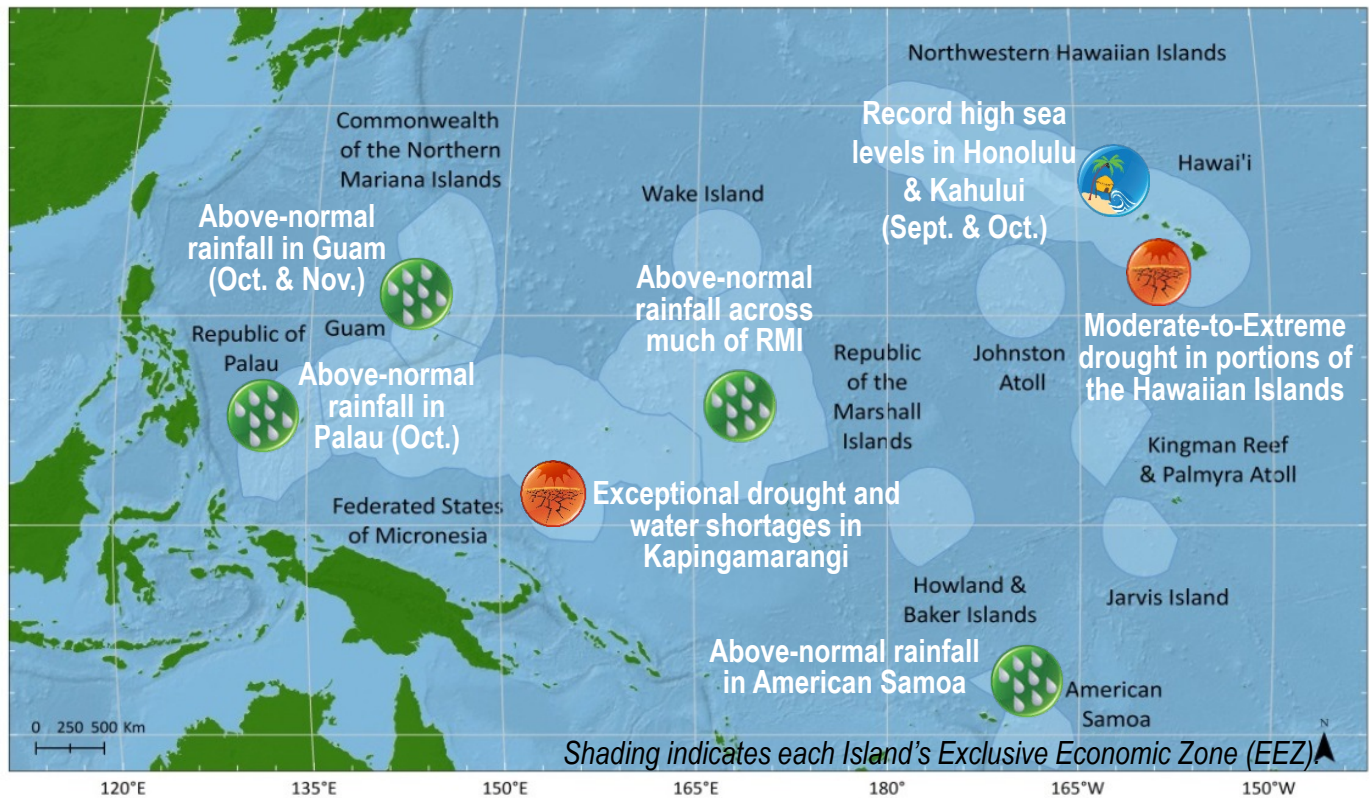


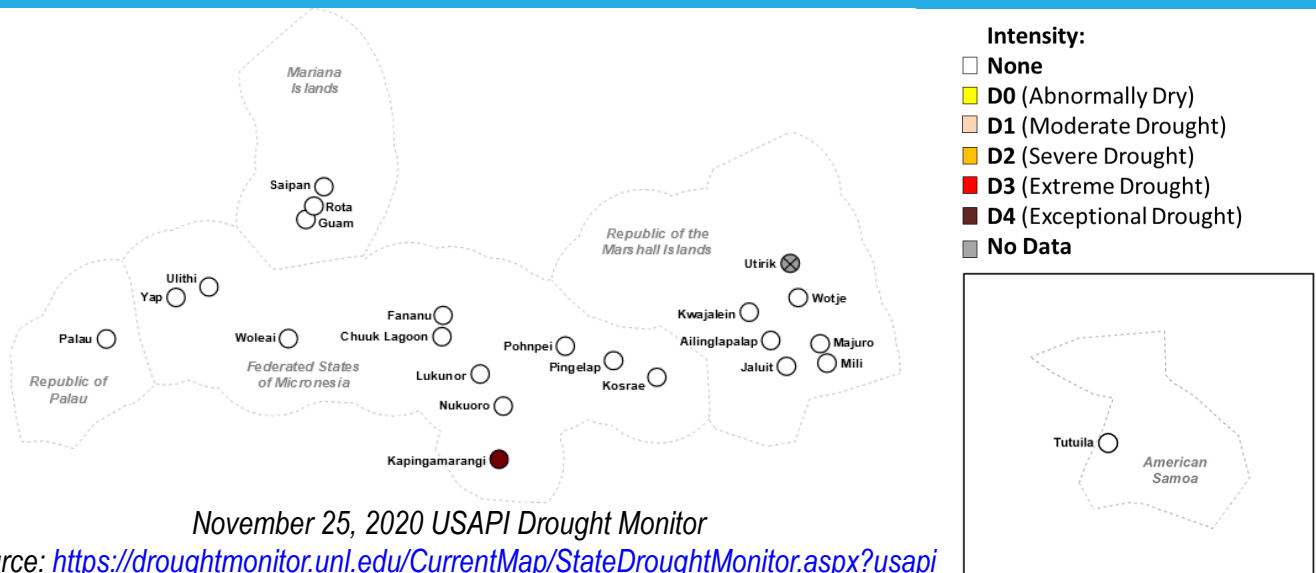
Significant Events – For September–November 2020



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

- La Niña Advisory in effect for the Northern Hemisphere winter 2020-21 (~95% chance) and advisory expected to persist into spring 2021 (~65% chance during March-May).
- Moderate-to-extreme drought conditions across portions of the Hawaiian Islands including Hawaii, Lanai, Maui, Molokai, and Oahu. Exceptional drought conditions observed in the Federated States of Micronesia (FSM) on Kapingamarangi Atoll.
- Western portions of the FSM reached a coral bleaching *Alert Level 2* in November.
- Kapingamarangi (FSM) observed its second driest Sept-Oct-Nov (SON) period on record and its driest January-November period on record. In American Samoa, Pago Pago logged its wettest SON on record and broke its annual precipitation record.
- Honolulu (Oahu) and Kahului (Maui) set records for monthly mean high sea levels for both September and October 2020.
- For the 2020 tropical cyclone season, 23 named storms impacted the Northwest Pacific region while 16 named storms were observed in the Northeast Pacific; both regions experienced below-normal tropical cyclone activity for the 2020 season.

Climate Overview – For September–November 2020



Across the central and eastern equatorial Pacific Ocean, sea-surface temperatures (SSTs) were below normal with La Niña conditions present and a La Niña Advisory in effect (11/30/20). All four Niño regions observed negative SST anomalies by the end of November—with the Niño 3.4 region at -1.3°C , Niño 3 at -1.4°C , Niño 1+2 at -1.0°C , and Niño 4 at -0.7°C .

Consistent with the ongoing La Niña event, sea levels in the tropical north-central and far western Pacific were above normal. Along the equator (east of $\sim 170^{\circ}\text{E}$) and the eastern Pacific, sea levels were below normal. For September and October, Honolulu and Kahului broke monthly mean high sea-level records while daily extreme high sea-level records were broken in Honolulu, Kahului, and Nawiliwili. Consistent with above-normal sea level around Hawaii, the Pacific Meridional Mode was extremely positive.

For the September through November period, nearly the entire U.S. Affiliated Pacific Islands region was drought free, except for Kapingamarangi in the southeastern FSM and Wotje (RMI). Median precipitation for the SON period was near normal with Saipan observing 18.89 in. (84% of normal) while Guam observed 38.04 in. (112% of normal). In Palau, above-normal rainfall was observed for the SON period with Koror precipitation at 103% of normal. In western FSM, Yap observed above-normal precipitation for SON with 40.96 in. (115% of normal). Elsewhere in FSM for SON, Pohnpei observed 58.64 in. (133% of normal) and Kosrae 56.9 in. (126% of normal). Conversely, Kapingamarangi (FSM) continued to be extremely dry for SON logging only 4.88 in. (15% of normal). In the RMI, Majuro observed 48.59 in. (127% of normal) for SON while Kwajalein logged 44.1 in. (138% of normal). In American Samoa, the well-above-normal rainfall levels continued with Pago Pago observing 49.78 in. (171% of normal)—with current year-to-date totals already breaking the annual precipitation record set in 1981. In the Hawaiian Islands, Hilo observed 32.4 in. (92% of normal) for SON while Honolulu logged 3.43 in. (69% of normal), Kahului 0.78 in. (21% of normal; 10th driest SON period on record), and Lihue 8.84 in. (85% of normal).

Tropical cyclone (TC) activity has been below normal in both the central North Pacific and Northwest Pacific regions. In the Northwest Pacific, the 2020 season saw most of the TC activity concentrated to the west and north of Micronesia with a total of 23 named storms since May and an ACE Index (Accumulated Cyclone Energy) of 148.5 by November 30, about $\sim 50\%$ of normal. In the central North Pacific region, the only significant TC events during the 2020 season were Tropical Depression Boris (first June tropical depression in the basin since 2001) and Hurricane Douglas in late July that passed just to the north of the Hawaiian Islands as a Category 1 hurricane.

Sectoral Impacts – For September–November 2020



Emergency water delivery arriving in Kapingamarangi in early November from Pohnpei. Photo credit: NOAA.

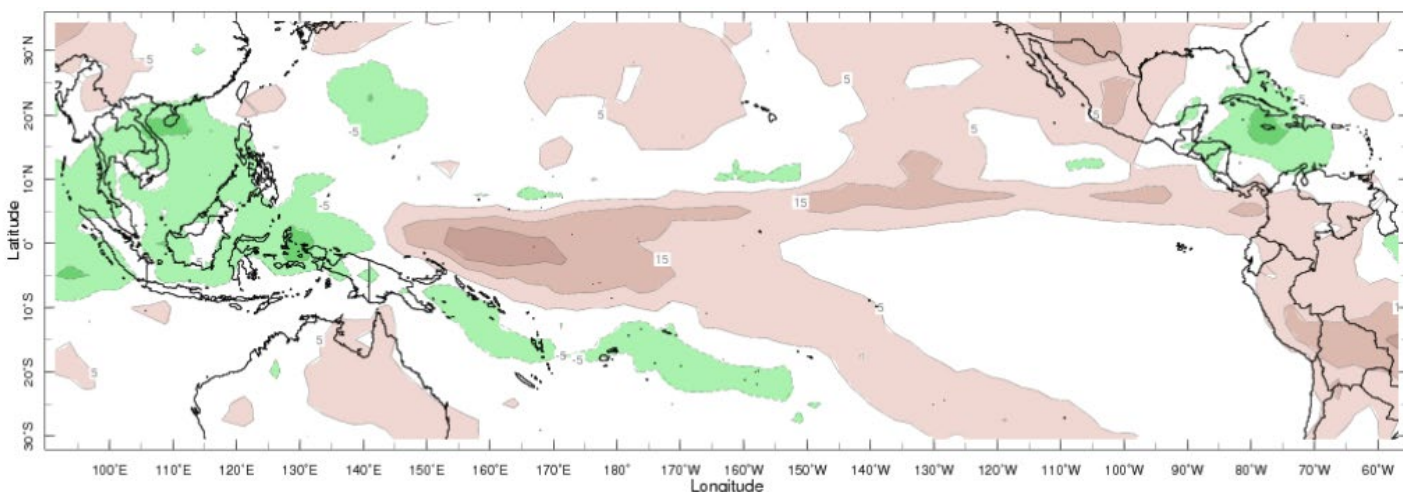


Dry vegetation and moderate drought conditions observed in the North Kohala District on Hawaii Island (September 5). Photo credit: Chelsea Jensen.

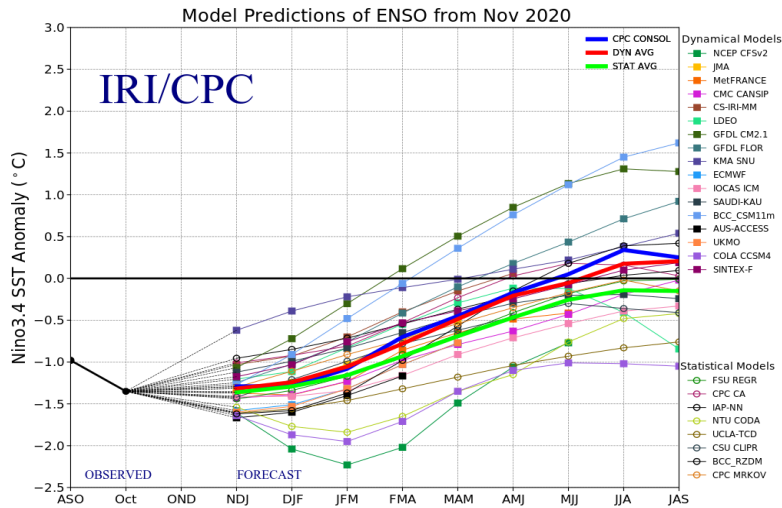
Agriculture – Across portions of the Hawaiian Islands, anomalously dry conditions during the past 90-day period led to observed drought impacts on Kauai, Maui, and the Big Island—including poor vegetation health, declining pasture conditions, plus cattle and deer deaths. At South Point on the Big Island, supplemental feeding of livestock and water hauling were reported. On Kapingamarangi, exceptional (D4) drought conditions and associated soil moisture deficits led to damage of local subsistence vegetation and food supplies—including taro, coconuts, bananas, and breadfruit.

Facilities and Infrastructure – In late October, high-intensity rainfall during a storm event caused flooding of roads in the village of Tafuna near the Pago Pago International Airport on the island of Tutuila, American Samoa.

Water Resources – Water supplies were critically low on Kapingamarangi Atoll (FSM) with water catchments and ground wells affected by persistently dry conditions in recent months. Moreover, ground wells suffered saltwater intrusion leaving water supplies from wells unsafe to drink. In early November, 500 5-gallon water containers, bottled water, and food supplies were delivered to Kapingamarangi by boat from Pohnpei as well as parts for solar stills and technical assistance. In early October, the Honolulu Board of Water Supply asked island residents to conserve water in response to depleted groundwater resources after five months of below-normal rainfall (<50% of normal) on Oahu.



Seasonal outgoing long-wave radiation anomalies for September–November 2020. Areas with more rain/clouds than normal are depicted in **green** while areas with fewer clouds/less rain are depicted in **brown**. Source: IRI.



November 2020 IRI/CPC Forecast

Source: <https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

According to the majority of ENSO prediction models, **La Niña will continue through the winter of 2020-21 and weaken sometime during the spring of 2021.** Chances of La Niña are ~95% during January-March. La Niña is favored during the spring with a ~65% chance for March-May 2021. By April-June, ENSO-neutral is favored with a ~55% probability.

NOAA's Coral Reef Watch 4-month (Dec 2020-Mar 2021) coral bleaching heat stress outlook calls for **a high probability of high heat stress (Alert Levels 1) in the southwestern portions of the FSM** and a bleaching **Watch** for the remainder of FSM as well as some western portions of RMI.

During the period from December 2020 through February 2021, rainfall is projected to be above normal across the Northern Mariana Islands, Guam, Palau, areas of the FSM (Yap, Chuuk, Pohnpei), and Kwajalein (RMI). Normal-to-above-normal rainfall is expected in American Samoa, Kosrae (FSM), Majuro (RMI), and across the Hawaiian Islands, according to the NOAA Pacific ENSO Applications Climate (PEAC) Center.

With La Niña conditions expected to continue, dynamical models suggest **there is likelihood of increasing sea-level anomalies for many islands in the tropical central and western Pacific, especially near the equator as well as around and southwest of the Samoan Islands.** The CFSv2 model predicts sea levels becoming increasingly above normal in the west and below normal in the east (especially within 10 degrees of the equator).

NOAA NWS Weather Forecast Office
Honolulu & Guam:

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

University of Hawaii Asia Pacific Data
Research Center (APDR):

<http://apdr.soest.hawaii.edu/index.php>

Western Regional Climate Center:

<https://wrcc.dri.edu/>