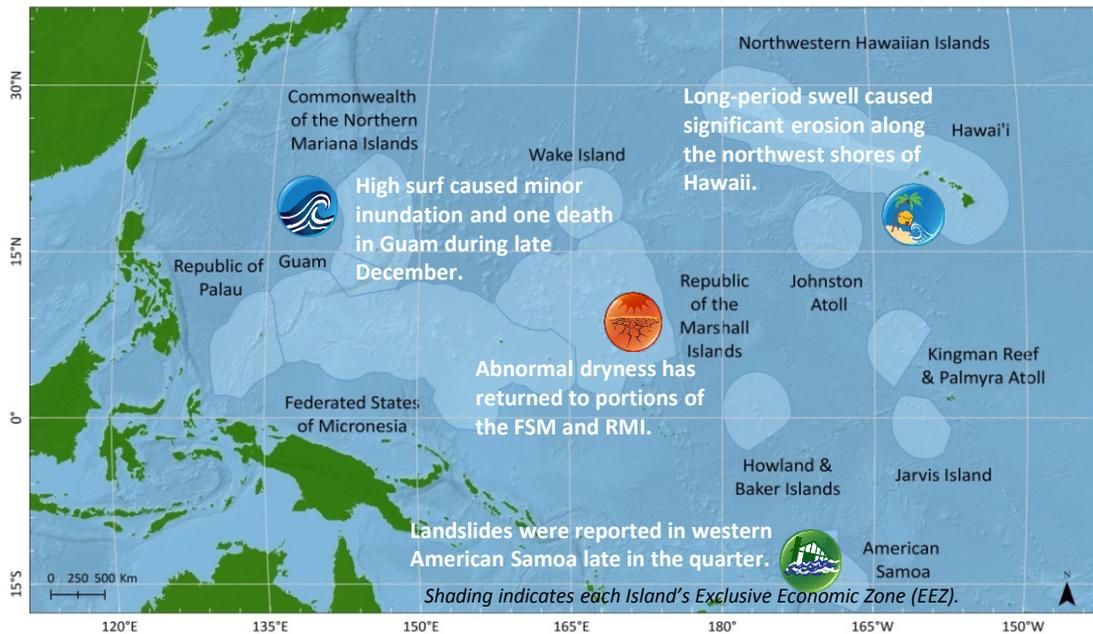


Climate Impacts and Outlook

Hawaii and U.S. Pacific Islands Region

1st Quarter 2014

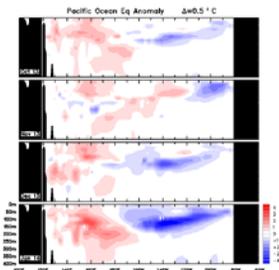
Significant Events and Impacts for 4th Quarter 2013



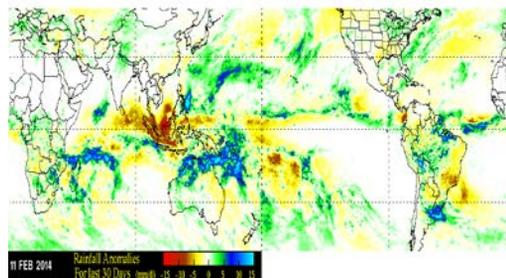
Persistently higher than average mean sea-level continues to be observed across Federated States of Micronesia (FSM) and American Samoa. No significant impacts were noted.

Above normal rainfall prevailed over much of Palau and American Samoa.

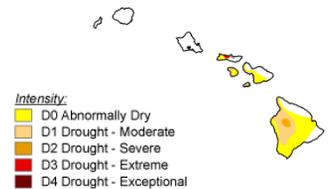
Regional Climate Overview for 4th Quarter 2013



Depth chart showing the progression of cool waters along the Equator. Source: <http://www.bom.gov.au/>



30-day TRMM satellite estimated precipitation anomalies January 2014. Source: <http://trmm.gsfc.nasa.gov/>



U.S. Drought Monitor – Drought Conditions in Hawaii as of February 4, 2014. Source: <http://droughtmonitor.unl.edu>

ENSO-neutral conditions continued in the Equatorial Pacific Region. Weather conditions were more in-line with La Niña in the quarter (e.g., the position of the monsoon trough and elevated sea level). As of February 7th the Niño 3.4 region anomaly was -0.3°C , which corresponds to ENSO neutral conditions.

The monthly mean *sea level* in the 4th quarter continued to show higher anomalies in most of the USAPI stations; all stations were 4-6 inches higher than normal. *Sea-surface temperatures* were generally above-normal except for the waters around and just south of the Equator where cooler waters prevailed.

Data from the *ocean color* satellite showed a large algae bloom off of Fiji and south of American Samoa during December, 2013.

In Hawaii, *rainfall* was near normal in many areas of the state, though dryness lingered on the Big Island. In Guam and the CNMI, rainfall was above normal as quarterly values were 147% of normal. In the RMI, rainfall was near to slightly below-normal (Majuro was 87% normal), while in the FSM, quarterly rainfall, in terms of percent of normal, was near-normal across most sites: Chuuk (82%), Kosrae (94%), and Yap (143%). Further west, Pohnpei was below normal (84%), while in Palau and Koror rainfall was slightly above normal. In American Samoa, rainfall was 105% of normal for the quarter.

Drought conditions continued over parts of the Hawaiian Archipelago and abnormal dryness expanded across portions of the FSM and RMI. As of the end of January, 57% of the state of Hawaii was abnormally dry or in drought, with some improvement on Oahu due to heavier rains in December. Meanwhile, abnormal dryness lifted out of Kapingamarangi, while the northern atolls of the RMI saw drier conditions develop. Meanwhile, severe drought conditions developed in Kwajalein.

Tropical Cyclone activity for November-January in the western North Pacific basin was near-normal. In mid-January 2014, a weak tropical cyclone was affecting the southern region of the Republic of the Philippines with heavy rains. In the Southern Hemisphere, Cyclone Ian weakened after moving out of the South Pacific tropics where severely impacted the Kingdom of Tonga.

Sectoral Impacts for 4th Quarter 2013

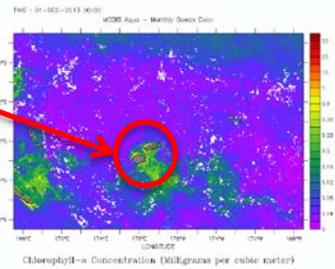
Water Resources – Due to the resurgence in abnormally dry conditions across the northern RMI, strong water conservation measures are urged, especially Wotje and Utirik, where rainfall has been less than half of normal.

Facilities and Infrastructure – Extreme seasonal beach erosion occurred near Rocky Point, a coastal area of the north shore, Oahu, Hawaii in December 2013, threatening and undermining several beachfront homes. This event was triggered by large, long-period W to WNW swell event Dec. 20-22 that had much more westerly component than normal winter events causing severe erosion of the beach and dune fronting 6 to 7 homes. Erosion was compounded by a series of overlapping, large, long-period WNW to NW events Dec. 24-30 that added large wave run up and subsequent failure of shoreline armoring features along this stretch.

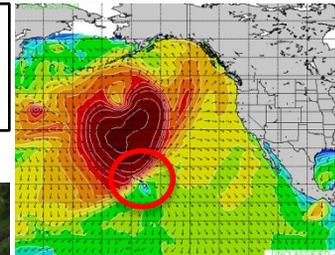
Fishing – Waters off the northeast coast of Hawaii were overcome by a large algal bloom in December. In addition, a cold-core eddy appeared southwest of the Big Island of Hawaii, upwelling nutrient-rich food sources.

Natural Resources – A coral reef bleaching watch is in effect for areas along and south of 5°N latitude between 140 and 165°E longitude. This includes the southern atolls of the FSM, however no significant bleaching is expected. Some warming and potential for bleaching may occur around American Samoa by April.

Ocean color highlighting algae bloom near American Samoa in December.

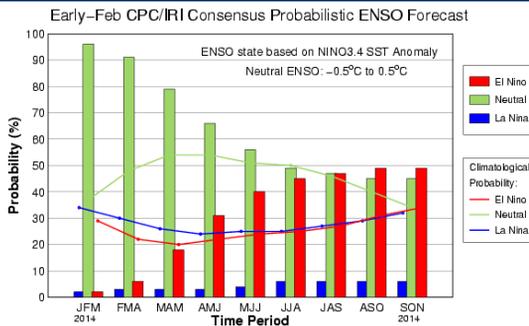


A large January storm in the north Pacific produced waves to 50' along the northwest shores of Hawaii.



Long-period swell in December caused significant coastal erosion on the northwest shores of Oahu.

Regional Outlook for 1st Quarter 2014 (Feb-Apr)



ENSO Forecast, January – November 2014. Source: <http://iri.columbia.edu/our-expertise/climate/forecasts/enso/>

ENSO Neutral conditions are expected to continue through the Northern Hemisphere spring 2014. There is an increasing potential for El Niño to develop after June 2014.

The SST anomaly outlook for the 1st quarter indicates near-normal temperatures throughout the region. **Coral bleaching thermal stresses are projected to be high** across the equatorial Pacific, especially from FSM to American Samoa.

The forecast values for sea level in the 1st quarter indicate that most of the stations in the north Pacific region are likely be 3-4 inches higher than normal. Only Honolulu and Hilo will remain closer to normal. A continuation of ENSO-neutral conditions may cause the sea levels to fall slightly during the quarter, though still elevated.

Rainfall in parts of FSM are expected to be near- to-above normal next quarter. Specifically, rainfall is anticipated to be above normal for Yap, near normal for Chuuk, Pohnpei, and Kosrae. Palau is projected to be wetter than normal, while the CNMI are expected to receive near normal rainfall. For the RMI, Kwajalein is expected to receive near normal rainfall while Majuro is expected to receive slightly below normal rainfall. Rainfall for American Samoa and Hawaii is projected to be near normal. Rains in Hawaii in early February suggest improvement to the drought picture over Hawaii.

A normal seasonal quiet period in tropical cyclone activity is expected for the western North Pacific. In the southwest Pacific, a slightly increased frequency of tropical cyclones are expected along the east coast of Australia and again near Fiji, Tonga, and the Cook Islands.

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/>

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/>