VPS Transcript: Mapping ENSO: Precipitation for the U.S. Affiliated Pacific Islands

Pacific Water Resources Team at NOAA NCEI

Nick Luchetti:

“The complexity of our climate system is vast. From oceanic to atmospheric phenomenon, its dynamical nature is constantly in flux. A primary driver of climate anomalies around the world is what are known as large-scale teleconnections. Teleconnections connect climate anomalies from one region of the globe to other sections of the globe, sometimes even as far as thousands of miles away. One of the most influential teleconnections is the El Niño – Southern Oscillation or ENSO.”“ENSO is a coupled oceanic-atmospheric circulation that develops off the west coast of South America. It oscillates between two different phases, La Niña and El Niño. La Niña events are characterized by cool sea surface temperature anomalies in the eastern Pacific and warm sea surface temperatures in the western Pacific. During these events, the trade winds strengthen, shifting equatorial convection and thunderstorms westward towards Australia. On the other hand, El Niño events are characterized by warm sea surface temperature anomalies in the eastern Pacific and cooler sea surface temperatures in the western Pacific. During these events, the trade winds slow down, allowing convection and thunderstorms to shift eastward.

These convection shifts have a significant influence on precipitation distribution throughout the world. One area that is particularly influenced by the different phases of ENSO, is the islands of the Tropical Pacific, where changes in the amount of seasonal precipitation has substantial social and economic impacts.

Ethan Wright:

Islands in the tropical Pacific are particularly vulnerable to stresses on water resources. Most island communities in the Pacific have limited sources of freshwater, often times almost entirely dependent on the amount of precipitation. Many island homes supplement their freshwater supply by utilizing large tanks to capture rainfall. With these limited sources, an abundance of freshwater is not always available, and water supplies often need to be strictly conserved.

Many islands in the Pacific experience drought during strong El Nino phases. Because of this, meteorologists and decision-makers are especially concerned about fresh water during these events. Other than a few historical ENSO events, decision-makers in this region do not have a historical context with which to frame and understand the influence of ENSO on precipitation.

Jessica Sutton:

Established in 1994, the Pacific ENSO Applications Climate or PEAC Center works to provide in-depth climatological forecasts as they relate to management of climate-sensitive sectors for the US Affiliated Pacific Islands. Currently, PEAC collaborates with representatives from local Weather Service Offices (WSOs) to create precipitation forecasts and outlooks.

PEAC works with the National Oceanic and Atmospheric Administration’s (NOAA) Climate Prediction Center (CPC) to develop precipitation outlooks for the islands. The current climatology used is based on observations from 66 stations scattered throughout the Pacific Basin from 1955-1996.

While the climatology that PEAC provides is extremely useful, it could be complimented by incorporating satellite data.

The Pacific water resources team apart of NASA DEVELOP National Program at NOAA’s National Centers for Environmental Information in Asheville, North Carolina collaborated with scientists and meteorologists across the USAPI to fill this need. They utilized the PERSIANN Climate Data Record (CDR) to determine the likelihood of precipitation changes within five specific ENSO phases, defined using the Oceanic Niño Index.

The PERSIANN CDR provides a 30-year record of global daily precipitation at 0.25° resolution. This high-resolution CDR is used for an in-depth analysis of precipitation within the USAPI.

Three month seasonal anomalous wet and dry maps were created for five ENSO phases for each of the US Affiliated Pacific Island Exclusive Economic Zones. These maps were given to local weather forecasters as a supplemental climatology to help better prepare their communities for extreme drought and heavy precipitation events. The results of this project were shared with science advisors, partners, end-users and the public through the ArcGIS online mapping application to easily access information about ENSO in the US Affiliated Pacific Islands, as well as view the seasonal maps, time series figures, and animations made by the NASA DEVELOP Pacific Water Resources Team.