an inch across the state.

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

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

"NCEP Models predict a tendency for below normal temperature for Hilo from May-June-July through Sept-Oct-Nov 2008… for Kahului from through Aug-Sept-Oct 2008… for Honolulu during June-July-Aug 2008… and for Lihue during July-Aug-Sept 2008. Models also predict below normal rainfall for all Hawaii locations during July-Aug-Sept 2008. Rainfall during the April-May-June, May-June-July and June-July-Aug 2008 seasons has equal chances of being below normal, near normal, or above normal at all Hawaii stations…"

Seasonal Sea Level Outlook for the US-Affiliated Pacific Islands

The following sections describe: (i) the *Canonical Correlation Analysis* (*CCA*)-based forecasts for sea level deviations for the forthcoming seasons AMJ, MJJ and JJA 2008; (ii) the observed monthly mean and maximum sea-level deviations for the season AMJ 2008, and (iii) forecast verifications (observed/forecast values) for the previous season JFM 2008. 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 AMJ, MJJ, and JJA 2008.**

Forecasts of the sea level anomalies in the USAPI are presented using CCA statistical model. Based on the independent SST values in JFM 2008, the resulting CCA model was used to forecast the sea level of three consecutive seasons: AMJ, MJJ and JJA 2008 (**Table 1**).

Table 1: **Forecasts of sea level deviation (in inches) for Apr-May-Jun, May-Jun-July and Jun-July-Aug 2008.**

	Seasonal Mean Deviations[1]				Seasonal Max Deviations[2]					
Tide Gauge Station	**AMJ**	**MJJ**	**JJA**	**Forecast Quality[3]**	**AMJ**	**MJJ**	**JJA**	**Forecast Quality[3]**	***Return Period[4] for AMJ Season***	
Lead Time[5]	*0*	*1M*	*2M*		*0*	*1M*	*2M*		*20 Year*	*100 Year*
Marianas, Guam	+7	+7	+7	Good	+22 (18)[6]	+22	+21	V. Good	*5.6*	*6.7*
Malakal, Palau	+6	+6	+6	Good	+40 (37)	+40	+41	Good	*9.6*	*14.3*
Yap, FSM	+7	+7	+7	Good	+33 (29)	+33	+33	Good	*16.8*	*33.1*
Chuuk, FSM**	+5	+5	+5	N/A	+33 (N/A)	+33	+33	N/A	*N/A*	*N/A*
Pohnpei, FSM	+5	+3	+2	V. Good	+33 (31)	+32	+31	Good	*5.8*	*7.1*
Kapingamarangi, FSM	+2	+1	+1	V. Good	+27 (27)	+27	+28	V. Good	*7.4*	*9.4*
Majuro, RMI	+2	+1	0	Good	+40 (39)	+38	+37	Fair	*4.1*	*5.1*
Kwajalein, RMI	+4	+4	+2	Good	+41 (39)	+40	+39	Good	*4.5*	*5.9*
Pago Pago, Am. Samoa	+4	+3	+2	V. Good	+27 (25)	+26	+26	V. Good	*3.9*	*5.4*

Remarks: The positive sea-level deviations forecast for the AMJ, MJJ, and JJA seasons (Table 1, above) indicate that sea levels will remain elevated at all USAPI stations for another 1 to 3 months. This trend of elevated sea level is consistent with the on-going La Niña conditions; however, as La Niña conditions weaken, the sea-level is expected to begin receding toward normal levels. Mean sea levels are expected to be 2 to 7 inches above average during the AMJ season. Maximum sea levels for the AMJ season are expected to be 2 to 4 inches above the median value (in parentheses) at each station.

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 of +/-1 in. are considered negligible and 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.

1. **Seasonal Mean Deviations** 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.
2. **Seasonal Maximum Deviations** 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.
3. **Forecast Quality** 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 are thought to be very good. Please refer to **www.soest.hawaii.edu/MET/Enso/peu/2008_2nd/Sea_Level.htm** for CCA cross-validation skill in previous seasons JFM, FMA and MAM 2008.
4. **Return period (RP)** of extreme values are calculated from hourly sea-level data. For example, the predicted rise of 5.6 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 5.6 inches **above the median of seasonal maxima** during the AMJ season. Likewise, about once every 100 years we can expect the highest AMJ tide at Marianas, Guam to be as high as 6.7 inches above the median of seasonal maxima. Note that Yap displays some alarmingly high values at the 20 and 100 year RP. *These high values are due to large and significant increases in the tidal range during the passage of past storm events in the AMJ season.*
5. **Lead time** 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 (AMJ), 1 (MJJ), and 2 (JJA) month leads based on SSTs of JFM 2008.
6. **Median values** of maximum sea level (in parentheses) for the AMJ season. (The median is the 50th percentile value in a distribution.)

Seasonal Sea Level Outlook for the US-Affiliated Pacific Islands

(ii) Observed Monthly Sea Level Deviation in January-February-March (JFM) 2008 Season

The monthly time series (January - March) 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 4** (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]				
	Jan.	Feb.	Mar.	Standard Deviations	Jan	Feb.	Mar.	Standard Deviations	*JFM Median*
Marianas, Guam	+6.0	+8.2	+8.5	(+3.8)	+21.3	+23.1	N/A	(+3.7)	*+15.3*
Malakal, Palau	+4.0	+8.7	+4.2	(+4.5)	+37.0	+44.1	+39.8	(+4.8)	*+32.3*
Yap, FSM	+6.0	+6.2	+8.9	(+3.8)	+31.0	+30.6	+36.6	(+4.5)	*+25.2*
Chuuk, FSM**	N/A	N/A	N/A	(N/A)	N/A	N/A	N/A	(N/A)	*N/A*
Pohnpei, FSM	+6.6	+5.9	N/A	(+3.1)	+35.3	+33.4	N/A	(+3.3)	*+31.4*
Kapingamarangi, FSM	+6.0	+4.2	N/A	(+3.5)	+33	+30.2	+27.1	(+4.1)	*+28.2*
Majuro, RMI	+3.0	+3.0	+3.0	(+2.2)	+42.0	+44.2	N/A	(+2.5)	*+43.4*
Kwajalein, RMI	+4.0	+4.0	+3.8	(+2.4)	+42.0	+41.7	+40.2	(+2.8)	*+39.4*
Pago Pago, American Samoa	+3.0	+1.0	+2.6	(+2.6)	+29.0	+23.1	+22.7	(+3.1)	*+24.8*

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.

Remarks: The observed values for seasonal mean/maxima display positive deviation for all the stations in USAPI. The mean values in March are higher than February values at some stations and lower at the others. This trend is consistent with the weakening state of the present La Niña episode. As the La Niña continues to weaken in the coming months, we may expect sea levels to begin falling (2 to 6 inches) within the next two to three months. **See Table 1 for other notes.**

(iii) Forecast Verification (Seasonal Mean) for JFM 2008

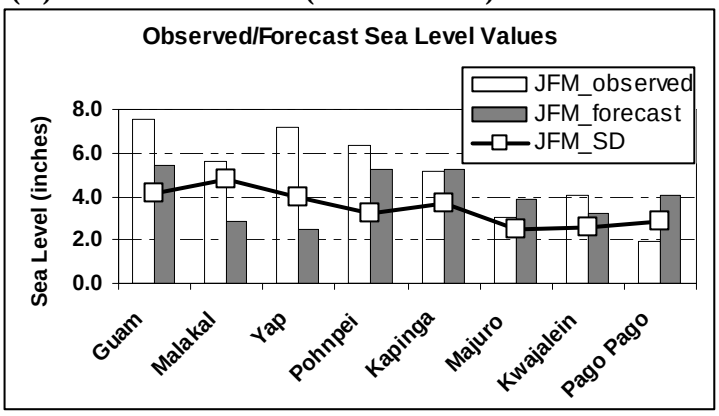


Figure 3: Observed and forecast seasonal sea-level values for the previous season JFM (*SD stands for standard deviations)* are presented above. Forecasts were in general skillful; however, Guam and the Micronesian Islands were found to be relatively under-forecast in the previous season. (Note: A similar verification figure for the seasonal maxima will be available in the 3rd Quarter 2008 *Pacific ENSO Update* newsletter.)

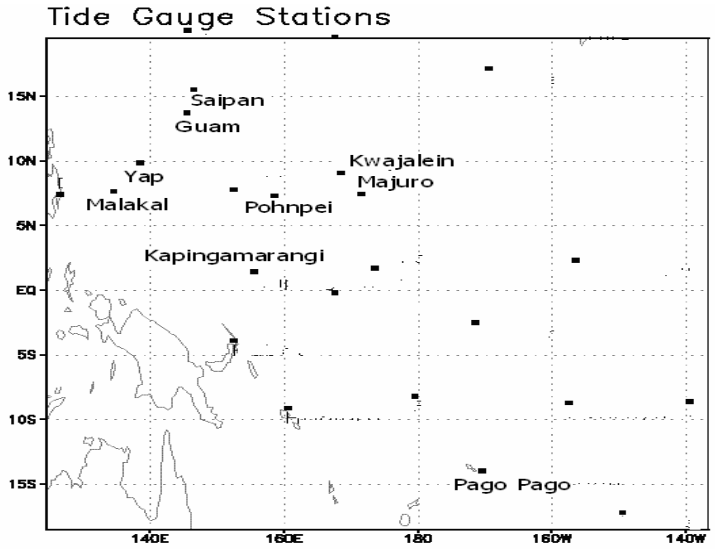


Figure 4, above: Locations of USAPI tide gauge stations.

Pacific ENSO Update

MONTHLY PACIFIC ENSO DISCUSSION FOR MICRONESIA AND AMERICAN SAMOA
Excerpts from March Discussion — Issued by NOAA-NWS-Guam WFO

In January, the South Pacific Convergence Zone (SPCZ) and monsoon trough brought periods of heavy rainfall to the Samoan Islands. However, these rain-producing systems remained west of the date line for most of February and March, bringing dry to near-normal rainfall to American Samoa. This dry to near-normal trend should continue into the southwest Pacific dry season. Trade winds continued to dominate the flow in Micronesia, but there were several periods of only weak trade winds, leading to more widespread deep convection over the central islands. As in February, the trade wind trough was not well developed in the western half of Micronesia, resulting in well-below normal rainfall for Palau and western Yap State. Rains did return to eastern Yap State, western Chuuk State, and Pohnpei State. Dry conditions in the northern Marshall Islands spread to the central and southern islands as well. Residents of the RMI should conserve water for the next month, until upper level winds become favorable for producing persistent rain showers. Because of its large population, Majuro may have to impose severe water conservation measures. Monsoon and tropical storm activity for the first half of 2008 should be limited to western Micronesia, and the 2008 tropical cyclone season could see a late start. The relatively strong trade winds will keep sea levels above normal for the next month or so in the western Pacific. The risk for coastal inundation during new and full moon phases has diminished in Micronesia, but some minor coastal flooding could occur during these periods in April.

Excerpts from El NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION
Issued by NOAA NWS Climate Prediction Center - 10 March 2008
Synopsis: La Niña is expected to continue for the next 3 months.

La Niña declined to moderate-strength during March 2008 as negative sea surface temperature (SST) anomalies weakened across the central and east-central equatorial Pacific. The latest weekly SSTs are more than 1.0°C below average in areas between 160°E and 120°W. All of the NIÑO indices warmed during March, with only the westernmost NIÑO-4 and NIÑO-3.4 regions having values nearly 1.0°C below average. In the central Pacific, the subsurface temperature anomalies also lessened. Despite this oceanic trend, the atmospheric conditions continue to strongly reflect La Niña. Enhanced low-level easterly winds and upper-level westerly winds persisted across the central equatorial Pacific, convection remained suppressed throughout the central equatorial Pacific, and enhanced convection covered the far western Pacific. Collectively, these atmospheric and oceanic conditions indicate an ongoing, but weaker, La Niña.

The recent dynamical and statistical SST forecasts for the Niño 3.4 region indicate La Niña will become weak and persist through May-June-July 2008. Thereafter, there is considerable spread in the forecasts, with nearly one-half indicating La Niña could continue well into the second half of the year. Based on current atmospheric and oceanic conditions and recent trends, La Niña is expected to continue for the next 3 months. Expected La Niña impacts April- June include a continuation of above-average precipitation over Indonesia and below-average precipitation over the central equatorial Pacific...

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

PACIFIC ENSO APPLICATIONS CLIMATE CENTER:
HIG #340, 2525 Correa Road, Honolulu, Hawaii 96822
LTJG Sarah Jones, PEAC Outreach Officer, at 808-956-2324
for information on PEAC, the *Pacific ENSO Update* and ENSO-related climate data for the Pacific Islands.
Dr. Rashed Chowdhury, PEAC Research Scientist, at 808-956-2324
for information on ENSO and sea level variability in the USAPI.

UNIVERSITY OF HAWAII (UH)
JOINT INSTITUTE OF MARINE AND ATMOSPHERIC RESEARCH (JIMAR),
SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY (SOEST),
DEPARTMENT OF METEOROLOGY:
HIG #350, 2525 Correa Road, Honolulu, Hawaii 96822
Dr. Tom Schroeder, PEAC Principal Investigator at 808-956-7476
for more information on hurricanes and climate in Hawaii.

NOAA NATIONAL WEATHER SERVICE
WEATHER FORECAST OFFICE (WFO) HONOLULU:
HIG #250, 2525 Correa Rd., Honolulu, HI, 96822
James Weyman, PEAC Director, at 808-973-5270

WEATHER FORECAST OFFICE (WFO) GUAM:
3232 Hueneme Road, Barrigada, Guam, 96913
Chip Guard, Warning Coordination Meteorologist,
at 671-472-0900 for information on tropical cyclones
and climate in the USAPI.

UNIVERSITY OF GUAM
WATER AND ENVIRONMENTAL RESEARCH INSTITUTE (WERI):
UOG Station, Mangilao, Guam 96913
Dr. Mark Lander, PEAC Meteorologist, at 671-735-2685
for information on tropical cyclones and climate in the USAPI.