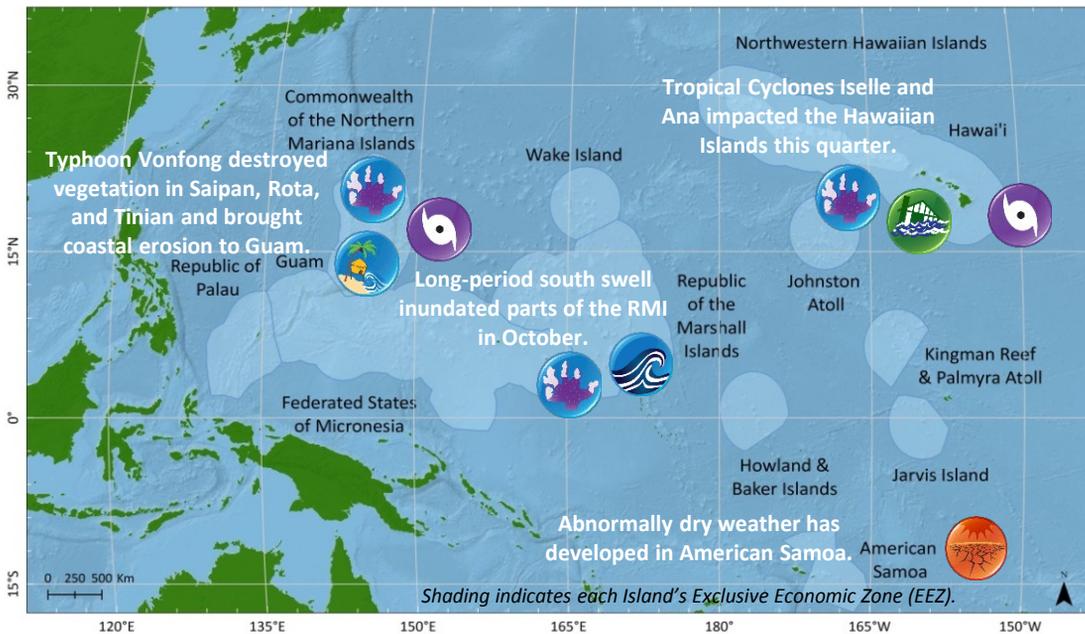


Climate Impacts and Outlook

Hawaii and U.S. Pacific Islands Region

4th Quarter 2014

Significant Events and Impacts for 3rd Quarter 2014



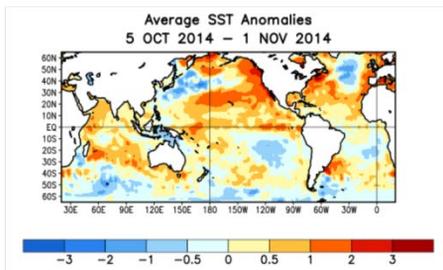
The region remains under an El Niño Watch.

Above normal rainfall fell over much of Guam, CNMI, Palau, the Federated States of Micronesia, and the Marshall Islands.

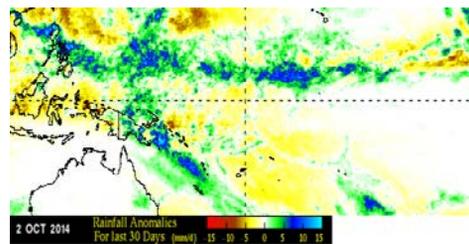
Sea-levels continued to fall across Palau, the Federated States of Micronesia, and the Republic of the Marshall Islands – supportive of the ongoing transition to El Niño state.

Coral bleaching was widespread across CNMI, RMI, and Hawaii.

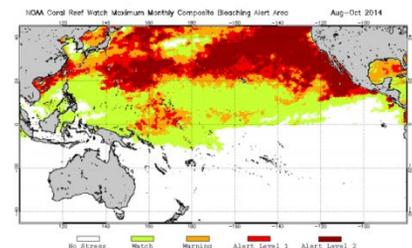
Regional Climate Overview for 3rd Quarter 2014



Sea-Surface Temperature Anomaly Map, valid Nov 1, 2014. Source: <http://www.cpc.ncep.noaa.gov>



Oct 2014 precipitation anomaly. Source: http://trmm.gsfc.gov/trmm_rain/Events/thirty_day.html



Maximum Coral Bleaching Alert Areas, Aug-Oct, 2014. Source: <http://coralreefwatch.noaa.gov/>

The region remains under an El Niño Watch and weather conditions were more in-line with El Niño during the quarter (e.g., increasing sea-surface temperatures, falling sea level, and wet conditions across Micronesia). As of November 4th, the Niño 3.4 region anomaly was +0.6°C, however other indicators generally remain in the neutral range.

Sea-surface temperatures were generally near-to-above normal across the equatorial Pacific, with the warmest anomalies exceeding 1.0°C near Hawaii and the southern Marshall Islands. Sub-surface water temperature anomalies are 1-2°C above normal across much of the equatorial Pacific. Sea-levels continued to drop slightly this quarter bringing most of the stations in the region very close to normal. However, this represents a large fall of sea level stands from high values early in the year; and in fact, the current sea level across Micronesia is the lowest seen for the past decade. Meanwhile, on October 8-9, a minor inundation event was reported on Majuro, Marshall Islands, from 16-second period southerly swell with significant wave heights of 5-7 feet. The wave event was generated by a storm near New Zealand, which sent wave propagation northward through Fiji and eventually reaching the Marshall Islands.

In Hawaii, rainfall was substantially above normal (161% of normal at Honolulu), erasing all but 7.3% of the drought area across the entire state. Tropical Storm Ana brought 135.5mm (5.33 inches) of rain to the U.S. Climate Reference Network station on Mauna Loa, setting a new 24-hour rainfall record. In Guam, rainfall was slightly above normal as quarterly values were 105% of normal. In the RMI, rainfall was 93% of normal, while in the FSM, quarterly rainfall was near to normal across most sites: Chuuk (130%), Kosrae (77%), Pohnpei (95%), and Yap (84%). Further west, in Palau rainfall was 86% of normal. In American Samoa, rainfall was much below-normal for the quarter (35%).

Tropical Cyclone activity for August-October in the western North Pacific basin was near-normal with 8 named storms. In the Southern Hemisphere, no tropical cyclones were reported in the 3rd quarter, which is normal for the season. The Central Pacific was above normal with 3 tropical storms affecting Hawaii this quarter (Iselle, Julio, and Ana).

Sectoral Impacts for 3rd Quarter 2014

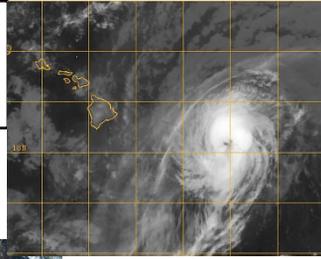
Water Resources – Wet weather dominated much of RMI, FSM, CNMI, and Guam during the last quarter. An early October inundation event in Majuro forced the Majuro Water and Sewer Company staff to pump saltwater off of the runway catchment until sufficiently low salinity levels were measured at the pump house. The water reservoirs in Majuro are currently at 85% capacity. The American Samoa Power Authority began water conservation efforts, including reduction of water pressure going to homes and businesses.

Agriculture – The arrival of T.S. Iselle in August on the Big Island of Hawaii resulted in roughly a 60% loss of the state's papaya crop among others. Total agricultural damages were estimated at \$66 million, which was enough to be classified as an agricultural disaster for the state by the Federal Emergency Management Agency (FEMA). Heavy rains all but eliminated drought conditions across the state.

Facilities and Infrastructure – Tropical Storm Iselle made landfall on the coast of Hawaii's Big Island on August 7, bringing gusty winds and torrential rainfall. Widespread power outages were reported on the Big Island as trees fell due to the strong winds. On October 5, the eye of typhoon Vongfong passed over the island of Rota (CNMI), bringing power outages and heavy rains across the Mariana's.

Natural Resources – NOAA Coral Reef Watch's near-real-time satellite monitoring continues to show the presence of positive sea surface temperature (SST) anomalies throughout the eastern equatorial region of Pacific Ocean, consistent with an El Niño event. Corals in CNMI, Guam, Hawaiian Archipelago, and RMI experienced significant bleaching. Satellite tools indicated that the northern CNMI and central Hawaiian Archipelago suffered unprecedented levels of thermal stress this quarter.

Infrared satellite image of Hurricane Iselle as it approaches the Hawaiian Islands.

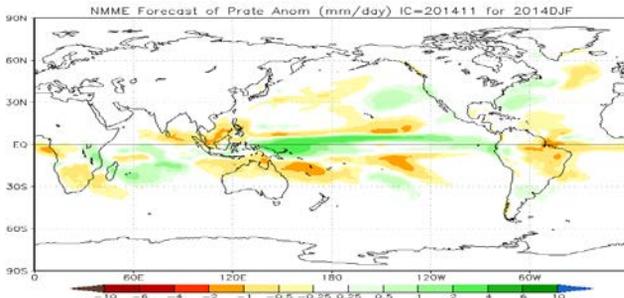


Flooding in Majuro, Marshall Islands, from high wave event in October. Photo courtesy of Karl Fellenius, Hawaii Sea Grant.

Bleached corals on Arno, Marshall Islands. Photo courtesy of the Marshall Islands Marine Resources Authority.



Regional Outlook for 4th Quarter 2014 (Nov-Jan)



Precipitation Anomaly Forecast, Valid Dec-Feb. Source: <http://www.cpc.ncep.noaa.gov/products/NMME/seasnom.shtml>

Computer models continue to suggest a **weak El Niño remains possible during the last quarter of 2014 or during the first two months of 2015.**

The SST anomaly outlook for the 4th quarter indicates near-normal values in Palau and FSM, but above-normal temperatures along and east of the Dateline. High values of **coral bleaching thermal stress are forecast to continue** across the Gilbert Islands and into the waters around American Samoa.

The forecast values for sea level in the 4th quarter indicate that **most of the USAPI stations in the north and south Pacific regions are likely to stay near current levels.** Sea-levels at Honolulu and Hilo are likely to be near normal.

Rainfall is anticipated to be near-normal for CNMI, Palau, Chuuk, Pohnpei, Kosrae, and Majuro. Yap is expected to receive near to below normal rainfall. Rainfall for American Samoa and the northern Marshall Islands is projected to be slightly below normal, while Hawaii is projected to be near to below normal as well.

Tropical cyclone activity for the remainder of the 2014 season in the western Pacific is **expected to be slightly below normal**, due to the forecast behavior of ENSO and season-characteristics to date. **There is an elevated risk of a late-season typhoon throughout Micronesia.** In the southwest Pacific, in line with the anticipated development of a weak El Niño, the outlook is for near normal TC activity with 8-12 named storms expected to develop from November 2014-April 2015; the 30-year normal number of named storms from 1981-2010 is 10.4.

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 NESDIS National Climatic Data Center:
<http://www.ncdc.noaa.gov/sotc/>

NOAA NESDIS National Oceanic Data Center:
<http://www.nodc.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/>