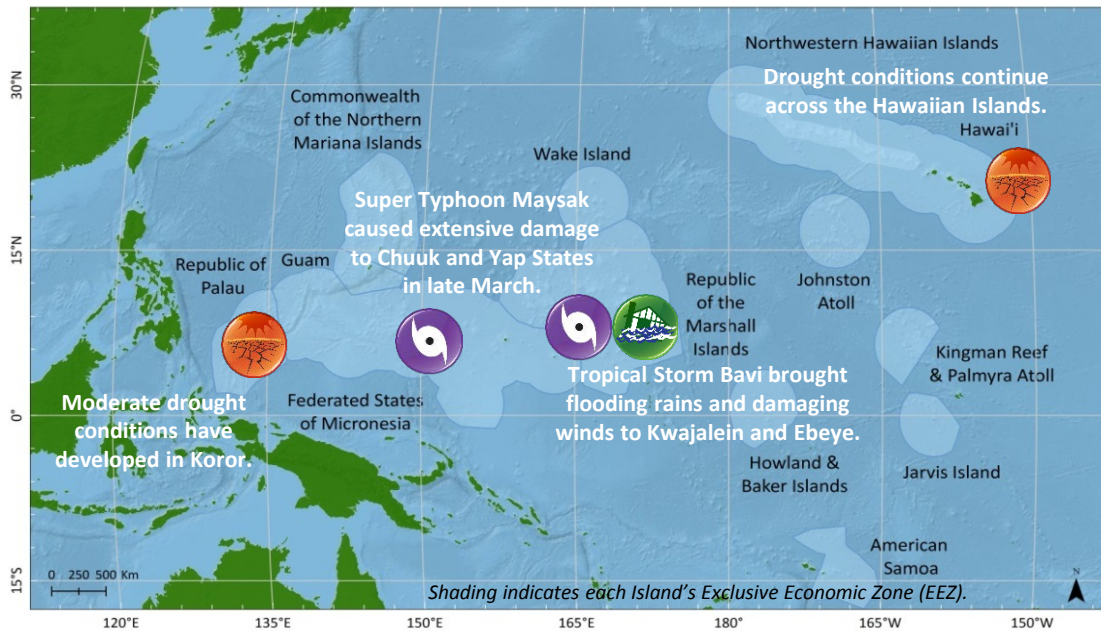


Climate Impacts and Outlook

Hawaii and U.S. Pacific Islands Region

2nd Quarter 2015

Significant Events and Impacts for 1st Quarter 2015



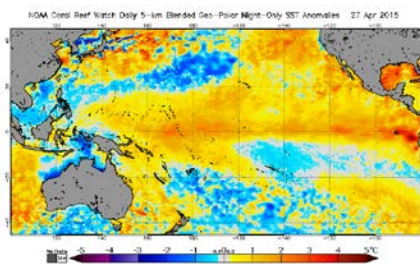
El Niño Advisory

Above normal rainfall fell over the Republic of the Marshall Islands and much of central and eastern parts of the Federated States of Micronesia.

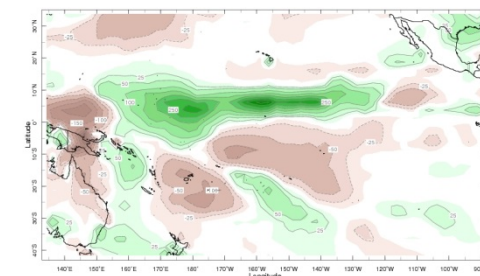
There have been an above normal number of typhoons in the western North Pacific so far this year.

Observed sea levels are at lowest values in a decade across all of Micronesia and is supportive of a weak to moderate El Niño event.

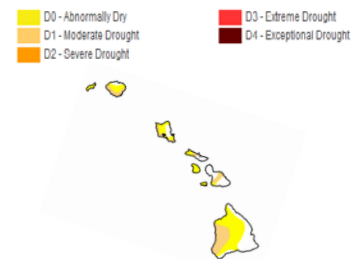
Regional Climate Overview for 1st Quarter 2015



Sea-Surface Temperature Anomalies, valid Apr 27, 2015. Source: <http://coralreefwatch.noaa.gov>



Apr 2015 precipitation anomaly. Source: http://trmm.gsfc.gov/trmm_rain/Events/thirty_day.html



U.S. Drought Monitor for Hawaii, Apr 28, 2015. Source: <http://www.drought.gov>

The region is under an El Niño Advisory, and weather patterns continued to resemble El Niño conditions during the quarter (e.g., above-average sea-surface temperatures, decadal -low sea levels, and wet weather across most of Micronesia). As of May 4th, the Niño 3.4 region anomaly was +1.0°C, supporting a moderate El Niño state.

Sea-surface temperatures were generally above normal across the central equatorial Pacific, with the warmest anomalies exceeding 1.0°C from Hawaii southwest to the Marshall and Caroline Islands. Sub-surface water temperature anomalies are still 5-7°C above normal across much of the central and eastern equatorial Pacific, especially east of 175°W. Palau had a 4" drop in sea-level this quarter, though most other sites hovered very close to their long-term normal but were still lower than levels seen over the last decade.

In Hawaii, rainfall was below normal at Honolulu (40%), Lihue (39%), and Hilo (83%), keeping each of the Hawaiian Islands in at least some stage of drought/dryness. In Guam, after a record dry February, rainfall ended 108% of normal, while Saipan was 180% of normal. In Kwajalein and Majuro in the RMI, rainfall was well above normal with 309% and 172% of normal respectively. In the FSM, quarterly rainfall was highly variable: Chuuk (143%), Kosrae (91%), and Pohnpei (114%). Further west, dry conditions developed in Palau as rainfall was only 64% of normal. In American Samoa, rainfall was near normal for the quarter (95%).

Record cold temperatures were felt in Honolulu and Lihue, Hawaii with 58°F and 57°F morning readings on 10 March. In addition, the Big Island of Hawaii had 29 consecutive days without rainfall from the end of January through the end of February, setting a new record dry spell.

Tropical Cyclone (TC) activity for February-April in the western North Pacific basin was well above-normal with 4 named storms, including Super Typhoon Maysak with peak wind speeds greater than 150 mph. Three storms originated in FSM and T.S. Bavi formed over the RMI in mid-March. In the South Pacific Ocean, there were a total of 6 TCs that formed; two of these, Marcia and Pam, attained Australian Category 5 TC status. Pam caused particularly catastrophic damage to the nation of Vanuatu with a direct hit with winds in excess of 150 mph.

Sectoral Impacts for 1st Quarter 2015

Coastal Hazards – Super Typhoon Maysak brought significant inundation to Chuuk and Ulithi, while Tropical Storm Bavi flooded Ebye atoll of the Marshall Islands as it passed through with high waves and copious rainfall. Meanwhile, gusty winds of 55 mph were reported on Oahu, Hawaii on 14 February with extensive tree damage.

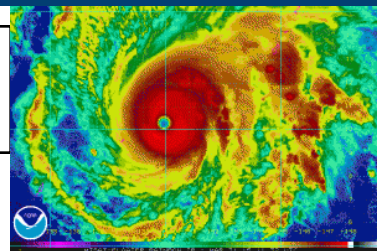
Facilities and Infrastructure – Super Typhoon Maysak caused extensive damage across much of FSM in late March. In Chuuk, the governor declared a state of emergency as the storm destroyed schools, health facilities, and private residences, while also sinking several fishing, passenger, and dive ships. On 31 March, the eyewall of Super Typhoon Maysak passed over Ulithi atoll, resulting in many homes being completely blown apart. The head of the Red Cross in the FSM reported that 60 to 80 percent of homes on Weno, the capital of Chuuk State, were destroyed by Typhoon Maysak, with up to 6000 people displaced.

Health – Due to heavy rains and flooding, the U.S. Embassy in Majuro, RMI issued an emergency message on the outbreak of Chikungunya disease as over 80 cases were reported by local hospitals.

Agriculture – The agricultural impact in Chuuk and Yap states was dramatic following Super Typhoon Maysak. In Chuuk, nearly 80% of the banana, breadfruit, and taro crops were destroyed, while in Ulithi, the typhoon's strong winds resulted in 100% crop loss across the island. It is estimated that it will take at least 12 months before the ground can support a replanting of local crops in Ulithi.

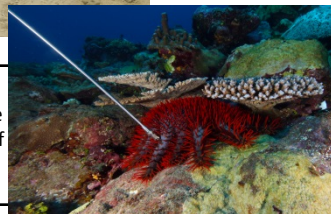
Natural Resources – American Samoa is currently experiencing outbreak levels of the coral-eating venomous crown-of-thorns (COTS) starfish. To date, approximately 15,000 COTS have been removed. The Transition Zone Chlorophyll Front progressed to its southernmost latitude on record (26°N); another signal of a developing El Niño. Bleaching in American Samoa last quarter was the worst seen in at least 12 years, more severe in the western parts of the Samoas than the eastern islands.

Infrared satellite image of Super Typhoon Maysak as it passed over Ulithi.

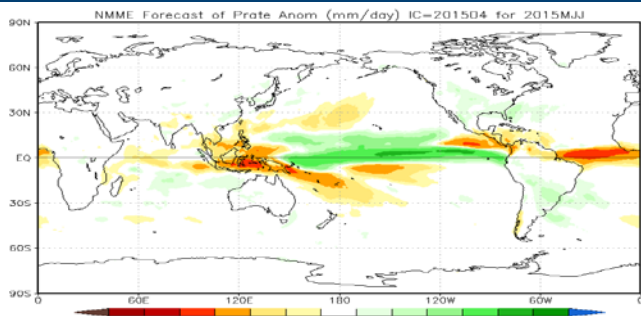


The sinking of a boat in Chuuk lagoon from Typhoon Maysak. Photo courtesy of Sanchez Salle, NOAA.

Crown of Thorns Starfish being injected with ox-bile to kill it. Photo courtesy of Greg McFall, NOAA.



Regional Outlook for 2nd Quarter 2015 (May-July)



Precipitation Anomaly Forecast, Valid May-July. Source: <http://www.cpc.ncep.noaa.gov/products/NMME/seasamon.shtml>

The latest climate model consensus continues to suggest greater than 80% chance of El Niño conditions continuing during the May-July period. Further strengthening of El Niño is possible through northern hemisphere Fall 2015.

The SST anomaly outlook for the 2nd quarter indicates near-normal values in American Samoa, CNMI, Palau, and the FSM, but above-normal sea-surface temperatures in the Marshall Islands and east through the Hawaiian Islands. The 4-month coral bleaching outlook indicates that thermal stress will reach Alert Level 2 (capable of causing widespread bleaching and significant mortality among some species) from near the southern Marshall Islands eastward to coastal South America.

The forecast values for sea level in the 2nd quarter indicate that **most of the USAPI stations in the north and south Pacific regions are likely to stay near current decadal lows.** Sea-levels at Honolulu and Hilo are likely to be slightly elevated, but generally close to normal.

Rainfall is anticipated to be above normal for Pohnpei, and near-normal for CNMI, Chuuk, and Majuro. Yap, Palau, and Kosrae are expected to receive near to below normal rainfall. Rainfall for American Samoa is projected to be near-normal. **Drought persistence and expansion is expected in leeward areas of the Big Island of Hawaii.**

Tropical cyclone activity in the western Pacific is expected to be above normal, which is typical during developing El Niño periods. **Most Micronesia islands will have about a 1-in-3 chance of serious effects from some combination of high winds, large waves, extreme rainfall associated with a typhoon during 2015.** More than 35 TCs have occurred in previous strong El Niño years. In the southwest Pacific, in analog seasons to 2015 a below average total of 4 TCs developed during the off-season period from May-July; while climatologically from 1981-2010, a total of 17 TCs developed during the May-July timeframe.

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/>