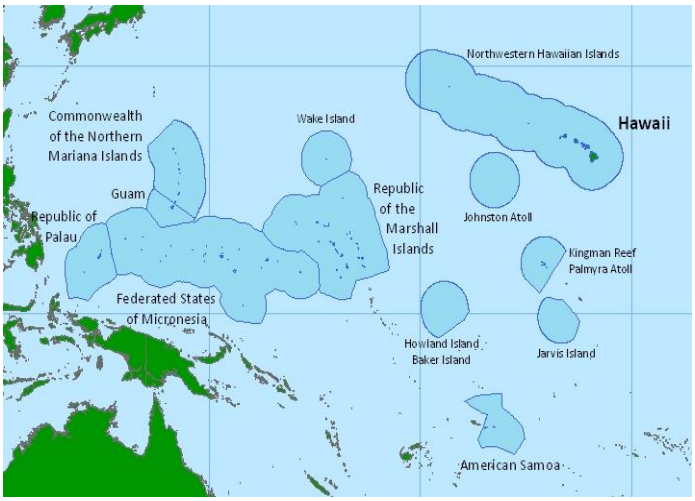
Climate Impacts and Outlook

Hawaii and U.S. Pacific Islands Region

1st Quarter 2013

Significant Events and Impacts for 4th Quarter 2012



The U.S.-Affiliated Pacific Islands.
Shading indicates each Island's Exclusive Economic Zone (EEZ).

Hawaii and Northwestern Hawaiian Islands – Drought persisted through the rainy season, with extreme drought on leeward areas of Maui, Lanai, Molokai and the Big Island.

Guam/Commonwealth of the Northern Mariana Islands (CNMI) – Large 20' waves hit the island this December, along with numerous fast-moving, trade-wind showers.

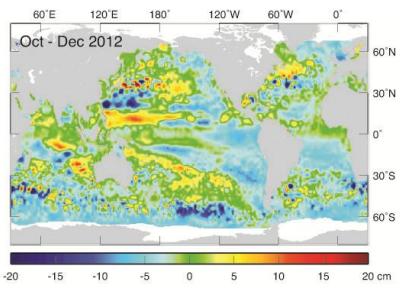
Republic of the Marshall Islands (RMI) – Lower than normal rainfall has reduced reservoirs on Majuro, while Kwajalein was wetter than normal.

Federated States of Micronesia (FSM) – Strong trade winds downed banana trees in December, but no inundation was reported.

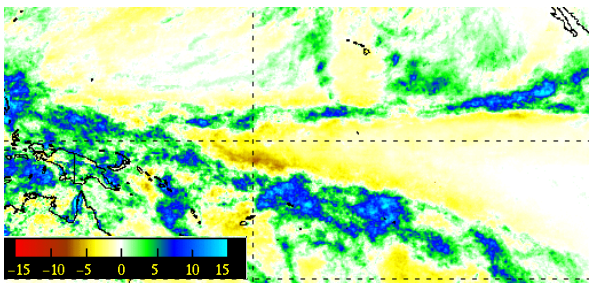
Republic of Palau – Super Typhoon Bopha impacted Palau with high winds, storm surge, and heavy rains, significantly damaging or destroying over 250 houses and displacing over 350 people.

American Samoa – Cyclone Evan struck the island in December with minimal damage. Rainfall was above normal. In neighboring island nations damage from Evan was significant.

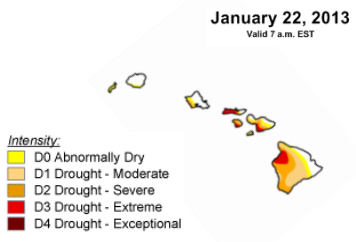
Regional Climate Overview for 4th Quarter 2012



Seasonal Sea Surface Height (SSH) anomalies relative to the 1993-2012 baseline average. Source: www.aviso.oceanobs.com Courtesy M Merrifield.



30-day TRMM satellite estimated precipitation anomalies for January 2013. Source: http://trmm.gsfc.nasa.gov/



U.S. Drought Monitor – Drought Conditions in Hawaii. Source: http://droughtmonitor.unl.edu

ENSO-neutral conditions continued in the Equatorial Pacific Region. The monsoon trough was relatively weak during the period, with low latitudes of the western North Pacific were dominated by anomalous easterly winds. In contrast, the Australian Northwest Monsoon was quite active, with some winds breaking containment of the South Pacific Convergence Zone (SPCZ) which resulted in the development of many tropical cyclones near American Samoa.

Sea surface temperature (SST) anomalies trended down across much of the Pacific Ocean. This relative cooling was consistent with a strengthening of *the Trade Winds* across the east-central Pacific. This resulted in a relative minimum in *sea-surface heights* over the eastern Pacific, and above normal heights across the far western Pacific. *Sea level* this quarter was 3-6 inches higher than normal.

Rainfall throughout much of the region was close to normal. In Hawaii, rainfall was below-normal in many areas of the state. In Guam and the CNMI, rainfall was near-normal. In the RMI, rainfall was below-normal. In the FSM, rainfall was above-normal in Chuuk, below-normal in Kosrae, near-normal in Pohnpei, and near-normal in Yap. In Palau, rainfall was near-normal. In American Samoa, rainfall was above-normal.

Drought conditions continued and worsened a bit over the Hawaiian Archipelago. By late January, over 71% of the state of Hawaii was abnormally dry or in drought. Drought in Majuro worsened during the quarter. Improvement over the leeward areas is expected toward the end of the rainy season.

Tropical Cyclone activity for November-January in the western North Pacific and southwest Pacific was near normal. The activity in the western North Pacific was displaced to the west and north of average, giving Micronesia another well-below normal typhoon season.

Regional Impacts for 4th Quarter 2012

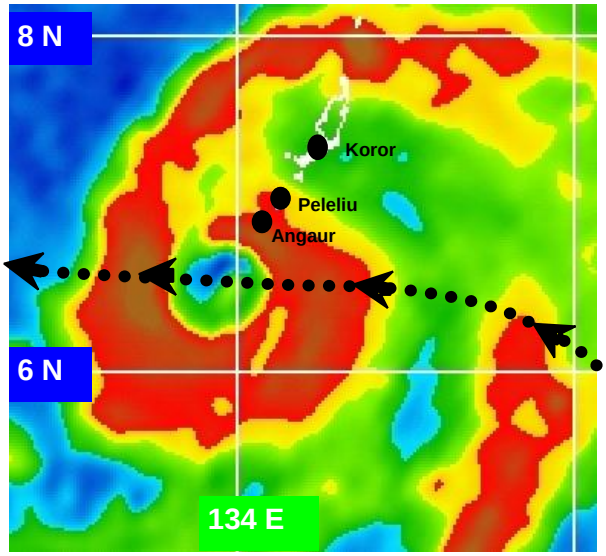
Agriculture and Husbandry
The Counties of Maui and Hawaii have been declared disaster areas due to prolonged drought.

Water Resources
As of mid-January 2013, the Majuro, RMI reservoir contained 9.947 million gallons of water, or less than one-third capacity. Strong water conservation measures will be needed.

Facilities and Infrastructure
A few of the villages on the eastern side of the island of Babeldaob, Palau were hit extremely hard by sea inundation from Bopha . An Initial damage assessment of 666 residences in 6 affected states found 112 houses completely destroyed and 136 houses with major damages.

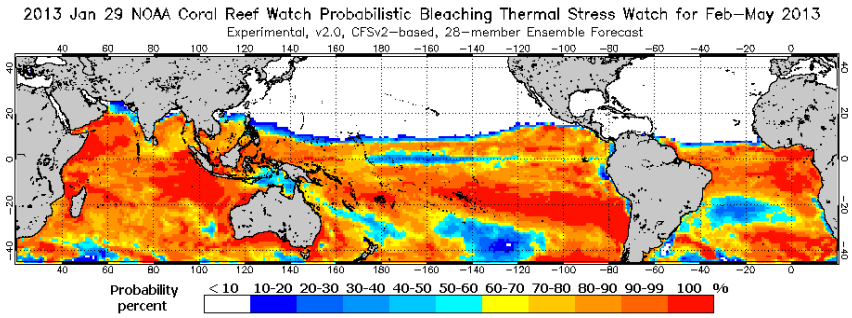
Recreation and Tourism
On Maui, Hawaii, the season-opening Tournament of Champions of the Professional Golf Association was postponed for two straight days in early January because of gusts that topped 40 mph and made it impossible to play.

Fisheries
A cold core ocean eddy developed off of Oahu, Hawaii. The eddy was associated with upwelling of deep, cold and nutrient-rich water.



TRMM satellite image of Typhoon Bopha as it passed to the south of Palau on the night of December 02, 2012. This image shows the cloud structure in the 85 GHz band of the microwave spectrum. The track of the eye is indicated by the dotted black line with arrows. Courtesy of the U.S. Naval Research Laboratory, Monterey, CA.

Regional Outlook for 2nd Quarter 2013 (February-April)



Bleaching Thermal Stress Outlook, Feb-May 2013. Source: http://coralreefwatch.noaa.gov/

ENSO Neutral conditions expected to continue.

Due to the trend of increasing *SSTs*, a coral bleaching watch exists across much of the west Pacific and portions of the south central Pacific . Portions of the equatorial central Pacific have greater than 70% chance of seeing coral stress during the next three months.

The forecasts values of sea level for the 2nd quarter indicate that most of the stations in the north Pacific region are likely to be about 1-3 inches higher than normal. American Samoa is likely to be about 3-4 inches higher than normal , and in Hawaii, both Honolulu and Hilo are likely to be closer to normal.

There is an increased potential for heavy rain events through early spring in Hawaii as ENSO neutral conditions dominate. As a result, drought conditions may abate somewhat, especially over the leeward areas. The northwest Australia monsoon and developing tropical storms should bring continued rains to American Samoa. In the FSM, rainfall is anticipated to be above-normal in Kosrae, near-normal in Pohnpei, near- to below-normal in Majuro, and near-normal in Yap. In Palau, rainfall is expected to be near- to above-normal.

Tropical cyclone activity is expected to be near-normal.

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 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/

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/