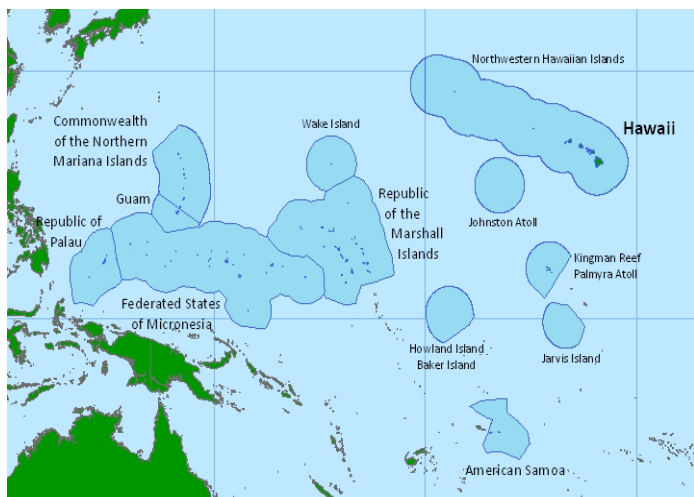


Climate Impacts and Outlook

Hawaii and U.S. Pacific Islands Region

2nd Quarter 2013

Significant Events and Impacts for 1st Quarter 2013



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

Hawaii and Northwestern Hawaiian Islands – Record cold temperatures invaded the islands in early April. Isolated flash floods occurred in late March, but prolonged drought remains.

Guam/Commonwealth of the Northern Mariana Islands (CNMI) – Strong trade winds dominated the weather during the 1st Quarter of 2013 with many days of high surf. Temperatures routinely reached 90°F under conditions of light to moderate trade winds and clear skies. Grass fire frequency increased.

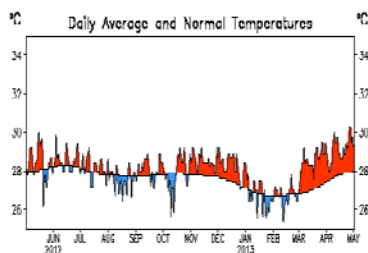
Republic of the Marshall Islands (RMI) – Dry conditions in the islands north of Majuro (e.g., Kwajalein, Wotje, Utrik) became severe with impacts to water quality and quantity and destruction of terrestrial food sources. **On May 6, the Government of RMI declared a state of disaster.**

Federated States of Micronesia (FSM) – Dry conditions prevailed on Yap and northern Chuuk. No significant impacts were noted.

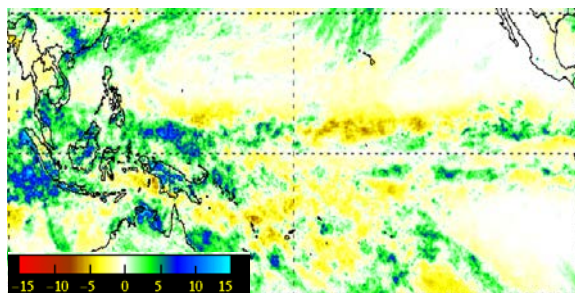
Republic of Palau – Near-normal conditions prevailed this quarter. No significant impacts were noted.

American Samoa – Near-normal conditions prevailed this quarter. No significant impacts were noted.

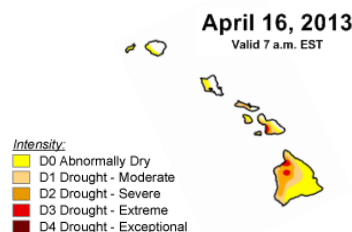
Regional Climate Overview for 1st Quarter 2013



Daily average temperatures compared to normal, at Agana, Guam. Source: www.cpc.ncep.noaa.gov/



30-day TRMM satellite estimated precipitation anomalies March 15-April 15. 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, but weather conditions were more in-line with La Niña (e.g., a weakening of the monsoon, reduced tropical cyclone activity and elevated sea level) all which became established across Micronesia. Temperatures were well-above normal across Guam and the CNMI during the quarter, with many daily maximums exceeding 90°F.

As compared to February 2013, the monthly mean *sea level* in March 2013 shows slight rise in most of the USAPI stations. Currently, all stations are 2-6 inches higher than normal. *Sea-surface temperatures* were generally near-normal except for the waters around Hawaii and American Samoa where cooler waters prevailed early in the quarter, eventually warming above normal in the last week of April.

Rainfall throughout much of the region was on the drier side of normal. In Hawaii, rainfall was near- to above-normal in many areas of the state, especially Honolulu and Lihue. In Guam and the CNMI, rainfall was above-normal. In the RMI, rainfall was well below-normal and *drought* conditions worsened in these areas. In the FSM, rainfall was below normal in northern Chuuk and above normal in the remainder of Chuuk, near-normal in Kosrae, below-normal in Pohnpei, and near-normal in Yap. In Palau, rainfall was below-normal. In American Samoa, rainfall was slightly above-normal.

Drought conditions continued over the Hawaiian Archipelago. By mid-April, over 83% of the state of Hawaii was abnormally dry or in drought, an increase of 12% over the last quarter. However, there was a 20% drop of areas in severe or extreme drought. Meanwhile, drought in Kwajalein, Guam, and Saipan worsened during the quarter, while abnormal dryness developed in Yap and Palau.

Tropical Cyclone activity for February-April in both the western North Pacific and southwest Pacific was near normal. Two cyclones in the western North Pacific passed across the Philippine archipelago and entered the South China Sea where they quickly dissipated. The southwest Pacific season formally ended on 30 April with late-season TC Zane that lasted until 2 May.

Sectoral Impacts for 1st Quarter 2013

Agriculture and Husbandry

Catastrophic drought has damaged agriculture on many of the atolls in the northern RMI. Crops including breadfruit, banana, and taro are withering in the dry weather.

Water Resources

As of mid-April 2013, due to continued drought conditions, a state of emergency has been in effect for the Northern Marshall Islands. The Majuro municipal water reservoir is just slightly above half capacity. Official reports from affected islands/atolls indicate that household water catchments and other water storage facilities have run out of water and that the levels of salinity in water drawn from under-ground wells has risen to unsafe levels. On May 6, the Government of RMI changed a state of emergency declaration to a state of disaster declaration.

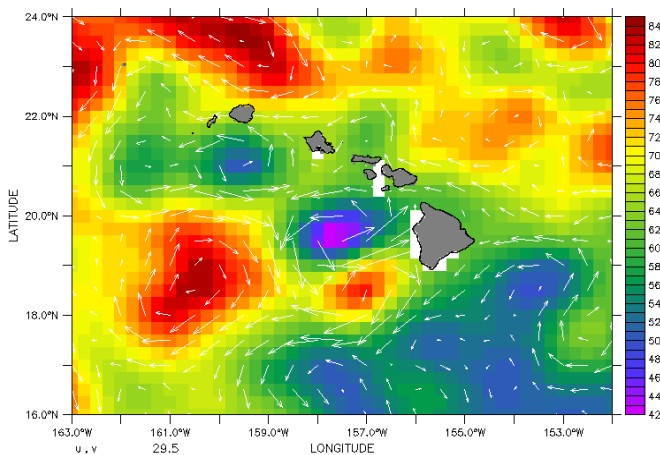
Facilities and Infrastructure

Due to flash floods at the end of March, many roads and bridges were impassable on Kauai, Hawaii, forcing the closure of schools and businesses for several hours.

Fisheries

Counter-clockwise rotating eddies developed off of Hawaii in late February bringing nutrient-rich food sources to the ocean surface.

TIME : 28-MAR-2013 00:00
Merged AVISO Altimetry and Niller Climatology - Weekly SSH

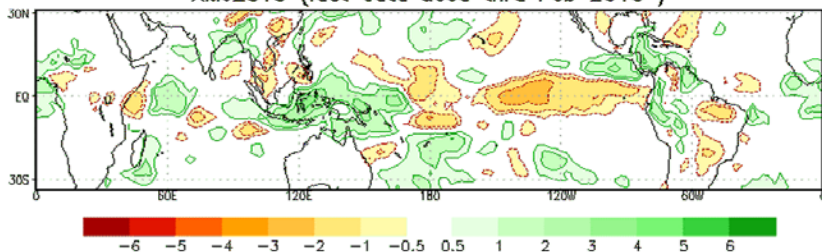


Sea-Surface Height (Centimeters)

Counter-clockwise ocean eddy evident west of Maui and the Big Island, Hawaii. Colors denote the sea-surface height in centimeters and the arrows indicate the velocity of the circulation.

Regional Outlook for 3rd Quarter 2013 (May-July)

PRECIP (mm/day) based on SST CA Forecast : Lead 1 :
AMJ2013 (last data used thru Feb 2013)



Huao van den Dool, CPC/NCEP/MNS/NOAA

Base Period 1981-2010

Precipitation outlook, April-June 2013. Source: <http://www.cpc.ncep.noaa.gov>

ENSO Neutral conditions expected to continue through the Northern Hemisphere summer 2013.

The SST anomaly outlook for the 3rd quarter indicates near-normal temperatures throughout the region. Coral bleaching thermal stresses are projected to be low across the USAPI through the period.

The forecast values of sea level for the 3rd 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 or slightly below normal.

The trade-wind trough will continue its slow seasonal northward march during the 3rd quarter, resulting in increased rain chances to atolls north of 8°N. However, the Marshall Islands and parts of Guam and Saipan are expected to be drier than normal. Specifically, rainfall is anticipated to be below-normal in Majuro with near-normal rainfall in Pohnpei and Kosrae. Above-normal rainfall is expected in Yap and Palau. Rainfall in American Samoa is expected to be near average as they enter their seasonal dry period. **Seasonal rainfall is expected to increase in June in northern areas of RMI. However, below-average rainfall could continue through July.**

Tropical cyclone activity in the western North Pacific is expected to be below-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/>