

University of
Hawai'i
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UH/SOEST

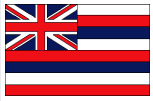


April rainfall totals reported (Joe)

% Normal: **blue** above normal & **red** below normal. Departure from normal: **blue**-above & **red**-below (same for 3 mon %)

	Rainfall	% Norm	Median	Departure	3 Month Total
	Inches	April	Inches	inches	FMA
Koror	8.25	113	7.32	0.93	20.03
Yap	3.80	67	5.63	-1.83	24.53
Chuuk	5.60	45	12.47	-6.87	29.16
Pohnpei	18.80	102	18.41	0.39	97.66
Kosrae	18.45	105	17.51	0.94	66.48
Kwajalein	12.05	229	5.26	6.79	31.80
Majuro	17.79	189	9.42	8.37	48.62
Guam NAS	7.99	316	2.53	5.46	12.11
Saipan	8.72	332	2.63	6.09	11.90
Pago Pago	17.76	189	9.39	8.37	56.59
Lihue	5.72	295	1.94	3.78	23.90
Honolulu	1.19	229	0.52	0.67	7.88
Kahului	4.46	501	0.89	3.57	12.24
Hilo	13.25	148	8.95	4.30	39.63

Reports from around the Region



Hawaii (Kevin)

Kauai

All of the gages on Kauai reported above average monthly rainfall totals for April. The U.S. Geological Survey's (USGS) gage on Mount Waialeale had the highest monthly total of 64.24 inches (170 percent of average). This was also the highest April total at Waialeale since 1982. The highest daily totals were from the April 15 event as discussed above. Records were broken at Anahola, Hanalei, Kapahi, Kokee, Lihue Variety Station, Omao, Wailua Experiment Station, and Wainiha for the highest April rainfall. Lihue Airport had its wettest April since 1971.

Due to the recent wet conditions, most of the gages on Kauai had above average rainfall totals for 2018 through the end of April. Mount Waialeale had the highest year-to-date total of 207.02 inches (166 percent of average). Note that this is already more than half of the annual average for this site.

Oahu

Most of the gages on Oahu logged above average rainfall totals for April. The Manoa Lyon Arboretum gage had the highest monthly total of 32.53 inches (231 percent of average). The USGS' Poamoho Rain Gage No. 1 had the highest daily total of 6.59 inches from the April 26 heavy rain event. April rainfall records were broken at Ahuimanu, Hawaii Kai Golf Course, Kamehame, Luluku, Manoa Lyon Arboretum, Maunawili, Niu Valley, Nuuanu, Olomana Fire Station, Palolo Fire Station, and Poamoho. The Luluku and Maunawili totals broke records that were set only last year. Elsewhere, Waipio and Moanalua had their highest April totals since 1998 and 2001, respectively.

Oahu rainfall totals for 2018 through the end of April were near to above average at most of the sites. A few of the gages along the lower leeward slopes of the Waianae Range had near to below average totals. The Poamoho Rain Gage No. 1 had the highest year-to-date total of 105.51 inches (137 percent of average).

Maui

Almost all of the gages across Maui County posted above average April rainfall totals. The USGS' gage on Puu Kukui had the highest monthly total of 54.75 inches (142 percent of average). This was also the highest April total at this location since 1998. The USGS' West Wailuaiki gage had the highest daily total of 12.93 inches on April 9. Records for the wettest April were broken at Hana Airport, Kihei, Lahainaluna, Mahinahina, and Waikapu Country Club. The Hana Airport and Lahainaluna records were last broken just last year.

Rainfall totals for 2018 through the end of April were near to above average at most of the gages across Maui County. The West Wailuaiki gage had the highest year-to-date total of 110.56 inches (124 percent of average).

Big Island

April rainfall totals were near to above average at most of the gages on the Big Island. The main exceptions were in the southern Kau District where several totals were in the near to below average range. The USGS' Saddle Road Quarry gage had the highest monthly total of 48.54 inches (333 percent of average). The Pahoia gage had the highest daily total of 9.37 inches on April 15. Records for the wettest April were broken at Glenwood, Pahoia, and Piihonua. Kamuela, Mountain View, Pahala, and Waiakea Uka had their highest April totals since 2004, and Kamuela Upper had its wettest April since 1998.

Big Island rainfall totals were mostly near to above average for 2018 through the end of April. The few below average totals were scattered across various parts of the island. The Saddle Road Quarry gage had the highest year-to-date total of 147.62 inches (288 percent of average).



American Samoa (Mark L, Clint):

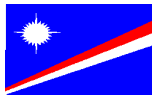
The month May record 189% of normal (% of normal and % are synonymously used throughout this call-note) rainfall. The island is very wet now with few flash floods. There is no report of any significant damage. Sea level stays elevated but there is no report of any inundations. Model-based PEAC's seasonal climate outlook is now indicating average to above-average rainfall with moderate confidence. The sea level is staying above but stable now. Forecasts indicate that it will stay elevated over the next three months (AMJJ).



Kwajalein (Mark L, Clint):

The atoll experiences a relatively dry windy season from mid-December to mid-May and a relatively wet calm (wind) season from mid-May to mid-November. Normal annual rainfall is approximately 100 inches; approximately 72% of the annual rainfall occurs during the wet season and 28% occurs during the dry season. The month of April recorded 229% rainfall. The rainfall in March was significant too. The atoll is currently very wet with strong trade winds. PEAC-model forecasts have trended to show above-average rainfall and elevated sea level over the next 3 months, and there is no active TC warning now.

Reports from around the Region (CON'T)



Majuro (Mark L, Clint):

Majuro had been receiving good rainfall since January 2018. The rainfall in March (343%) and April (189%) significantly improved Majuro's drought situation and made the island wet. The drought statement issued in the last week of April was the last. With the considerable rainfall for the last three months, the concern for "abnormal dry" weather condition has faded. As anticipated by PEAC and the PacIOOS wave run-up model forecasts for Majuro, tides have been high with high waves, but there was no inundation and damage, so far. PEAC-model forecasts have trended average to average-above rainfall and elevated sea level over the next 3 months, and there is no active TC warning now.



Pohnpei (Wallace):

Pohnpei have lately been, "Plenty wet". It has become very wet now with 440% of rainfall in the month of March (wettest month in 66 years) and 102% rainfall in April. The trade-winds have been strong and the sea level has been high with high waves. There were several flood warnings issued in the months of March and April. Despite wet climate it feels very hot now (*PEAC call it a diagnostic signal of forthcoming El Niño*), especially, starting from the 1st week of May. PEAC-model forecasts have trended average-above rainfall and elevated sea level over the next 3 months.



Kosrae (Eden):

Kosrae received 181% of normal rainfall in March and 105% in April. After prolonged dry periods, the situation has improved in Kosrae. Currently, the island is wet. The trade-winds have been strong and the sea level has been high with high waves. One flood warning was issued but there was no damage reported, so far. PEAC forecasts have trended to show average rainfall for the next three months.



Chuuk (Sanchez):

Despite good rainfall in the last couple of months: January (99%), February (175%), and March 13%, Chuuk recorded only 45% of rainfall in April. This small amount of rain fell in the northern part of the island. There were larger high-tides with waves and high-surf adversaries. There were some inundations in the lagoon and windward sides of the island, but didn't cause any major damage. There was no landslide or mudslide and no report of insufficient water. PEAC forecasts are favoring above-average rainfall and high sea level in the next season.



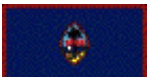
Yap (Chip, Clint):

Yap is fairly dry now. It received only 67% rainfall in April. There were some convergences, but it produced some rainfall to the northern side of Yap. However, everything looks normal in Yap—reservoirs are full and streams are flowing well. The overall climate was feeling cold, which was caused partly due to the flow of tradewinds. The island is relatively high and the south-west part of the island is protected by mangrove forest, so it is protected from any minor inundation problem. PEAC forecasts are favoring above-average rainfall and high sea level in the next three months.



Palau (Clint):

Palau has been dry with putty shower. It is current bit drier than normal. The rainfall at Palau tracks ENSO so well that it makes a good ENSO index in its own right! Sea level is reading 0-level (normal). The normal sea level and drier than normal atmospheric climate is a precursor of forthcoming El Niño. PEAC forecast favors average rainfall in the next season.



Guam and CNMI (Mark L, Chip, & Clint):

With weak La Niña now in-place, and expected to transition to ENSO-neutral over the next few months, it is not surprising that computer model forecasts have aggressively indicated above average rainfall over Guam and Saipan. However, for the past three months, such aggressive forecasts for wetter than average rainfall for Guam and the CNMI have been incorrect; instead, a "personal" drought occurred in the region. The PEAC has manually tempered the current model aggressiveness for above average rainfall for Guam and the CNMI. Reasons for this persistent dryness include a weak and largely absent monsoon and a lack of tropical cyclone activity. This situation has changed and, after prolonged dry conditions, Guam and Saipan is moderately wet now—particularly in the month of April. The 316% and 332% of rainfall in Guam and Saipan have significantly improved the dry conditions and changed these two islands to wet and green. PEAC forecasts are now indicating average rainfall for both Guam and Saipan over the next three months and slightly elevated sea level.



Reports from around the Region (CON'T)



Tropical Cyclones (Chip, Mark L)

We expect more tropical cyclone activity than in 2016 and 2017, about the same activity as in 2015 for Guam (Typhoon Dolphin), but not quite as busy as 2015 for the CNMI (Typhoons Soudelor and Dolphin). 2. For the remainder of the year, there is a 50% chance of getting a strong tropical storm (sustained winds 50-73 mph) and a 25% chance of getting a Category 1 typhoon (sustained winds 74-95 mph). The chance of getting a Category 2 typhoon (sustained

winds 96-110 mph) is about 15%, while the chance of getting a Category 3 typhoon (sustained winds 111-129 mph) is around 10%. Tropical cyclone activity for Guam could begin a little late, toward mid-summer, but keep in mind that the weather patterns can change quite rapidly. Remember, we are in the only basin that can get a typhoon any month of the year.

Saipan and Tinian could see a nearby tropical storm in July, but could be impacted by a typhoon in October, November, or December. Rota could see a nearby tropical storm or typhoon in July, but could be impacted by a typhoon in late October, November, December, and/or early January.

Sea Level Discussion Remarks (Rashed) All values are in inches (1 inch=25.4 mm); Seasonal cycle removed.

Tide Gauge stations			Monthly mean ¹ anomaly				FMA 2018			Monthly max ² anomaly		
			Observed rise/fall							Observed rise/fall		
			Feb/ 2018	Mar/ 2018	Apr/ 2018					Feb/ 2018	Mar/ 2018	Apr/ 2018
Marianas, Guam	+4	4.2	+7.5	+8	+6	Above/ Stable	+21	4.1	+24	+23	+20	
Malakal, Palau	+0	4.8	+1.5	+6	0	Above/ falling	+36	4.9	+39	+41	+37	
Yap, FSM	+4	4.7	+8.5	+7	+6	Above/ Stable	+33	5.2	+35	+35	+32	
Chuuk, FSM***	+3	*	+3.8	+5.2	+2.8	Above/ falling	+32					
Pohnpei, FSM	+4	2.6	+8.5	+6.2	+4.6	Above/ Stable	+32	3.0	+41	+34	+32	
Kapingamarangi	+7	**	+9	+7.5	+6.6	Above/ Stable	+28	3.7	+38	+29	+28	
Majuro, RMI	+4	2.0	+8.8	+5	+5	Above/ Stable	+42	2.6	+48	+45	+43	
Kwajalein, RMI	+3	2.8	+7	+4.4	+1.7	Above/ Falling	+40	3.2	+47	+46	+36	
Pago Pago*	+6 (+2)	3.9	+10.5 [+5.5]	+10.5 [+5.5]	+10.5 [+5.5]	Above/ Stable	+33 (+27)	4.2	+38	+34	+31	
Honolulu	+2	1.7	+3	+2	+2	Above/ Stable	+22	2.0	+25	+18	+16	
Hilo	+2	1.9	+4	+1	+3.5	Above/ Stable	+25	2.6	+29	+21	+23	

+/- indicate positive anomaly (rise) and negative anomaly (fall) respectively. Note that any changes between (0~ ±1) inch is considered to be negligible. Also note that changes within the range of (+/-) 2 inches are unlikely to cause any adverse climatic impact. *** (Experimental) Satellite Aviso Altimetry data, ** Data currently unavailable; *Figures in parenthesis for monthly-max anomaly indicates difference between the maximum anomaly for the given month and the long-term monthly average anomaly.*

1: Difference between the mean sea level for the given month and the **1983 through 2001 monthly mean sea level value at each station (seasonal cycle removed)**; 2: Same as 1 except for maxima; SD stands for standard deviations.

* **In Pago Pago**, There was a level shift (approximately 5 inches) in American Samoa at the time of September 2009 earthquake. So, -5 inches has been adjusted (shown in parenthesis) to the current tide-gauge values of Pago Pago.

Current Conditions: Weak La Niña to ENSO neutral conditions are observed in the tropical Pacific. However, SSTs remain below average in the central and eastern equatorial Pacific, but have weakened compared to March 2018. The lingering impact of la Niña will still be present for some time higher-than-normal sea level is expected—currently most of the north Pacific stations are 2-6 inches above normal. Only Palau is reading normal. Earlier, Hawaii sea levels returned to normal, but Hilo recorded some considerable rise in April.

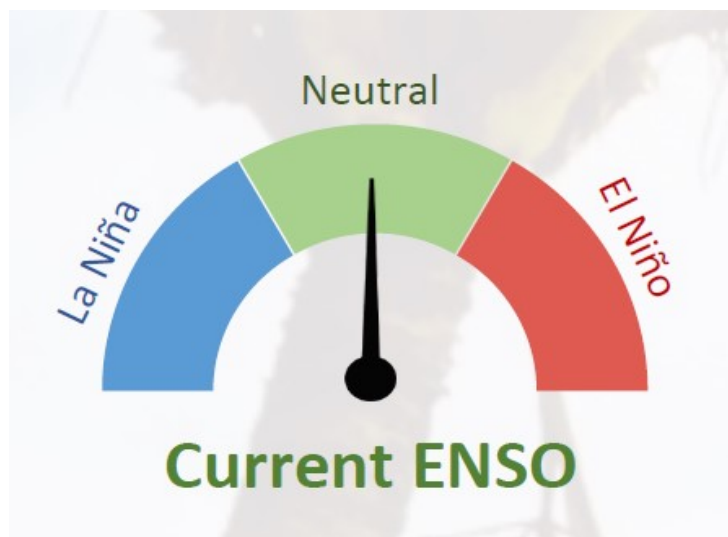
Forecasts for AMJ: PEAC-CCA Statistical model is predicting 3-6 inches above normal sea levels within the USAPI region. Complementary to PEAC forecasts, some dynamical models are also predicted high sea levels (see <https://uhsic.soest.hawaii.edu/sea-level-forecasts/>). These models suggest an increase in sea levels (likely exceeding 15 cm above-normal for Majuro, Pohnpei, and Chuuk during the next four to six months. The rise seems related to oceanic Rossby waves.

5. Current State of ENSO and predictions: () **ENSO Alert System Status: Final La Niña Advisory**

Synopsis: : ENSO-neutral is favored through September-November 2018, with the possibility of El Niño nearing 50% by Northern Hemisphere winter 2018-19.

During April 2018, the tropical Pacific returned to ENSO-neutral, as indicated by mostly near-to- below average sea surface temperatures (SSTs) along the equator. The latest weekly Niño indices were near zero in all regions (between +0.2°C and -0.3°C), except for Niño-1+2, which remained negative (-0.6°C). Subsurface temperature anomalies (averaged across 180°-100°W) remained positive, due to the continued influence of a downwelling oceanic Kelvin wave. Atmospheric indicators related to La Niña also continued to fade. While convection remained suppressed near and east of the Date Line, rainfall near Indonesia was also below average during the month. Low-level winds were near average over most of the tropical Pacific Ocean, and upper-level winds were anomalous westerly over the eastern Pacific. Overall, the ocean and atmosphere system reflected a return to ENSO-neutral.

The majority of models in the IRI/CPC plume predict ENSO-neutral to continue at least through the Northern Hemisphere summer 2018. As the fall and winter approaches, many models indicate an increasing chance for El Niño. Therefore, the forecaster consensus hedges in the direction of El Niño as the winter approaches, but given the considerable uncertainty in ENSO forecasts made at this time of year, the probabilities for El Niño are below 50%. In summary, ENSO-neutral is favored through September-November 2018, with the possibility of El Niño nearing 50% by Northern Hemisphere winter 2018-19.



Source: NIWA , The Island Climate Update Bulletin

Summary:

There is 75% chance for **ENSO-neutral** conditions to continue during **May – July 2018** and 50% Chance for **El Niño** conditions to emerge during **September– November 2018**

Based on recent rainfall and sea level variability data in the USAPI region, PEAC's observations revealed that there is a diagnostic signal for a forthcoming El Niño.

6. Rainfall Outlooks for MJJ (Joe)

The verification result of FMA rainfall forecasts has been found to be encouraging with 10 hits and 4 misses (Heidke score: 0.4783). The stations that hit the forecasts were: Koror, Yap, Pohnpei, Kosrae, Kwajalein, Majuro, Pago Pago, Lihue, Honolulu, and Kahului. The 4 missed stations were Chuuk, Guam and Saipan, and Hilo. PEAC forecasts are based on six GCMs and two statistical models.

Note

Interpretation of tercile probability: The **Avg-above** probability, **30:35:35** forecasts in MJJ season means there is a **35%** chance (probability) for occurrence of excess rainfall during the MJJ season, **35%** chance for occurrence of rainfall within a pattern considered normal during the MJJ season, and **30%** chance for occurrence of deficit rainfall during the MJJ season. *Also note that excess and deficit limit for each of the stations are different*

<i>Location</i>	<i>Rainfall Outlook</i>	<i>Final Probabilities</i>
Palau		
Koror	Average	30:40:30
FSM		
Yap	Avg-above	30:35:35
Chuuk	Above	25:35:40
Pohnpei	Avg-above	30:35:35
Kosrae	Average	30:40:30
RMI		
Kwajalein	Above	25:30:45
Majuro	Avg-above	30:35:35
Guam and CNMI		
Guam	Avg-above	30:35:35
Saipan	Avg-above	30:35:35
American Samoa		
Pago Pago	Avg-above	30:35:35
State of Hawaii		
Lihue	Above	30:30:40
Honolulu	Above	30:30:40
Kahului	Above	25:30:45
Hilo	Above	25:30:45

7. Drought monitoring updates (Richard Heim).

A. End-of-April Monthly Drought Assessment:

- i. With WxCoder III data, we have 23 stations in the monthly analysis.
- ii. April was dry (less than the monthly minimum required to meet most water needs) at Chuuk & Yap. April was a little dry (but within 1 or 2 inches of the monthly minimum) in the FSM (Ulithi, Lukonor) and Marshalls (Jaluit & Utirik). It was wet at the rest of the USAPI stations. Fananu & Pingelap could not be analyzed due to missing data. The April monthly analysis (April 30) is consistent with the weekly analyses for April 24 and May 1, and in fact is the same as the May 1 analysis. Compared to the end-of-March analysis, drought conditions at the end of April improved (ended) in the Marianas, northern Marshalls, and eastern Yap State, and got a little worse in western Yap State.:

D2-S improved to D-Nothing at Guam & Saipan.

D1-S improved to D-Nothing at Rota.

D0-L improved to D-Nothing at Utirik & Wotje.

D0-S improved to D-Nothing at Woleai.

D-Nothing worsened to D0-S at Yap.

D0-S continued at Ulithi.

Fananu & Pingelap were missing too many days in April so could not be analyzed.

All other stations continued at a D-Nothing classification.

- B. Current (Weekly) Drought Conditions: The discussion above is the monthly (end of April) analysis. The latest weekly USAPI USDM assessment may show different USDM classifications. The latest weekly USAPI USDM assessment is for May 8 and shows D0-S at Fananu, but otherwise is the same as the end of April depiction.

- C. April NCEI State of the Climate Drought Report: I will include a discussion of USAPI drought conditions in my April 2018 NCEI SotC Drought & Synoptic reports (which will go online Monday, 5/14).

- i. The web page url will be:

<https://www.ncdc.noaa.gov/sotc/drought/201804#det-reg-pacis-usapi>

<https://www.ncdc.noaa.gov/sotc/synoptic/201804>

- D. Automated Ingest of Daily Rainfall Data: We are working with NWS, WRCC, and HPRCC personnel to have the WxCoder III daily data transmitted near-real time every day so we can incorporate it into our GHCN-Daily data base here at NCEI. This will enable us to automate the processing, which is a required step before we can make the USAPI USDM weekly analyses official and release them publicly (they are considered experimental now). – **Status: The computer program, that automates the ingest and processing of the data, is running every morning at 10 a.m. EST; I'm in the process of doing routine checking of the output; should have results the end of May.**

Weekly USAPI Drought Assessment:

- i. I assessed drought conditions for each week from December 9, 2014 through May 8, 2018.
- ii. Stations that don't have data (or enough data) for the week in question are designated as having No Data for that weekly assessment.
- iii. Source of the daily data for the weekly assessments: Guam and Pago Pago NWS web sites; Kwajalein PLCD web site; WRCC web sites for the automated stations; WxCoder III for most of the stations.
- iv. I will continue this on a weekly basis (Monday afternoons EST).

Preferred process: I can do the weekly rainfall analysis, send my drought classification recommendation to the USAPI folks (either just Guam or Guam and all WSOs) for confirmation and local impacts, then send it after any modification to the USDM author.

Discussion: Koror water problems may be due to influx of tourism (increased consumption), not due to drought, although surface water sources not up to standard. If Koror continues dry for the next week or 2, may consider giving them D0-S, but holding off for now.

***** Next Call– 14 June 2018, 1430 HST (15 June 2018, 0030 GMT)*****