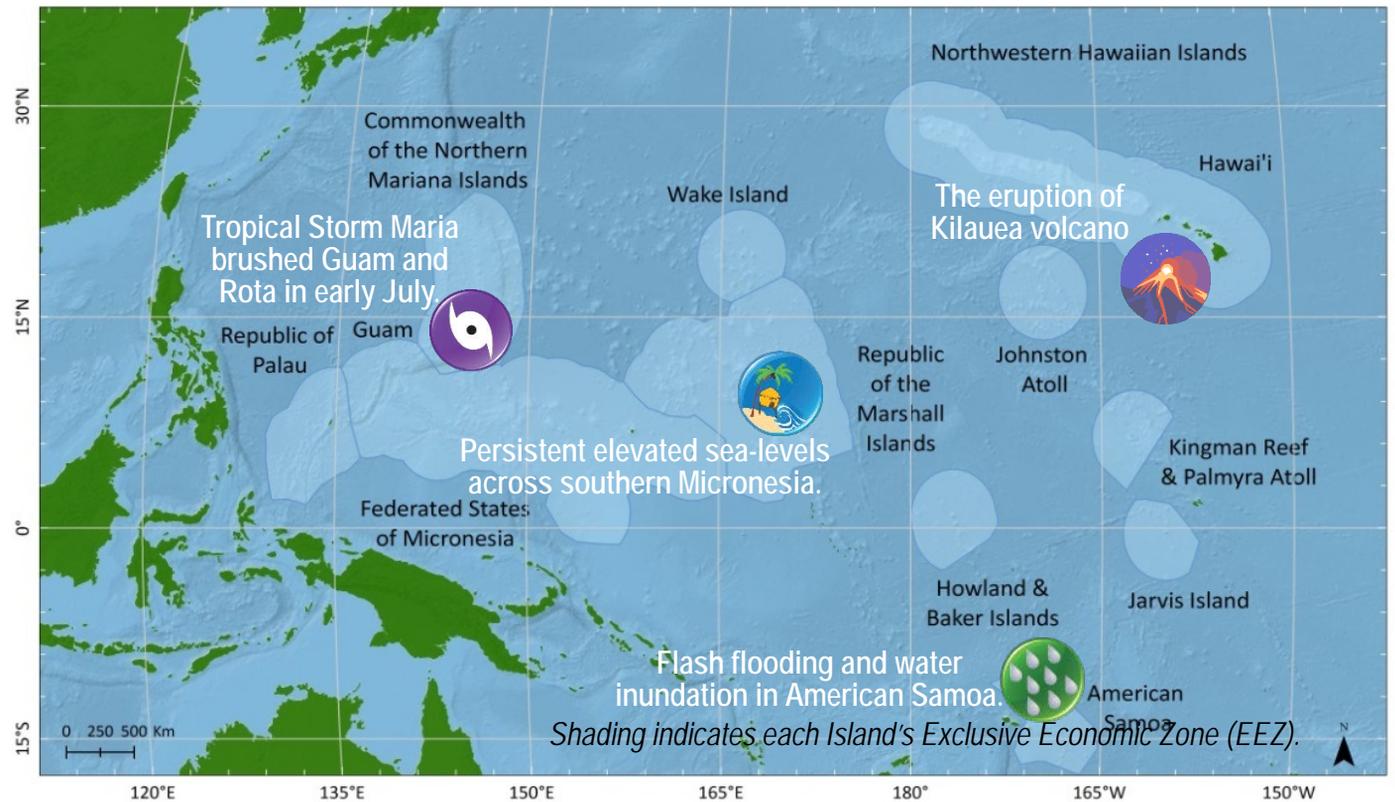




Significant Events – For May 2018-July 2018



El Niño Watch

Highlights for Hawaii and the U.S. Affiliated Pacific Islands

- Near normal rainfall was observed in American Samoa with a few isolated periods of intense rainfall and flooding.
- Below normal rainfall fell in Yap and Palau while near normal rainfall fell across Pohnpei, Chuuk, and Kosrae and much above normal rainfall fell in the Republic of the Marshall Islands.
- Tropical Storm Maria brought gusty winds and heavy rains in early July as it moved across Guam and parts of the Commonwealth of the Northern Mariana Islands.
- In Hawaii, attention was focused on the continuous and vigorous eruption of the Kilauea volcano on the Big Island, which at times brought light coatings of ash to nearby communities.
- Sea-levels remain elevated across the southern areas of the Federated States of Micronesia and the Republic of the Marshall Islands.
- Sea-surface temperatures continue to warm and are now above normal across much of the Pacific basin.

Climate Overview – For May 2018–July 2018

The 1 August Niño 3.4 region anomaly was $+0.4^{\circ}\text{C}$, supporting a neutral state.

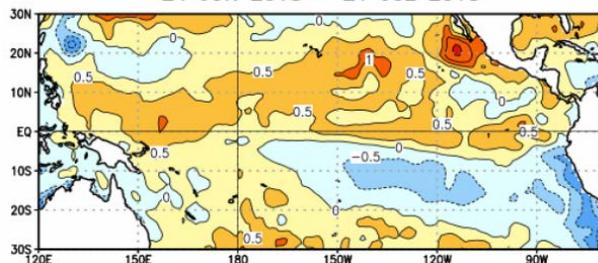
Sea-surface temperatures are above normal across much of the Pacific with $+0.5^{\circ}\text{C}$ anomalies stretching from Guam all the way east to Mexico. An area of cool SST anomalies continues in the southeastern Pacific off the coast of South America. **Positive sub-surface water temperature anomalies exist across the entire domain**, with the warmest observations near 130°E at a depth of 150m and 120°W at a depth of 75m. As a result of the unusually warm waters throughout the western Pacific Islands, a coral reef bleaching watch is in place across the basin.

Above-normal sea levels continue in the equatorial western and central Pacific as well as parts of the tropical southwestern Pacific. Sea levels lowered in northern Micronesia over the past several months. In Hawaii, May 8-9 had combined seas and swell to 11 feet under fresh to strong NE trades. The Pacific sea level pattern is consistent with neutral El Niño-La Niña atmosphere-ocean conditions, although rising equatorial sea levels are consistent with increasingly likely El Niño development that is suggested by most climate forecast models.

In Hawaii, *rainfall* for the quarter was: Honolulu (45%), Lihue (84%), Kahului (101%), and Hilo (90%). Elsewhere, from May-July, Saipan was above normal at 142% and Guam was above normal (120%). In Kwajalein and Majuro in the RMI, rainfall was much above normal, with 193% and 163% of average respectively. In the FSM, rainfall from May-July was distributed as follows: Chuuk (103%), Pohnpei (100%), and Kosrae (94%). Further west, May-July rainfall at Yap was below normal with 87% of average and Palau was 80%. In American Samoa, rainfall was near normal for the quarter (93%).

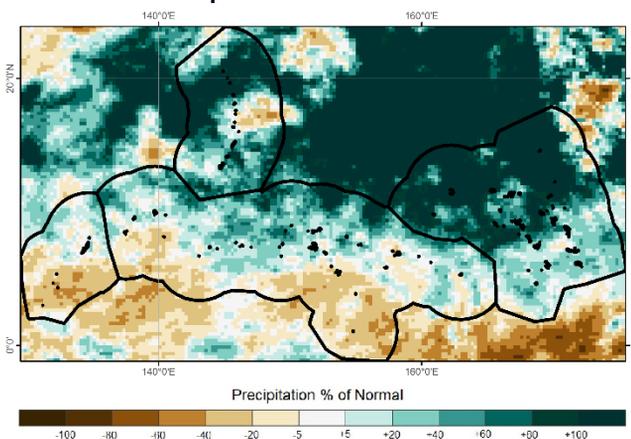
Tropical Cyclone (TC) activity in the western North Pacific basin was above normal with 16 numbered storms, the most significant of which was Typhoon Maria with maximum sustain winds of 120 mph. The storm developed near Guam before rapidly intensifying as it moved westward away from CNMI. In the southwest Pacific, the May-July period was very quiet with zero named storms or depressions.

Average SST Anomalies
24 JUN 2018 – 21 JUL 2018



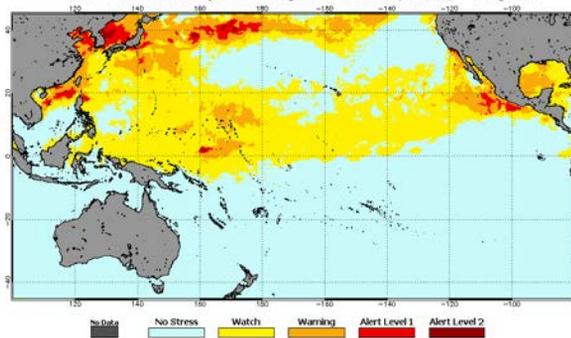
Sea-Surface Temperature Anomalies, valid July 26, 2018. Source: <http://www.cpc.ncep.noaa.gov/>

GPM Precipitation Anomalies for 2018 MJJ



May'18-July'18 precipitation anomalies. Source data [NASA GPM](#). Brown areas are dry; green areas wet.

NOAA Coral Reef Watch Daily 5km Bleaching Alert Area 7d Max (Version 3) 5 Aug 2018



NOAA's [Coral Reef Watch](#) Bleaching Alert Areas, valid 5 August 2018.



Severe flooding in Pago Pago. Photos courtesy of social media (Instagram and Twitter).



A passenger boat run aground due to strong trade winds. Photo courtesy of Sanchez Salle, WSO Chuuk.



Kilauea Volcano lava flow as seen by Sentinel satellite. Photo courtesy of Pierre Markuse.

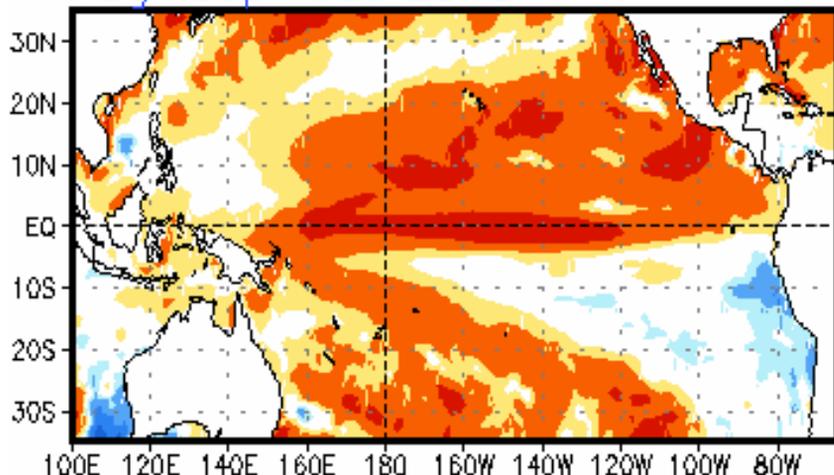
Facilities and Infrastructure – The eruption of Kilauea volcano began in earnest on 15 May, resulting in nearly two dozen fissures on the southeast side of the Big Island of Hawaii. A large eruption occurred on 17 May, sending a billowing ash plume 30,000 feet into the air. Fissure 8 was particularly active, feeding a robust channel of lava across the landscape which destroyed hundreds of homes on its way to the ocean. In addition, a 6.9 magnitude earthquake occurred in south Hilo, HI on 4 May which resulted in power outages for nearly 13,000 homes and businesses.

Elsewhere, on 12 May, a passenger boat was run aground at Mechitiw Village, Chuuk, due to strong trade winds. Then on 4 July, Tropical Storm Maria damaged a few aircraft at Andersen Air Force Base on Guam and a few substandard houses on Guam and Rota, CNMI. In addition, parts of the island were without power from downed trees and power lines due to the strong winds. On 5-6 July heavy rainfall was observed in Pago Pago, American Samoa with many low lying / low drainage areas experiencing flooding and inundation.

Natural Resources – May-June had typical longline activity with average to below average catches. Come late July, vessel activity dropped off with catches much lower. This is pretty normal for the tuna longline fishery.

Health – The Kilauea haze traveled all the way to Guam and beyond. The trip to Guam from the Big Island of Hawaii takes about 10 days riding the trade-wind flow. Meanwhile, a tour boat, sightseeing the ocean entry point of lava from the Kilauea volcano, was blasted by a littoral explosion resulting in 23 injuries. In mid May, three people were injured due to respiratory issues resulting from the inhalation of sulfur dioxide and fine particulate matter from the Kilauea volcano in Hawaii's Puna District. Local schools were also preemptively closed due to elevated levels of volcanic gasses.

Aug-Sep-Oct 2018



Sea-Surface Temperature Anomalies for Aug-Oct 2018. Source: <http://www.cpc.ncep.noaa.gov/>

Following the latest ENSO prediction models, there is a 65% chance of El Niño conditions by October 2018.

The SST anomaly outlook indicates a continuation of +0.5° C anomalies across Palau, FSM, RMI, and eastward to the Hawaiian Islands. Above normal SSTs are also projected for the waters around American Samoa. NOAA's Coral Reef Watch 4-month bleaching outlook projects continued heating and increased coral stress in the waters around RMI and the Howland and Baker Islands by October 2018. Minimal bleaching is expected throughout the rest of the Pacific, however, due to the continued absence of heat stress since northern hemisphere winter.

From August-October, above-normal sea levels are projected in the tropical southwestern and southcentral Pacific, including American Samoa. Meanwhile, below normal sea levels are projected for Yap and Guam, with near to slightly below sea levels for Chuuk and Pohnpei, while elevated sea levels persist around Majuro.

During the period August-October, rainfall is projected to be generally above normal across the Hawaiian Islands, southern FSM, much of RMI, Guam, and American Samoa. Near normal rainfall is projected for central FSM, and central CNMI. Below normal rainfall is anticipated for Palau, consistent with developing El Niño conditions.

Tropical cyclone (TC) activity in the western north Pacific is expected to be more active than either 2016 or 2017 – about 30 numbered storms. In the southwest Pacific, the period from Aug-Oct is climatologically the quietest part of the entire year and there are no indications that the upcoming period will be above the climatological average.

Pacific ENSO Applications Climate Center:

<http://www.prh.noaa.gov/peac/>

NOAA NWS Weather Forecast Office Honolulu:

<http://www.prh.noaa.gov/pr/hnl/>

NOAA NWS Weather Forecast Office Guam:

<http://www.prh.noaa.gov/pr/guam/>

NOAA National Centers for Environmental Information:

<http://www.ncei.noaa.gov/>

NOAA NMFS Pacific Island Fisheries Science Center:

<http://www.pifsc.noaa.gov/>

NOAA OceanWatch - Central Pacific:

<http://oceanwatch.pifsc.noaa.gov/>

NOAA Coral Reef Watch:

<http://coralreefwatch.noaa.gov/>

USGS Pacific Islands Water Science Center: <http://hi.water.usgs.gov/>

USGS Science Center – Pacific Coastal and Marine Science Center:

<http://walrus.wr.usgs.gov/>

University of Hawaii - Joint Institute of Marine and Atmospheric Research:

<http://www.soest.hawaii.edu/jimar/>

University of Guam - Water and Environmental Research Institute:

<http://www.weriguam.org/>

University of Hawaii Sea Level Center:

<https://uhslc.soest.hawaii.edu/>