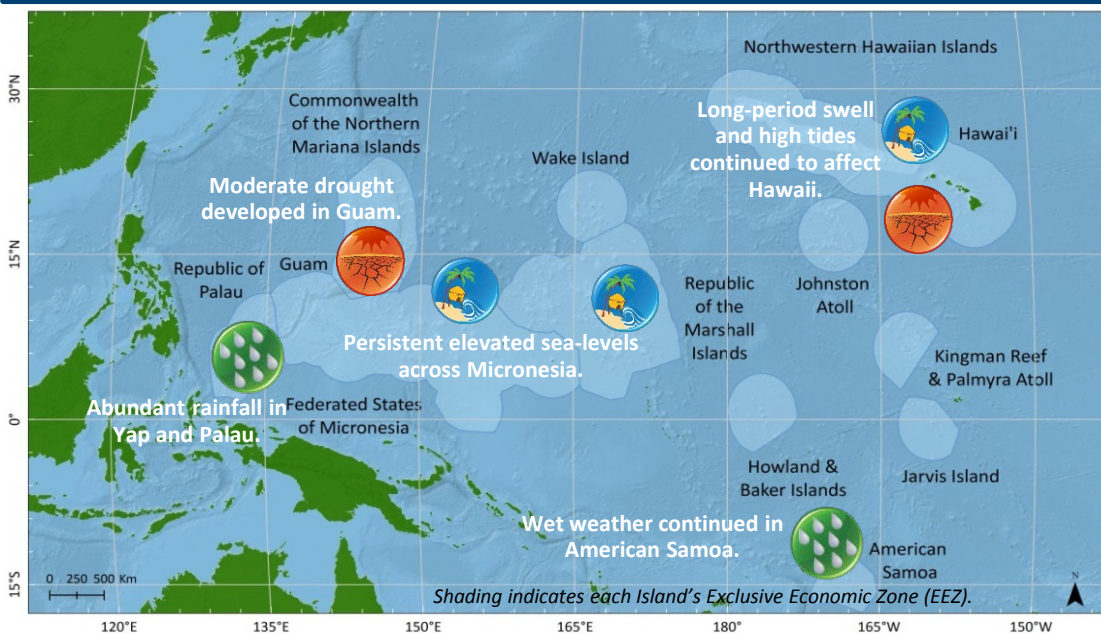


Climate Impacts and Outlook

Hawaii and U.S. Pacific Islands Region

1st Quarter 2018

Significant Events and Impacts for 4th Quarter 2017



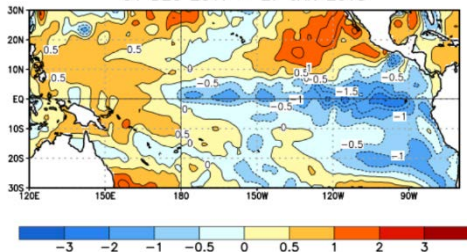
La Niña Advisory

Above normal rainfall fell across the Federated States of Micronesia and Palau. Much below normal rainfall was observed in Guam and the Commonwealth of the Northern Mariana Islands. The leeward side of the Hawaiian Islands continue to be abnormally dry, while regular rains have returned to American Samoa and central parts of the Republic of the Marshall Islands.

Sea-levels remain elevated across the western Pacific with periodic inundation events for some atolls. Long-period swell and high tides also affected the Hawaiian Islands.

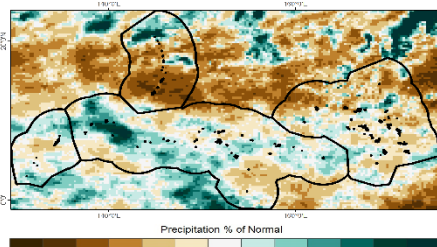
Regional Climate Overview for 4th Quarter 2017

Average SST Anomalies
31 DEC 2017 – 27 JAN 2018



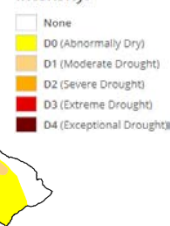
Sea-Surface Temperature Anomalies, valid Jan 29, 2018. Source: <http://www.cpc.ncep.noaa.gov/>

GPM Precipitation Anomalies for 2017-2018 NDJ



Nov '17-Jan'18 precipitation anomalies. Source data NASA GPM. Brown areas are dry; green areas wet.

Intensity:



U.S. Drought Monitor for Hawaii. Source: <https://www.drought.gov>

The region is under a La Niña Advisory. As of February 5th, the Niño 3.4 region anomaly was -0.9° C, supporting a solid La Niña state.

Sea-surface temperatures are above normal across the far western Pacific with anomalies between $+0.5^{\circ}$ and $+1.0^{\circ}$ C, but a large area of cold anomalies continues from 175° E all the way to 85° W along the equator. The coldest anomalies below -1.0° C were located east of the Howland & Baker Islands to the coast of South America. Anomalies of at least $+0.5^{\circ}$ C are prevalent north of 10° N and east of 150° W, from just east of Hawaii to coastal California. Sub-surface water temperature anomalies have dramatically recovered over the last two months, with now positive anomalies from 130° E to 110° W, and a shrinking area of very shallow negative anomalies between 170° W and 80° W.

Above-normal sea levels are occurring in the tropical North Pacific including most islands in southern Micronesia and around Hawaii. Satellite and model analyses continue to show high sea levels (>15 cm) above normal stretching across the North Pacific, especially in a narrow band north of the equator. High sea levels are consistent with La Niña conditions, though other ocean-atmosphere factors are contributing. Sea levels are below-normal on the equator east of the dateline and along tropical latitudes of the North and South American Coasts. Near-normal sea levels are occurring in most of the tropical South Pacific.

In Hawaii, rainfall for the quarter was: Honolulu (49%), Lihue (20%), Kahului (111%), and Hilo (124%). Nearly all leeward sides of the Hawaiian Islands have been rated "abnormally dry" by the U.S. Drought Monitor. From November-January, Saipan and Guam were both below normal at 60% and 51% respectively. January 2018 is now the driest January on record in Guam. In Kwajalein and Majuro in the RMI, rainfall was above normal, with 124% and 132% of average respectively. In the FSM, rainfall from Nov-Jan was distributed as follows: Chuuk (103%), Kosrae (105%), and Pohnpei (129%) of normal. Further west, Nov-Jan rainfall at Yap was 124% of normal and Palau was 110%. In American Samoa, rainfall was near normal for the quarter (104%).

Tropical Cyclone (TC) activity in the western North Pacific basin was near normal with 5 named storms, though most were west of the USAPI. In the southwest Pacific, given ENSO conditions, the expectation was that activity in the quarter would be near normal, however, activity was even quieter than that with only one named TC, Fehi, that formed in late January 2018.

Sectoral Impacts for 4th Quarter 2017

Facilities and Infrastructure – In late November, a large swell resulted in reports of new seawall failures and sinkholes at multiple properties in West Maui. Minimum of westerly swell component and active northerly swell component led to extreme erosion at select beaches, especially beaches near Sunset and Laniakea, north shore, Oahu. Nov-Dec. Return of dominant westerly component swell allowed beach recovery in Jan. Meanwhile, high tides and elevated sea levels brought a period of inundation to Chuuk, Pohnpei, and Kosrae during December. Some roads in Kosrae were damaged by the inundation event.

Water Resources – Increasing dryness through the period has resulted in elevated fire weather conditions across Guam. Meanwhile, water storage reservoirs in Majuro (RMI) and Yap were over 90% full.

Natural Resources – Due to the return of widespread and sufficient rainfall across western FSM and Palau, natural resources were rebounding, including the welcome return of the jellyfish to Jellyfish Lake in Palau. A steep increase in loggerhead turtle interactions was seen in January in the shallow-based longline fishery targeting swordfish. It is unclear at this point why this is.

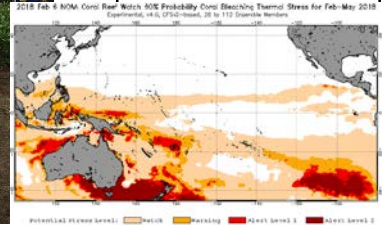
Inundation from high tide in Pohnpei on 5 December. Photo courtesy of Wallace Jacob, NOAA.



Erosion in West Maui from long-period swell in November. Photo courtesy of Tara Owens, Sea Grant.

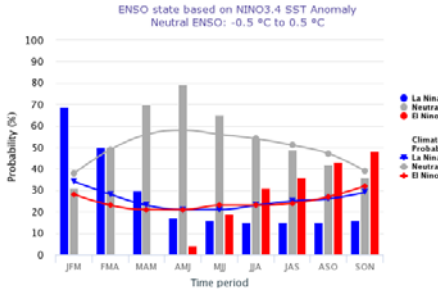


Coral Reef Watch Bleaching Outlook for Feb-Apr.



Regional Outlook for 1st Quarter 2018 (Feb-Apr)

Mid-Jan IRI/CPC Model-Based Probabilistic ENSO Forecasts



ENSO Probabilities and projected SST anomalies, valid mid January 2018. Source:

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

Following the latest ENSO prediction models, there is a 50% chance of La Niña transitioning to ENSO neutral conditions from February-April.

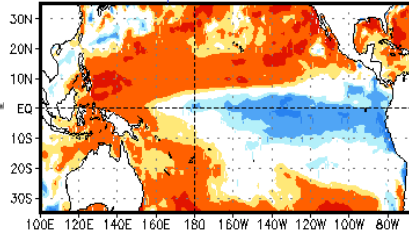
The SST anomaly outlook for the 1st quarter indicates +0.5° C anomalies across the far western Pacific, including areas of CNMI, Palau, and western FSM. Above normal SSTs are also projected for the southern Hawaiian Islands. In the South Pacific, SST anomalies near American Samoa are also projected to be near normal. NOAA's Coral Reef Watch most recent four-month Bleaching Outlook projects that thermal stress levels will rise into the "watch" category across southern RMI, FSM, and Palau, with warning level conditions around American Samoa.

In the first quarter, sea levels are likely to be above-normal (10–15 cm) for Majuro and Pohnpei. It remains unlikely that the high sea levels will propagate as far west and north as Yap, Malakal, and Guam. By the end of the period, dynamical models suggest likely rising sea levels around American Samoa. Sea levels are predicted to gradually lower around Hawaii.

Rainfall for Hawaii is projected to be above normal during the period February-April, with above normal rains also projected for the FSM, Palau, the central RMI, and American Samoa. Near-normal rainfall is projected for Guam and the CNMI, while near to below normal rainfall is expected for the RMI atolls north of 10° N. Parts of the northern RMI may be particularly dry during this quarter.

Tropical cyclone (TC) activity in the western north Pacific is expected to be near normal with 2-3 early season storms in the 1st quarter. In the southwest Pacific, TC activity is also projected to be near normal, with 7 named storms on average during the period.

Feb-Mar-Apr 2018



Regional Partners

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://uhscl.soest.hawaii.edu/>