

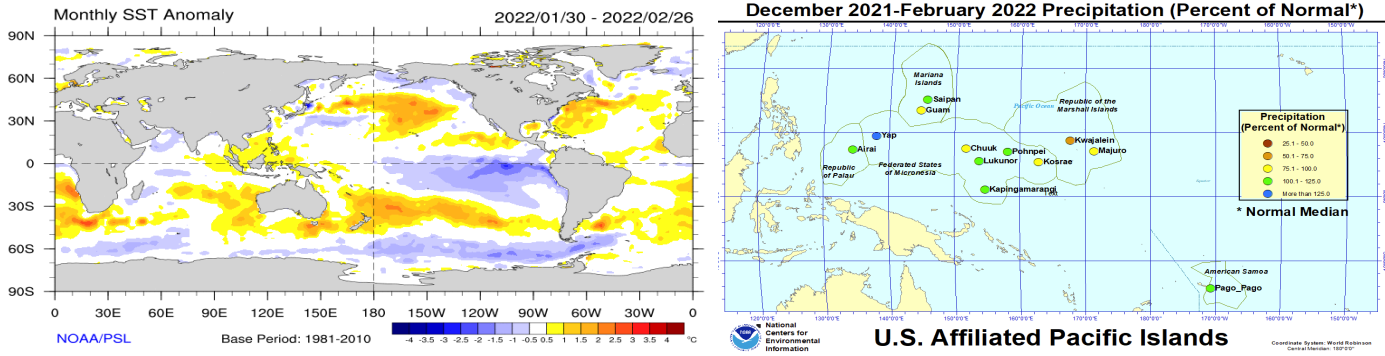
Significant Events – For December 2021–February 2022



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

- La Niña Advisory was in effect (March 10) with below-normal sea surface temperatures (SSTs) observed across the east-central and eastern Pacific Ocean. La Niña is likely to continue into the Northern Hemisphere summer 2022 (June-August 2022, 53% chance), with a 40-50% chance of La Niña or ENSO-neutral conditions thereafter, according to NOAA Climate Prediction Center.
- Drought-related impacts were observed in the Republic of the Marshall Islands (RMI) near and north of 9°N and in areas of northern Chuuk State in the Federated States of Micronesia (FSM).
- For the December – February (DJF) period, precipitation was below normal in Guam, areas of FSM (Chuuk, Fananu, Kosrae, Pingelap) and in northern RMI (Kwajalein, Majuro, Wotje [2nd driest DJF on record]). Conversely, near to above-normal rainfall was observed in Palau, Saipan, western/southern FSM, and in American Samoa. In early December, a kona low brought very wet conditions to the Hawaiian Islands before transitioning to abnormally dry conditions in Jan-Feb.
- Satellite analysis showed above-normal sea levels occurring across the tropical western Pacific for DJF consistent with the on-going La Niña event while normal to below-normal sea levels were observed across much of the tropical eastern Pacific.

Climate Overview – For December 2021–February 2022



Monthly sea surface temperature anomaly map for 1/30/22 to 2/26/22 (left) and U.S. Affiliated Pacific Islands percent of normal precipitation for December 2021-February 2022 (right). Sources: NOAA PSL, NOAA NCEI.

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 NOAA CPC update (2/28/22) at the end of the DJF period: Niño 3.4 region at -0.8°C ; Niño 3 at -1.1°C ; Niño 1+2 at -1.5°C ; and Niño 4 at -0.4°C .

During DJF, above-normal sea levels were observed across much of the equatorial western Pacific and ranged from normal to below-normal levels across the tropical eastern Pacific. In the Hawaiian Islands, above-normal sea levels (monthly means) were observed during December and January. In the western Pacific, monthly mean sea levels were above normal (15-25 cm) throughout DJF with numerous daily extreme-high -sea level records broken during December including in Palau (12/3, 5-7), Saipan (12/1, 4-6), Kwajalein (12/2-7), Majuro (12/3-7), and in Pago Pago (12/1-3, 5-9, 29-30). In the Hawaiian Islands daily extremes were broken in December and January at Honolulu (12/3-7, 1/2-4), Mokuoloe (12/4-7, 1/2-4), Kahului (12/5-7, 1/3, 31), Nawiliwili (12/3-5, 7, 1/1-3, 15), and Hilo (12/4-8), according to the University of Hawaii Sea Level Center.

During the DJF period, drought conditions ranging from Moderate (D1) to Extreme (D3) were observed in northern RMI (Ainglalap, Kwajalein, Wotje) and in FSM in northern Chuuk State (Chuuk Lagoon, Fananu, Woleai) with the most severe drought (D3) observed in Wotje, according to the U. S. Drought Monitor. Median precipitation for the DJF period was near to above normal across areas of the tropical western Pacific including in Palau with Airai recording 39.48 in. (116% of normal). In FSM (for DJF), Yap observed 28.24 in. (129% of normal), Kapingamarangi 35.34 in. (107% of normal), Pohnpei 42.89 in. (107% of normal), Lukunor 34.2 in. (106% of normal), Kosrae 47.96 in. (89% of normal), and Chuuk 23.58 in. (79% of normal). In the Mariana Islands, Saipan observed 10.15 in. (100% of normal) and Guam 11.59 in. (77% of normal). In the RMI, Majuro observed 22.28 in. (79% of normal) for DJF while Kwajalein logged 11.44 in. (73% of normal). In American Samoa, precipitation was slightly above normal (41.16 in., 102% of normal) at Pago Pago for DJF after a relatively dry December (61% of normal). In the Hawaiian Islands, above-normal rainfall associated with the development of a kona low was observed in early December, helping to ease drought conditions statewide. By mid-January and continuing through February, a general drying trend was observed leading to the re-emergence of drought conditions (D1) across much of the island chain. For the DJF period, Lihue observed 14.86 in. (134% of normal), Honolulu 17.59 in. (295% of normal), Molokai 7.76 in. (89% of normal), Kahului 7.64 in. (106% of normal), Kailua Kona 2.04 in. (57% of normal), and Hilo 32.82 in. (109% of normal).

Tropical cyclone (TC) activity has been below normal in the South Pacific basin (east of 135°E) with 5 named storms since December and an Accumulated Cyclone Energy (ACE) Index of 15.8 (normal is 44.3 by 2/28 based on 1991-2010 climatology). Likewise, below-normal tropical cyclone activity has been observed in the Southern Hemisphere (including the South Pacific & South Indian basins) through late February with 14 named storms and an ACE Index of 86.2 (normal is 125.5 by 2/28).



Flooded roadway near the Amata Kabua International Airport in association with very high tides and strong winds in early December 2021 in Majuro, RMI.
Photo credit: Chewy Lin

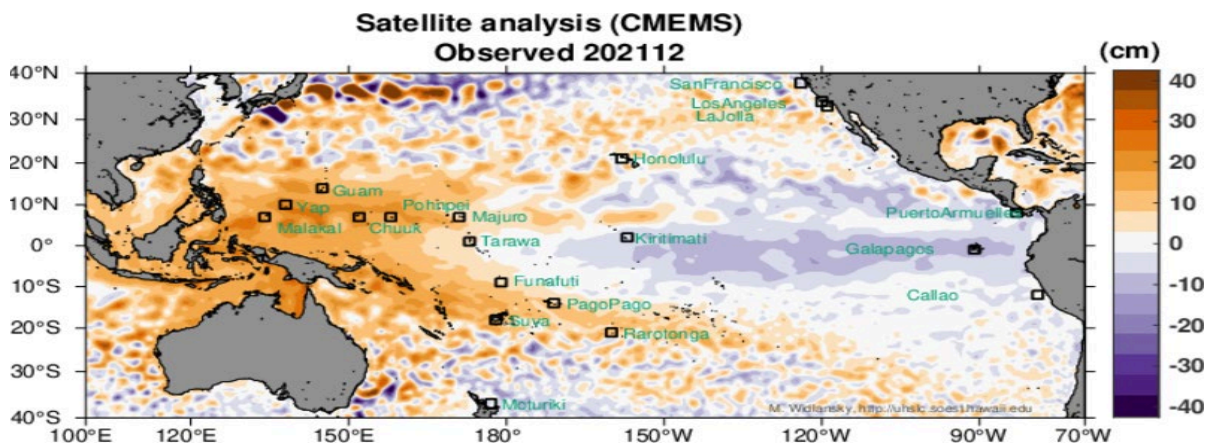


Shelf cloud associated with a strong thunderstorm approaching Honolulu on January 2, 2022.
Photo credit: NWS Honolulu

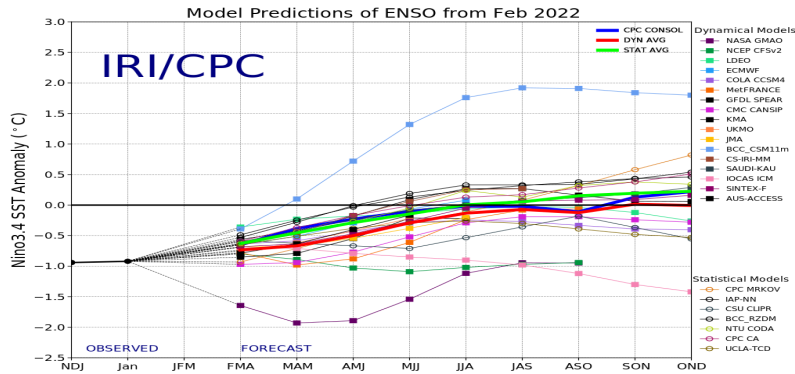
Agriculture – In the Hawaiian Islands, rainfall shortfalls in January-February led to re-emergence of drought impacts (Big Island, Maui, Kauai) including deteriorating pasture conditions and low streamflows. In Chuuk State (FSM), significant coastal flooding was observed in December 2021 due to high tides, elevated sea levels, and strong winds leading to concern about saltwater intrusion impacts to local crops (taro).

Facilities and Infrastructure – In areas of FSM and RMI, coastal flooding (December 2021-January 2022), associated with very high tides, impacted shorelines, homes, and roadways including adjacent the Amata Kabua International Airport (upper left). In FSM, USAID is working with the local government to assess the impacts from the coastal flooding events. On Tutuila Island, American Samoa, a tsunami warning was issued (1/14) in association with the major volcanic eruption in Tonga, but no significant impacts or damage were reported. In February, persistent rains on Tutuila Island led to minor landslides in the villages of Agugulu and Nu'uuli.

Water Resources – In response to intensifying drought, USAID partners from the International Organization for Migration are working in support of the RMI Government's drought response plan to assess and assist the estimated 9,300 drought-affected residents across 17 islands to the north and west of Majuro where some catchment systems were running very low or empty. On Fananu (FSM), water tanks were extremely low or empty with well water reportedly brackish. Food and water deliveries for the islands of northern Chuuk State were expected by ship during March. On the Big Island, dry conditions in the Puna District led to an uptick in water hauling for home use due to low catchment tank levels in late January.



Satellite analysis of observed sea level height anomalies for December 2021. **Warm colors** represent above-normal sea levels and **cool colors** represent below-normal sea levels. Source: University of Hawaii Sea Level Center



ENSO forecast model predictions – February 2022

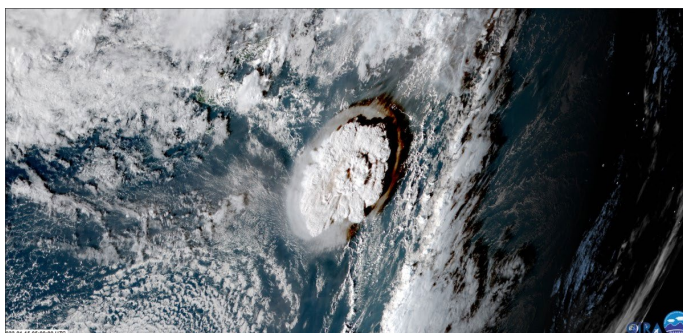
Source: IRI/CPC. <https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

According to the majority of ENSO prediction models (see IRI/CPC forecast above), there is a high probability that weak **La Niña** conditions continue into the Northern Hemisphere summer 2022 (53% chance) with a 40-50% chance of **La Niña or ENSO-neutral** conditions moving into fall 2022.

NOAA’s Coral Reef Watch four-month (Mar 2022– Jun 2022) coral bleaching heat stress outlook calls for a **high probability (90%) of high heat stress bleaching Warning** (possible bleaching) across the central and southern islands of FSM. In other areas of FSM, central islands of RMI, and American Samoa, a bleaching heat stress **Watch** is forecasted.

During the period April 2022 through June 2022, precipitation ranging from **normal to above-normal** is forecasted for much of USAPI, including Palau, Mariana Islands (Guam, CNMI), FSM, RMI, and American Samoa. **Normal to below-normal** rainfall is expected across the Hawaiian Islands, 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, especially south of 10°N (including regions around Palau, Chuuk, Pohnpei, and Majuro) and extending southeastward through most of the South Pacific Convergence Zone (SPCZ) region, according to the University of Hawaii Sea Level Center.



Hunga Tonga-Hunga Ha'apai volcano eruption on 1/15/22. Photo credit: CIRA RAMMB

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/>