NWS Climate Services

February PEAC Audio Conference Call Summary

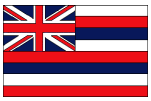
8 March, 1430 HST (9 March 2018, 0030 GMT)

February rainfall totals reported (Joe)

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

	Rainfall	% Norm	Normal	Departure	3 mon %
	Inches	February	Inches	inches	DJF
Koror	9.03	105	8.56	0.47	35.30
Yap	8.44	163	5.19	3.25	31.35
Chuuk	12.70	175	7.25	5.45	36.23
Pohnpei	20.94	219	9.55	11.39	63.83
Kosrae	19.03	147	12.93	6.10	55.50
Kwajalein	4.20	159	2.64	1.56	23.38
Majuro	8.29	120	6.88	1.41	43.64
Guam NAS	2.72	90	3.03	-0.31	8.15
Saipan	2.25	87	2.59	-0.34	7.53
Pago Pago	32.47	271	12.00	20.47	59.90
Lihue	9.15	497	1.84	7.31	10.70
Honolulu	4.12	416	0.99	3.13	7.58
Kahului	5.58	521	1.07	4.51	13.77
Hilo	15.45	184	8.38	7.07	39.98

Reports from around the Region



Hawaii (Kevin)

Kauai

Wet conditions affected the entire island of Kauai and all of the gages reported above average monthly rainfall totals. The USGS' gage on Mount Waialeale posted the highest monthly total of 51.78 inches (212 percent of average) and the highest daily total of 9.42 inches on February 26. The Hanapepe, Hanalei, Kokee, and Wailua gages recorded their highest February totals in a data record going back to the early 1990s. Mount Waialeale and Lihue Airport had their highest February totals since 1989.

Locations along the northwest, north, and northeast areas of Kauai had rainfall totals in the near to above average range for 2018 through the end of February. Nearly all sites located in the east, south, and west sides had above average year-to-date totals. Mount Waialeale had the highest 2018 year-to-date total of 76.95 inches (156 percent of average).

Oahu

Most of the gages on Oahu had monthly totals in the above average range for the month of February. The USGS' Poamoho Rain Gage No. 1 had the highest monthly total of 32.65 inches (207 percent of average). The highest daily total (midnight to midnight) of 10.38 inches came from the Hakipuu Mauka gage on February 18. However, the highest 24-hour total of 11.97 inches occurred at Ahuimanu during the period from 8 PM HST on February 17 through 8 PM HST on February 18, which encompassed the double-header flash flood events along the windward Koolaus. The gages at Hakipuu Mauka, Hawaii Kai Golf Course, Kahuku, Lualualei, Maunawili, Olomana Fire Station, and Poamoho all recorded their highest February totals in data records going back as far as 1991. The USGS' Poamoho Rain Gage No. 1 had its highest February total since 1979.

Almost all of the gages along the Koolau Range had totals for 2018 through the end of February in the above average range. Sites along the south shore and Waianae Range had totals in the near to below average range with several sites having to recover from significant January deficits. The USGS' Poamoho Rain Gage No. 1 had the highest year-to-date total of 44.19 inches (130 percent of average).

Maui

Above average monthly rainfall totals were posted by most of the gages across Maui County. The USGS' gage on top of Puu Kukui had the highest monthly total of 21.55 inches (82 percent of average) and the highest daily total of 5.71 inches on February 15. The Kaunakakai Mauka gage posted its highest February total in a data record going back to 1992. Kula Branch Station, Ulupalakua Ranch, and Kahului Airport had their highest February totals since 1982, 1989, and 1990, respectively.

A majority of the gages across Maui County had rainfall totals for 2018 through the end of February in the near to above average range. There were several sites with totals still in the below average range due to substantial dryness in January. The Puu Kukui gage had the highest year-to-date total of 38.31 inches (67 percent of average).

Big Island

Most of the gages on the Big Island logged above average monthly totals for February. The USGS' Saddle Road Quarry gage had the highest monthly total of 38.90 inches (375 percent of average), of which 30.30 inches occurred during the last 7 days of the month. The highest daily total was 16.74 inches from the National Park Service's Pali 2 rain gage on February 15. This was an odd heavy rain event that primarily occurred over the lower elevations of the Kau District with rainfall pouring onto mostly porous lava flows with no known flooding impacts. The Pahala rain gage had its highest February total in a data record going back to 1991, and the Kapapala Ranch gage posted its highest February total since 1979.

Rainfall totals for 2018 through the end of February were in the near to above average range at most of the gages in the North Hilo, South Hilo, Puna, and Kau Districts. Many of the sites in the North Kona, South Kona, and South Kohala Districts had year-to-date totals remaining in the below average range due to significant January dryness. The Saddle Road Quarry gage had the highest year-to-date total of 69.82 inches (335 percent of average).

American Samoa (Mark, Chip, Rashed):

The 2017 annual rainfall at the WSO Pago Pago was moderately above average despite seven months of the year having below average rainfall. Very high rainfall in some of the wet months (notably May and October) more than compensated for the deficit accrued during the below-average months. Early on the morning of 09 February, Cyclone Gita swept past American Samoa bringing a period of damaging west-northwesterly wind, with a peak gust of 63 mph recorded at the WSO Pago Pago. The cyclone was tracking to the east-southeast along the axis of the monsoon trough during its passage to the south of American Samoa. Very heavy flooding monsoonal rains occurred in American Samoa during the two days prior to the direct passage. The WSO Pago Pago reported 5.24 inches of rainfall on the 7th and 2.60 inches on the 8th. February recorded 271% of normal (% of normal and % are synonymously used throughout this call-note). Sea level stays elevated but there is no report of any inundations. Model-based PEAC's seasonal climate outlook is now indicating above-average rainfall with moderate confidence. The sea level will stay elevated over the next three months (MAM).

Reports from around the Region (CON'T)

Kwajalein (Jason, Rashed, Mark):
Over the past two years (2016, 2017 and to-date in early 2018) the RMI has undergone substantial variations of rainfall. The pattern of rainfall variation was very similar during both 2016 and 2017; with both years beginning very dry and then ending very wet. The month of February and January recorded 159% and 458%. As anticipated by PEAC and the PacIOOS wave run-up model forecasts for Kwajalein, tides have been relatively high with higher-than-normal waves, and there was some minor inundation on February 27 and 28; otherwise, the overall island climate is typical with strong trade winds. However, there was no severe damage reported, so far. 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.

Majuro (Nover):
Majuro had good rainfall in December (172%) and January (204%) that is helping them to keep their water reservoirs around 31 million gallons. Majuro is having high sea level and high tides since October 2017. As anticipated by PEAC and the PacIOOS wave run-up model forecasts for Majuro, tides have been very high with high waves causing some inundation (Pic 1). Event was associated with northerly swell from northern Pacific storm. PEAC-model forecasts have trended above average rainfall and elevated sea level over the next 3 months, and there is no active TC warning now.

Picture. 1: Tides and Inundation pictures in Majuro during February 3-4 high tides (top: inundated roads, bottom: inundated houses). Event is associated with northerly swell from northern Pacific storm. (Photo Credit: Mr. Charles C Guard).

Pohnpei (Wallace, Mark):
For most of 2017, Pohnpei Island and the atolls of Pohnpei State had a long period of uneventful tranquil weather. The 2017 annual rainfall total at the WSO Pohnpei was above average, but with high month-to-month variability. Pohnpei remains sustainable without any major problems as the Island and most of the atolls of Pohnpei have lately been, "Plenty wet". It also received 219% of normal rainfall in February. The trade-winds have been strong and there were six tropical storms. The sea level has been high and there were high waves that caused minor inundations without any severe damage. PEAC forecasts have trended above-average rainfall and continuation of elevated sea level for the next three months.

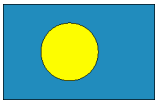
Kosrae (Wallace):
Kosrae received 123% and 100% of rainfall in December and January. After prolonged dry periods, the situation has improved in Kosrae. There were some high tides that inundated low-lying areas, but no damage reported, so far. Currently, the island is wet. PEAC forecasts have trended to show average-above rainfall for the next three months.

Chuuk (Sanchez/Rashed):
Chuuk has had good rainfall in the last couple of months: November (105%), December (12%), January (99%), and February (175%). There were larger high-tides with waves, which inundated some low-lying atolls and a boat was capsized causing major damage but no fatalities were reported from the incident. PEAC forecasts are favoring above-average rainfall and high sea level in MAM season.

Reports from around the Region (CON'T)

Yap (Mark/Rashed):

Yap has been wet for the last couple of months. It received 132%, 182%, and 163% rainfall in December, January, and February respectively. It has been wet for so long time that some of the residents are now complaining about wanting to get back to their regular dry season (dry season is necessary for their agriculture)! Everything looks normal in Yap—reservoirs are full and streams are flowing well. Sea level has been relatively high (9 inches above normal), but the island is relatively high and the south-west part of the island is protected by mangrove forest. Therefore, the island is relatively safe from any severe inundation problem. PEAC forecasts are favoring above normal rainfall and high sea level in the MAM.



Palau (Mark, Chip, Rashed):

As compared to other islands, Palau is bit drier now. It received 105% of normal rainfall in February. The Jelly fish are also coming back. The rainfall at Palau tracks ENSO so well that it makes a good ENSO index in its own right! During La Niña, the ONI is cold and Palau's rainfall is high. Currently, the state of ENSO is leaning towards neutral, so normal rainfall is expected in the forthcoming months. PEAC forecast still favors above average rainfall in MAM. Sea level is gradually coming back to normal.

Guam and CNMI (Mark):

The character of the weather throughout 2017 was rather mellow and unremarkable in Guam and the CNMI. The monsoon was late, and then either weak or absent through the rainy season. Tropical cyclone activity was below average. Dry conditions became established in November and December as the monsoon departed and TC activity in the basin shifted far to the west. The rainfall recorded in January was only 23% of normal and the rainfall in February was 90% of normal. While the climate model output largely indicates a wetter Guam in DJF, Guam has been found to be dry during the same time period. While the rainfall in Saipan was 62% and 60% in November and December respectively, it received 87% of normal rainfall in February. Both Guam and Saipan are dry now! Reasons for this persistent dryness include a weak and largely absent monsoon and a lack of tropical cyclone activity. PEAC forecasts are now indicating average rainfall for both Guam and Saipan over the next three months. The climate is now in a state of La Niña, and La Niña (0) correlates well with average-to-above average rainfall in Guam.

Tropical Cyclones (TC) (Mark, Rashed)

For all the wild and crazy hurricane activity in the Atlantic basin, the TC activity in the Pacific was well below average in many categories. The inactivity of the Pacific was enough, and in some cases more than enough, to cancel the influence of Atlantic high activity on the summation of TC activity for the whole Northern Hemisphere! A particular characteristic of the 2017 typhoon season was a clustering of activity across the South China Sea. The westward and northward displacement of the 2017 TCs are consistent with the development of La Niña. However, early on the morning of 09 February, the only Cyclone Gita, swept past American Samoa.

Despite the lack of customary guidance, the PEAC anticipates that TC activity numbers will be at least near average during 2018. For example, the average annual number of named tropical cyclones passing within 180 n mi of Guam, the CNMI, Yap, or Palau is four. The average yearly threat of a damaging typhoon strike on Guam is roughly 1-in-7, or 15%. And with due consideration to these local agency forecasts and the recent track of Cyclone Gita near American Samoa and Tonga, the PEAC foresees near average TC activity for the remainder of the cyclone season (ending 30 June 2018) for American Samoa.

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

Tide Gauge stations	Seasonal Forecasts MAM (mean[1]) (ano)	SD of DJF (mean)	Monthly mean[1] anomaly Observed rise/fall Dec/ 2017	Jan/ 2018	Feb/ 2018	Current State/ Trend NDJ 2017	Seasonal Fore-casts MAM (max[2]) (ano.)	SD of DJF (max)	Monthly max[2] anomaly Observed rise/fall Dec/ 2017	Jan/ 2018	Feb/ 2018
Marianas, Guam	**+5**	4.7	+7	+8	+7.5	Above/ Stable	+22	4.3	+22 (0)	+25 (3)	+24
Malakal, Palau	**+1**	5.3	+4	+3	+1.5	Above/ falling	+41	5.3	+44 (8)	+39 (3)	+39
Yap, FSM	**+5**	4.9	+9	+9.5	+8.5	Above/ Stable	+34	4.9	+40 (13)	+37 (9)	+35
Chuuk, FSM***	**+3**	*	+9	+6	+3.4	Above/ falling	+34		N/a		
Pohnpei, FSM	**+4**	4.4	+5	+7.5	+6	Above/ Stable	+36	4.3	**	**	**
Kapingamarangi	**+6**	**	**	**	+9	Above/ Stable		**	**	+38	+38
Majuro, RMI	**+4**	3.1	+8	+8	+6.3	Above/ Stable	+45	3.0	**	**	**
Kwajalein, RMI	**+4**	3.6	+6	+9	+7	Above/ Stable	+44	3.8	+47 (10)	+47 (10)	+47
Pago Pago*	**+7 (+2)**	3.2	+11.5 [+6.5]	+11.5 [+6.5]	+10.5 [+5.5]	Above/ Stable	+32 (+27)	3.5	+38(5) [33]	+38(5) [33]	+38
Honolulu	**+2**	1.7	+4.7	+4.7	+3	Above/ Stable	+23	2.4	+26 (6)	+27 (7)	+25
Hilo	**+1**	2.0	+5.5	+3.5	+4	Above/ Stable	+26	2.8	+28 (5)	+31 (8)	+29

+/- 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: D*ifference 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: Atmospheric and oceanic signals are leaning towards weak La Niña. La Niña means higher-than-average sea level—currently all stations are 4-10 inches above normal. This could potentially impact islands with minor coastal flooding or salt water intrusions and increase vulnerability to flooding from storms or large waves.

Forecasts for MAM: PEAC-CCA Statistical model is predicting 1-7 inches above normal sea levels with reasonably high skill for the whole USAPI region. ***Complementary to PEAC forecasts, some dynamical models are also predicted high sea levels*** during the next three months. According to UHSLC forecasts (see https://uhslc.soest.hawaii.edu/sea-level-forecasts/), at longer leads (four to six months) these models suggest an increase in sea levels (likely exceeding 6 inches/15 cm above-normal for Majuro, Pohnpei, and Chuuk). Sea levels are predicted to gradually lower around Hawaii.

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

Synopsis: A transition from La Niña to ENSO-neutral is most likely (~55% chance) during the March-May season, with neutral conditions likely to continue into the second half of the year.

During February 2018, La Niña weakened, but was still reflected by below-average sea surface temperatures (SSTs) in the east-central equatorial Pacific Ocean. The latest weekly index values were -0.8°C and -0.6°C in the Niño-3.4 and Niño-3 regions, respectively, and were near zero in the surrounding Niño.4 and Niño1+2 regions. While negative anomalies were maintained near the surface, the sub-surface temperature anomalies (averaged across 180°-100°W) warmed to near zero. This warming was due to the eastward propagation of above-average temperatures along the thermocline in association with a downwelling equatorial oceanic Kelvin wave. The atmospheric anomalies typical of La Niña weakened considerably across the tropical Pacific. Convection was suppressed near Indonesia and was only weakly enhanced over the far western Pacific. Also, low-level wind anomalies were westerly over the western and central Pacific, while upper-level winds remained anomalously westerly over the eastern Pacific. Overall, the ocean and atmosphere system suggests La Niña is weakening.

Most models in the IRI/CPC plume predict La Niña will decay and return to ENSO-neutral during the Northern Hemisphere spring 2018. The forecast consensus similarly favors a transition during the spring, with a continuation of ENSO-neutral conditions through the summer. In summary, a transition from La Niña to ENSO-neutral is most likely (~55% chance) during the March-May season, with neutral conditions likely to continue into the second half of the year.

According to NIWA 'The Island Climate Update Bulletin', while weak La Niña conditions remain present in the Pacific Ocean, the breakdown of the atmospheric signals, along with expansion and intensification of warmer than normal subsurface ocean waters toward the central Pacific, that La Niña has reached its decay phase. This tendency is expected to continue over the next few months: the international consensus is for a rapid transition to an ENSO-neutral state over the next three month period (69% chance over March – May 2018). ENSO neutral remains the most likely outcome over the winter season (June – August 2018), but the models indicate that a transition towards El Niño becomes increasingly likely thereafter (45% chance for El Niño conditions to emerge over the September – November 2018 period).

Source: NIWA , The Island Climate Update Bulletin

6. Rainfall Outlooks for MAM (Joe)

The verification result of DJF rainfall forecasts has been found to be encouraging with 10 hits and 4 misses (Heidke score: 0.4830). The stations that hit the forecasts were: Yap, Chuuk. Pohnpei, Kosrae, Majuro, Pago Pago, Lihue, Honolulu, Kahului, and Hilo. The 4 missed stations were Koror, Kwajalein, Guam and Saipan. While the forecasts for DJF were above rainfall for Guam and Saipan, the observed rainfall was below. PEAC forecasts are based on six GCMs and two statistical models. The forecast problems for Guam and Saipan are partly because of the limitations of GCMs. Because in GCMs, many small-scale features, such as a temporary but significant shift in the prevailing trade winds or unusually dry surface conditions due to increased evaporation cannot be represented even though they may significantly impact the local, regional, or even global climate. Therefore, direct model-based interpretation is sometimes difficult for the small island countries. PEAC is carefully monitoring the forecast quality and would emphasize more on statistical downscaling and local-experience-based interpretation.

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

Note

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

7. Drought monitoring updates (Richard Heim**).**

A. End-of-February Monthly Drought Assessment:

i. With WxCoder III data, we have 23 stations in the monthly analysis.

ii. February was dry (less than the monthly minimum required to meet most water needs) in the Marianas (all stations), most of the Marshalls (except Jaluit & Majuro), and 4 stations in the FSM (Ulithi, Woleai, Fananu, & Pingelap); it was wet elsewhere in Micronesia and in American Samoa. The February monthly analysis (February 28) is consistent with the weekly analyses for February 27 and March 6 and, in fact, matches both of these analyses. Compared to the end-of-January analysis, drought conditions at the end of February were the same as at the end of January:

D1-SL continued at Utirik and Wotje.
D1-S continued at Guam, Rota, & Saipan.
All other stations continued at a D-Nothing classification (no drought or abnormal dryness).

iii. I started plotting rainfall for Mwoakilloa as a comparison station for Pingelap.

B. Current (Weekly) Drought Conditions: The discussion above is the monthly (end of February) analysis. The latest weekly USAPI USDM assessment may show different USDM classifications. The latest weekly USAPI USDM assessment is for March 6 but is the same as February 28.

C. February NCEI State of the Climate Drought Report: I will include a discussion of USAPI drought conditions in my February 2018 NCEI SotC Drought reports (which will go online next week).

i. The web page url is:

https://www.ncdc.noaa.gov/sotc/drought/201802#det-reg-pacis-usapi

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.**

E. Weekly USAPI Drought Assessment:

i. I assessed drought conditions for each week from December 9, 2014 through March 6, 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; WcCoder III for most of the stations.

iv. I will continue this on a weekly basis (Monday afternoons EST).

v. 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.

Participants:

NWS Climate Services Program Managers (CSPMs): Joe Brinkley

WSO Climate Service Focal Points (CSFPs):

Nover (Majuro)	Sanchez (Chuuk)	Wallace (Pohnpei)
(Kosrae)	(Yap)	(Pago Pago)
(Palau)	Jason (Kwajalein)	Mark/Chip/Clint (Guam & CNMI)

PEAC Principal Research Scientist: Rashed Chowdhury

WERI Scientist: Mark Lander

CPC Forecaster: Matthew

WFO Guam : Chip Guard, Clint Simpson

NWS MIC, Honolulu: Christopher Brenchley

NCEI: Richard Heim

Pacific RISA: Krista Jaspers

NWS Hydrologist: Kevin Kodama

Additional Attendees:

***** Next Call– 12 April 2018, 1430 HST (13 April 2018, 0030 GMT)*****