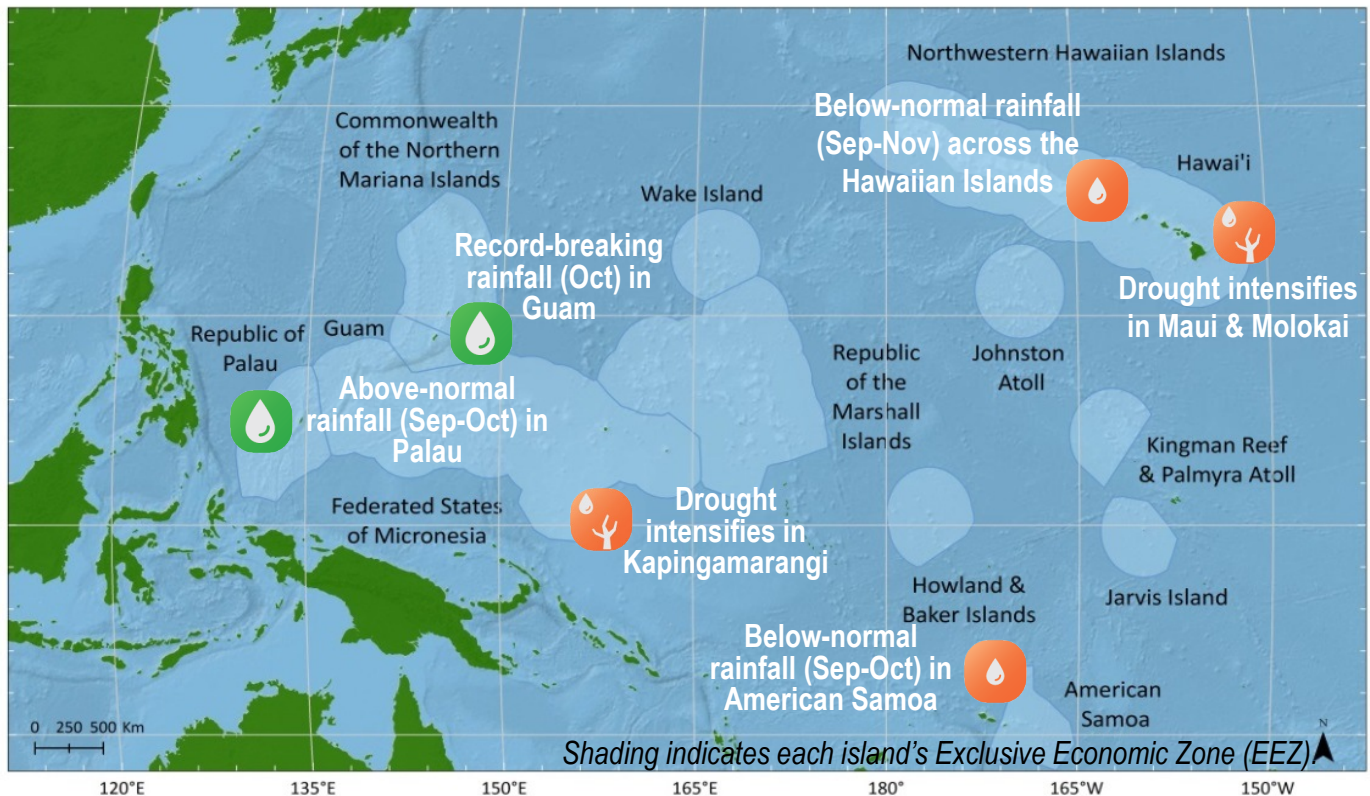
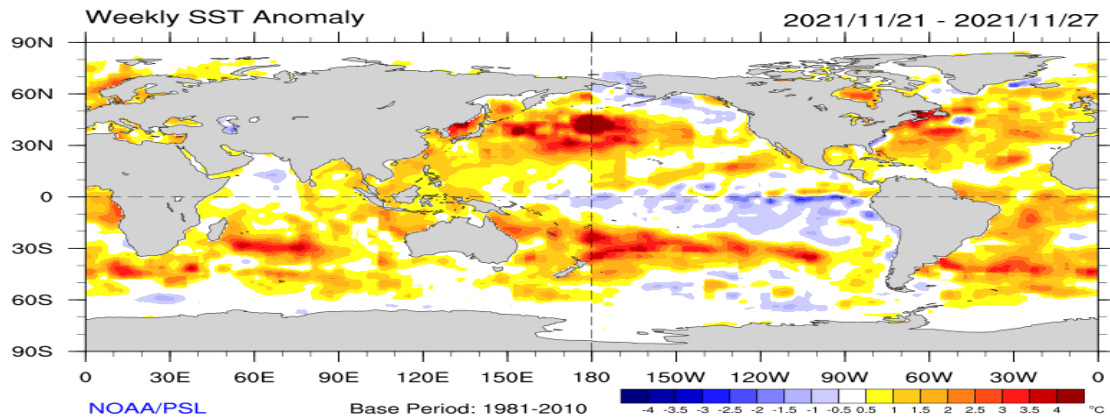


Significant Events – For September 2021–November 2021



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

- During October 2021, ENSO-neutral conditions transitioned to La Niña conditions and by November all Niño regions had dipped below the -0.5°C threshold. La Niña is expected to continue through the Northern Hemisphere winter (~95% chance) and transition to ENSO-neutral during Spring 2022 (~60% chance during April-June).
- In the Federated States of Micronesia (FSM), drought conditions re-developed in Kapingamarangi during September and intensified to Extreme Drought (D3) by late November.
- For the September – November (SON) period, precipitation was near normal to above normal across much of USAPI, including the Republic of the Marshall Islands (RMI), FSM, Palau, and in Guam which observed its wettest October on record. Conversely, American Samoa and Kapingamarangi (FSM) experienced below-normal precipitation for SON.
- In the Hawaiian Islands, drier-than-normal conditions prevailed during SON with 57% of the island chain in drought by the end of November, according to the U.S. Drought Monitor (USDM).
- Satellite analysis showed above-normal sea levels occurring across much of the tropical western Pacific (north of the equator) for SON while below-normal sea levels were observed across much of the tropical central and eastern Pacific regions.



Weekly sea-surface temperature anomaly map for 11/21/21 to 11/27/21.

Source: NOAA PSL. <https://psl.noaa.gov/map/clim/sst.shtml>

Across most of the equatorial Pacific Ocean, sea-surface temperatures (SSTs) were below normal with La Niña conditions present. All four Niño regions registered negative SST anomalies on the latest NOAA CPC update (11/29/21): Niño 3.4 region at -1.0°C ; Niño 3 at -0.8°C ; Niño 1+2 at -1.0°C ; and Niño 4 at -0.7°C .

During SON, **above-normal sea levels were observed across much of the equatorial western Pacific and ranging from normal to below-normal levels across the tropical eastern Pacific.** In the Hawaiian Islands, near-normal sea levels (monthly means) were observed during September and October. In the western Pacific, monthly mean sea levels were above normal with daily extreme high-sea level records broken in Guam (10/7), Palau (10/8-10, 10/21), Kwajalein (9/21, 10/5-9, 10/21), and in Majuro (9/5-7, 9/20-22), according to the University of Hawaii Sea Level Center.

During the SON period, below-normal rainfall led to expansion and intensification of drought across areas of the Hawaiian Islands with the most severe drought-related conditions (Exceptional Drought [D4]) observed in Maui and Molokai. **In the USAPI region, drought-free conditions prevailed during SON** except for the development of Moderate Drought (D1) on Ailinglaplap during September as well as re-development of drought in Kapingamarangi where conditions had degraded to Extreme Drought (D3) by late November, according to the USDM. Median precipitation for the SON period was generally **near normal to above normal across much of the tropical western Pacific.** In the Marianas, Guam observed 48.16 in. (142% of normal, 5th wettest on record) for SON, while Saipan was near normal with 27.01 in. (96% of normal). In the West Caroline Islands, Palau experienced well-above-normal rainfall during the SON period with Airai recording 54.86 in. (152% of normal, wettest SON period on record). In the FSM, Chuuk observed 44.45 in. (124% of normal), Kapingamarangi 9.1 in. (29% of normal), Kosrae 47.24 in. (102% of normal), Lukunor 29.95 in. (90% of normal), Pohnpei 53.57 in. (121% of normal), and Yap 31.23 in. (87% of normal). In the RMI, Majuro observed 44.95 in. (117% of normal) for SON while Kwajalein logged 36.74 in. (115% of normal). In American Samoa, despite seeing above-normal rainfall in November, SON totals were below normal with 20.29 in. (70% of normal). **Below-normal rainfall in the Hawaiian islands** for SON was observed at Lihue 4.5 in. (47% of normal), Honolulu 0.26 in. (6% of normal), Molokai 0.63 in. (12% of normal), Kahului 0.77 in. (25% of normal), Kailua Kona 0.31 in. (14% of normal), and Hilo 24.3 in. (73% of normal).

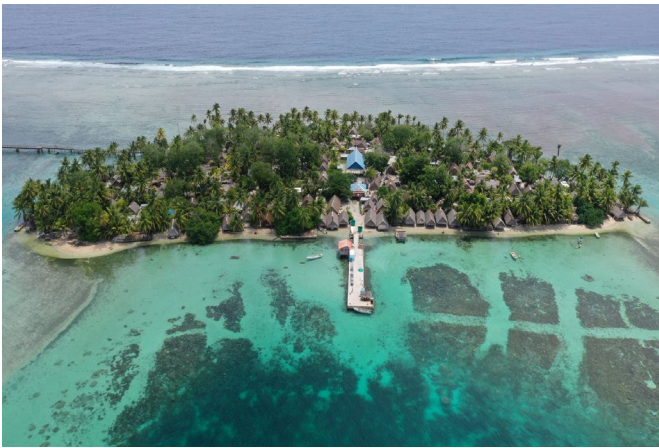
Tropical cyclone (TC) activity has been **below normal in the Northeast Pacific** (east of 180°) with 19 named storms since May and an ACE Index (Accumulated Cyclone Energy) of 93.6 (normal is 132.6 by 11/30 based on 1981-2010 climatology). Likewise, **below normal tropical cyclone activity has been observed in the Northwest Pacific** (west of 180°) through late November with 20 named storms and an ACE Index of 173.9 (normal is 285.8 by 11/30).

Sectoral Impacts – For September 2021–November 2021



Flash flooding along Route 15 in Guam during early October 2021. For October, Guam International Airport reported 26.68 in. (209% of normal) of rainfall.

Photo credit: Dontana Keraskes, The Guam Daily Post



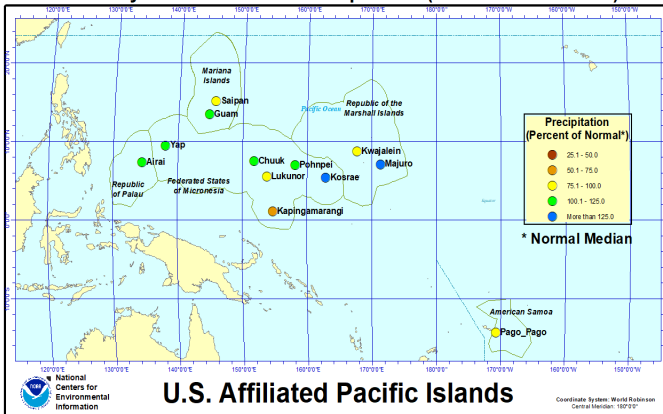
Island of Werua in the Kapingamarangi Atoll, Pohnpei, FSM. Photo credit: International Organization for Migration - Micronesia.

Agriculture – On November 9, the Acting Governor of Hawai'i, Clare Connors, signed an emergency proclamation providing drought-related relief for Maui County (includes Maui, Moloka'i, and Lāna'i), where local ranches and farms continue to suffer from economic losses due to the on-going drought situation.

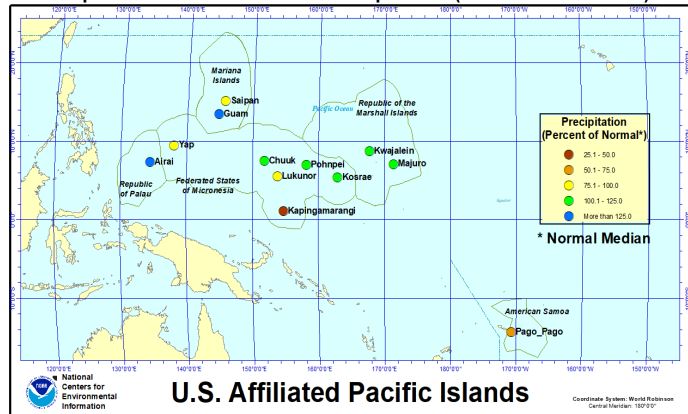
Facilities and Infrastructure – On Tutuila Island, American Samoa, heavy rainfall (11/16-17) led to localized flash flooding while landslides impacted roadways around the villages of Aoa and Utulei. In Guam, record-breaking rainfall in October led to flooding of low-lying areas during the month. The heaviest rainfall totals were observed on 10/5-6 with 6.25 in. recorded at the Guam Intl Airport. In Palau, a monsoon trough brought gale-force winds, torrential rains, widespread flooding, inundation of low-lying areas, and numerous landslides with Koror observing 16.03 in. (10/7-9) during the monsoon event. For October, Koror logged 25.99 in., Airai 27.58 in., and Aimeliik 28.22 in.

Water Resources – In Majuro (RMI), reservoir storage reached 76% of total capacity on 11/29, according to the Majuro Water & Sewer Company. On Kapingamarangi (FSM), large community tanks were at ~60% of capacity during mid-November. In response to recent water shortages in Kapingamarangi, USAID funded a response effort working closely with partners from the International Organization for Migration and local government to install eight 1500-gallon water tanks and purifiers to help meet long-term water needs of the community.

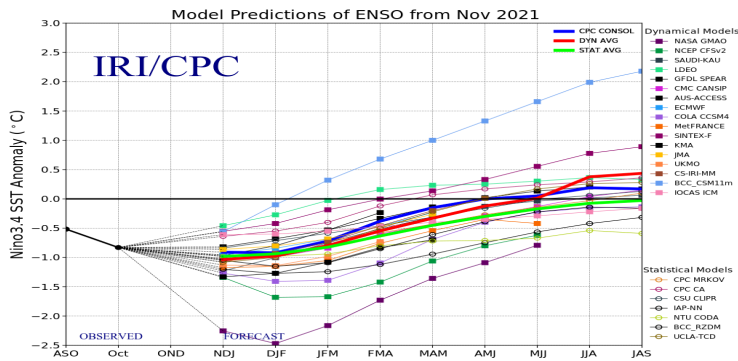
January–November 2021 Precipitation (Percent of Normal*)



September–November 2021 Precipitation (Percent of Normal*)



U.S. Affiliated Pacific Islands percent of normal precipitation for January–November 2021 (left) and September–November 2021 (right). Source: Richard Heim, NOAA NCEI.



ENSO forecast model predictions – November 2021

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

According to the majority of ENSO prediction models (see IRI/CPC forecast above), **La Niña** conditions are expected to continue through the Northern Hemisphere winter 2021-22 (~95% chance) and transition to ENSO-neutral during Spring 2022 (~60% chance during April-June).

NOAA's Coral Reef Watch four-month (Dec 2021 – Mar 2022) coral bleaching heat stress outlook calls for **a high probability (90%) of high heat stress (Alert Level 1, bleaching likely)** as well as a bleaching **Warning** (possible bleaching) in areas of southwestern FSM. In other areas of FSM, south-central islands of RMI, and American Samoa, a bleaching heat stress **Watch** (possible bleaching) is forecasted.

During the period December 2021 through February 2022, **normal to above-normal** precipitation is forecasted for most of USAPI, including Palau, Mariana Islands (Guam, CNMI), FSM, RMI, and the Hawaiian Islands. **Normal to below-normal** rainfall is expected in American Samoa, according to the NOAA Pacific ENSO Applications Climate (PEAC) Center.

For the next three months, dynamical models (NOAA CFSv2, ACCESS-S1 [Australia]) suggest continuation of **above-normal sea levels** for the western Pacific, mainly within 10° latitude of the equator. The highest anomalies are likely to be observed south of 10°N and extend southeastward through most of the SPCZ region, according to the University of Hawaii Sea Level Center. Sea level anomalies in the eastern tropical Pacific are expected to remain below normal.

Anomalous high tides observed in the Chuuk Lagoon on Dec 4, 2021.
Photo credit: Sanchez Salle, NWS WSO Chuuk, FSM



NOAA Coral Reef Watch:
<https://coralreefwatch.noaa.gov/>

NOAA National Centers for Environmental Information:
<http://www.ncei.noaa.gov/>

NOAA NMFS Pacific Island Fisheries Science Center:
<https://www.fisheries.noaa.gov/region/pacific-islands#science>

NOAA NWS Weather Forecast Office Honolulu & Guam:
<https://www.weather.gov/hfo/>
<https://www.weather.gov/gum/>

NOAA OceanWatch - Central Pacific:
<https://oceanwatch.pifsc.noaa.gov/>

NPS Pacific Island Inventory & Monitoring Network:
<https://www.nps.gov/im/pacn/index.htm>

University of Guam - Water and Environmental Research Institute:
<https://weri.uog.edu/>

University of Hawaii Asia Pacific Data Research Center (APDRC):
<http://apdrc.soest.hawaii.edu/index.php>

University of Hawaii - Joint Institute of Marine and Atmospheric Research:
<https://www.soest.hawaii.edu/jimar/>

University of Hawaii Sea Level Center:
<https://uhslc.soest.hawaii.edu/>

USGS Science Center – Pacific Coastal and Marine Science Center:
<https://www.usgs.gov/centers/pcmssc>

USGS Pacific Islands Water Science Center:
<https://www.usgs.gov/centers/piwsc>

Western Regional Climate Center:
<https://wrcc.dri.edu/>