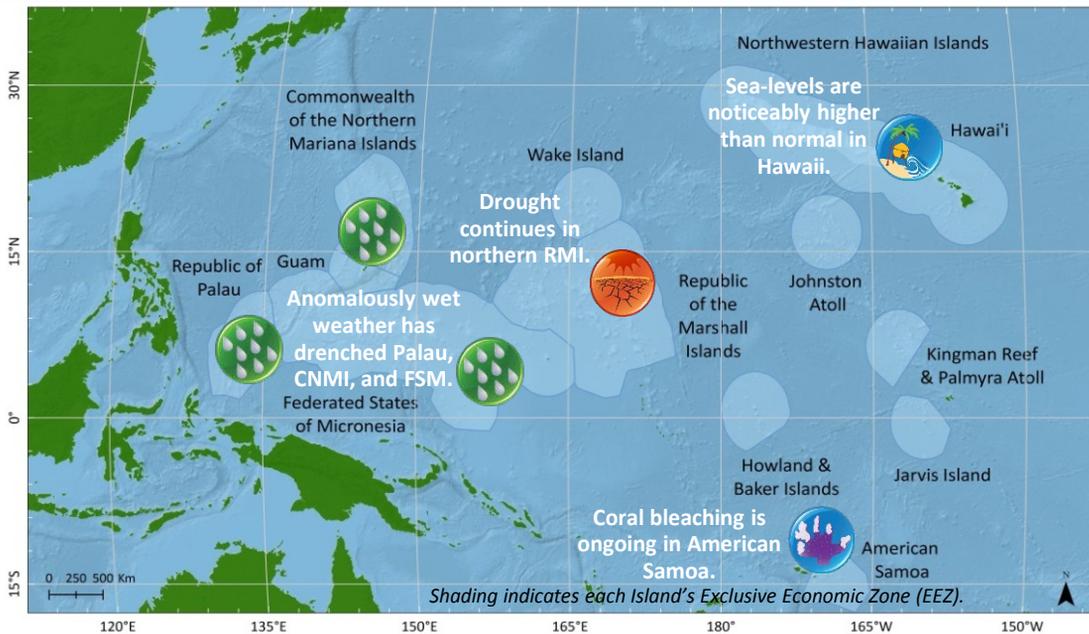


Climate Impacts and Outlook

Hawaii and U.S. Pacific Islands Region

2nd Quarter 2017

Significant Events and Impacts for 1st Quarter 2017



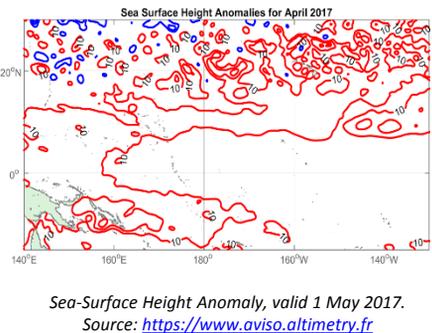
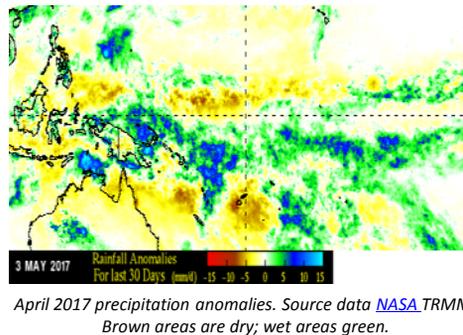
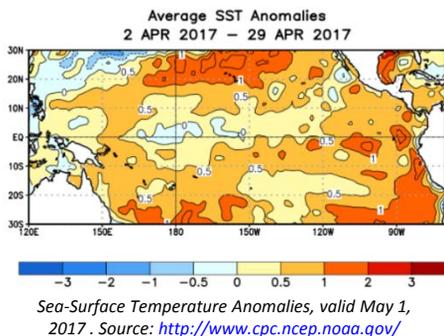
Much above normal rainfall was recorded across Guam and the Commonwealth of the Northern Mariana Islands

Above normal rainfall also fell across the Federated States of Micronesia and the Republic of Palau. Meanwhile, the northern Marshall Islands were drier than normal. Below normal rains were observed in American Samoa.

Sea-levels are high across the region, but are really evident in the Hawaiian Islands.

So far in 2017, there has been only 1 tropical cyclone in the western North Pacific.

Regional Climate Overview for 1st Quarter 2017



There are no active ENSO advisories in effect. As of May 1st, the Niño 3.4 region anomaly was +0.5° C, supporting a marginally-neutral state.

Sea-surface temperatures are above normal across much of the Pacific, with a small localized region of cold anomalies along the equatorial eastern Pacific. The warmest anomalies exceeding 1.0° C were located across the Hawaiian Islands, with 0.5° C anomalies across American Samoa, the FSM, and the CNMI. Sub-surface water temperature anomalies have warmed substantially, especially near and west of the Dateline with departures exceeding 2.0° C to a depth of 150m. Further east, a pocket of cooler sub-surface anomalies (-1.0° C) are located between 150° W and 120° W to a depth of 100m.

Exceptionally high sea levels are occurring around the Hawaiian Islands. In the north-central Pacific, sea levels have risen since last month both near and away from the equator. The Honolulu tide gauge anomaly was +19 cm during April. Hawaii regional sea surface heights were also above-normal as observed from satellite altimetry (+17 cm) and model analysis (+11 cm). Sea level anomalies are smaller in the Southern Hemisphere, though still above-normal.

In Hawaii, rainfall was way above normal for the quarter at Honolulu (278%), Lihue (128%), and Kahului (235%), but significantly below normal at Hilo (42%). From Feb-Apr, Saipan was much above normal at 158% and Guam was also above normal with 187% of average rainfall. In Kwajalein and Majuro in the RMI, rainfall was below and above normal, with 71% and 137% of average rainfall respectively. In the FSM, quarterly rainfall was generally above normal: Chuuk (112%), Kosrae (143%), and Pohnpei (91%) of normal. Further west, rains continued to fall across the islands of Yap (203%) and Palau (141%). In American Samoa, rainfall was below normal for the quarter (91%).

Tropical Cyclone (TC) activity in the western North Pacific basin was quiet with only one named storm. On 4 April, the WSO Pago Pago recorded a wind gust to 52 mph from the north associated with an unnamed tropical disturbance. The latter half of the 2016/17 SW Pacific TC season was below average in activity with only 4 named TCs (climatologically that number is 6); two of those, Debbie (in March) and Cook (in April), attained major TC status.

Sectoral Impacts for 1st Quarter 2017

Facilities and Infrastructure – Elevated sea levels are occurring in the central North Pacific around Hawaii. Minor coastal flooding in Honolulu was reported during the highest tides in April when the [offset between observed water levels and predicted tides sometimes exceeded 30 cm](#). Large surf from the northeast that affected the windward coast of Oahu January 31-Feb 2, which caused water to over-top the coastal highway during the higher tidal levels.

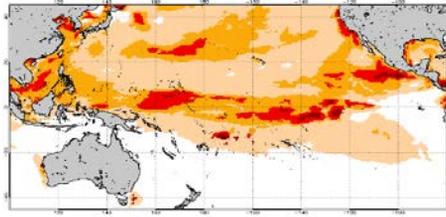
Water Resources – Persistent dryness continued in the northernmost atolls of the RMI through April 2017. On the 24th of April, the President of the RMI declared a State of Emergency for the northern atolls and islands affected by dry conditions. Household rain tanks have gone dry and emergency short-term assistance has been provided by the RMI Government. Meanwhile in Yap, locals have noted that the current dry season has been unusually wet, as water reservoirs are completely full.

Natural Resources – HotSpots are mostly below the bleaching threshold for most of the Pacific, with the exception of the Samoa's and the eastern Pacific along Colombia and Ecuador. Surveys were conducted on the reef slope around Tutuila between March 27th and April 11th and more bleaching was observed at the 20-50ft depth than the shallower areas. In fact, bleaching was also observed to a depth of 108ft! The bleaching ranged from 10-20% of the hard coral. In addition, a recent crown of thorns outbreak has hit the coral reefs in American Samoa.

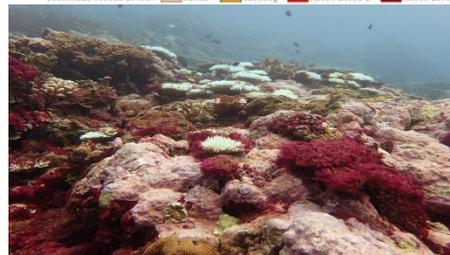
Coral bleaching on the Great Barrier Reef. Photo courtesy of The Ocean Agency.



2017 May 2 NOAA Coral Reef Watch 90% Probability Coral Bleaching Thermal Stress for May-Aug 2017

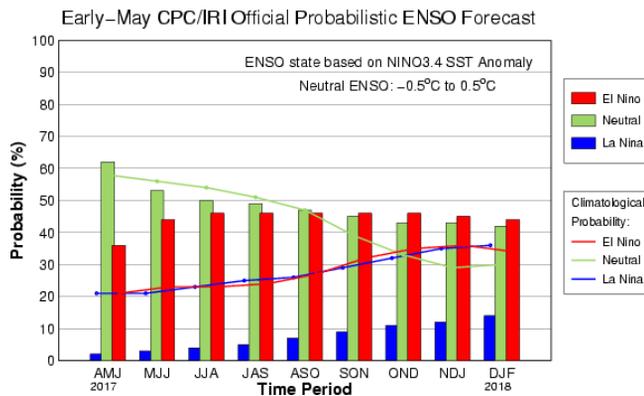


Coral Reef Watch's thermal stress outlook for May-Aug 2017.



Coral bleaching near American Samoa. Photo courtesy of Alice Lawrence, Dept. Marine and Wildlife Resources.

Regional Outlook for 2nd Quarter 2017 (May-July)



ENSO Probabilities, Valid early May 2017. Source: <http://iri.columbia.edu/our-expertise/climate/forecasts/ens/current/>

Following the latest ENSO prediction models, there is a 55% chance of ENSO neutral conditions and a 45% chance of an El Niño developing from May-July.

The SST anomaly outlook for the 2nd quarter indicates 1+° C above-normal values in Hawaii, with 0.5° C anomalies in RMI, FSM, Guam, and CNMI. Above-normal SST anomalies near 0.5° C are also projected around American Samoa. NOAA's Coral Reef Watch most recent four-month Bleaching Outlook projects heat stress in American Samoa to continue until at least the beginning of June. The possibility of Bleaching Alert Level 1 is predicted for the western Pacific Ocean near the Marshall Islands and eastern Federated States of Micronesia in July and August.

The current sea level forecasts indicate that all the north and south Pacific stations are likely to hold constant or rise over the next three months. Elevated sea levels around Hawaii are likely to continue through the forecast period, potentially [enhancing extreme high tides during May, June, and July](#).

Near to above-average rainfall is projected for the southern RMI, Yap, Koror, Guam, and CNMI, while most of the northern RMI, American Samoa, and the Hawaiian Islands will be near-normal.

Tropical cyclone (TC) activity in the western north Pacific is expected to be near-normal in the 2nd quarter, but few early-season TCs are expected in FSM and Guam/CNMI. In the southwest Pacific, the outlook for the period from May-July using analog seasons from 1981-2010 calls for a chance of possibly 1 TC; but in fact two TCs, Donna and Ella, developed in early May and they will be reported on in more detail next quarter.

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/>