



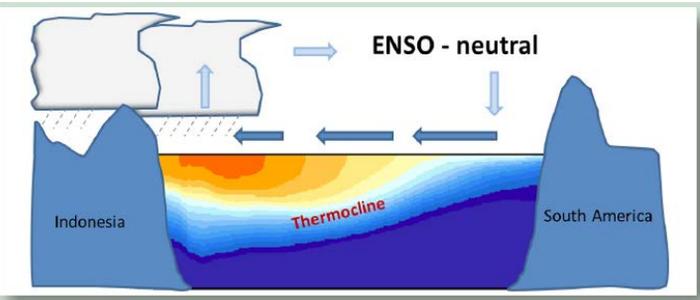
El Niño and its Impacts on the Republic of the Marshall Islands



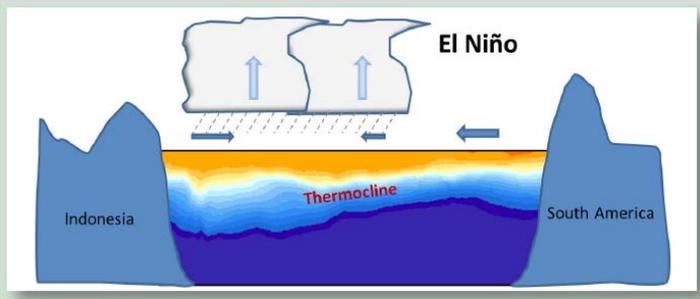
What is El Niño?

The El Niño – Southern Oscillation (ENSO) is a recurring climate pattern involving changes in the temperature of waters in the central and eastern tropical Pacific Ocean and the patterns of sea level pressure, lower- and upper-level winds, and tropical rainfall across the Pacific basin. On periods ranging from about two to seven years, the surface waters across a large swath of the tropical Pacific Ocean warm or cool by anywhere from 1°C to 3°C, compared to normal. This irregular oscillation between warm and cool patterns, referred to as the ENSO cycle, directly affects rainfall distribution in the tropics and can have a strong influence on weather across the Pacific basin. **El Niño** and **La Niña** are the extreme phases of the ENSO cycle; between these two phases is a third phase called **ENSO-neutral**.

ENSO-neutral: Under normal conditions strong trade winds blow from the east along the equator, pushing warm water into the western Pacific Ocean.



El Niño conditions occur when abnormally warm waters build in tropical region of the central and eastern Pacific Ocean and are usually associated with a weakening of the easterly trade winds, sometimes even reversing to westerlies. Consequently, tropical rains that usually fall over Indonesia move eastward; sea level decreases in the western Pacific; and the vertical, thermal structure of the ocean and coastal and upwelling currents are changed.



The **Thermocline** is a layer of water in which there is an abrupt change in temperature separating the warmer surface water from the colder deep water.

El Niño in the RMI	
Rainfall	Less
more at first, but then much less	↓
Trade Winds	Less
weaker, with occasional westerly winds	↓
Tropical Cyclones	More
increased risk, as more storms form closer to the islands	↑
Sea Level	Less
lower at first, then gradually recovering	↓
Ocean Conditions	More
warmer in the year after El Niño	↑

See back page for more details

Every El Niño is a little bit different!
El Niño conditions can start to develop as early as May or June and typically reaches maximum strength during December; the conditions then subside towards normal conditions by June of the following year. However, the evolution and duration, strength and impacts of individual El Niño events can vary, in some cases greatly. This makes constant monitoring and awareness extremely important for decision makers across multiple sectors.

El Niño and Rainfall in the RMI

With modified rainfall patterns, El Niño poses the threat of major drought for the RMI. Rainfall during El Niño is greater than average during the first half of the year. After September, the monthly rainfall begins a steady decline, sinking to well below average during the first few months (January through May) of the year following El Niño. The level of these dry conditions depends on the intensity of the El Niño event, with severe drought affecting the RMI in the year after the strong events (e.g., 1998 after the 1997 event). Recovery to average rainfall is delayed until June for the southern atolls and until July for the northern atolls.

El Niño and Tropical Cyclones in the RMI

El Niño tends to shift the development of tropical cyclones away from western Micronesia and towards the RMI. This makes for an increased risk of tropical cyclone activity in the RMI from March-December of El Niño years. There is also higher risk of coastal flooding due to storm surge and strong west winds.

El Niño and Sea Level in the RMI

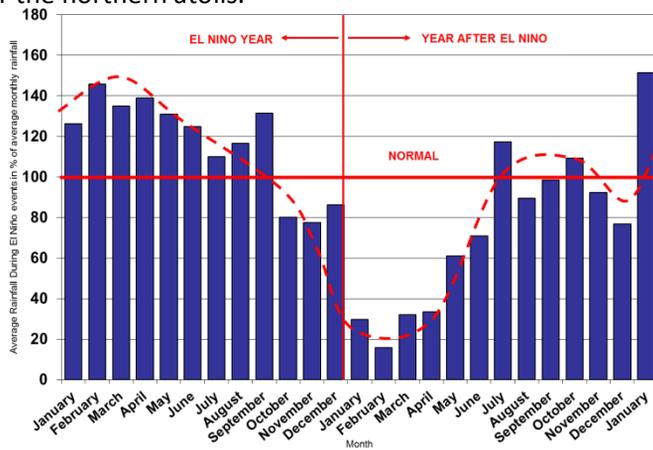
In the RMI, large drops in sea level are observed during strong El Niño years. The falls begin in the middle and peak at the end of the El Niño year. Sea level begins to rise in the summer of the year following El Niño. Moderate El Niño years also show lower than average sea level — the amount commensurate with the strength of the El Niño.

El Niño and Ocean Conditions in the RMI

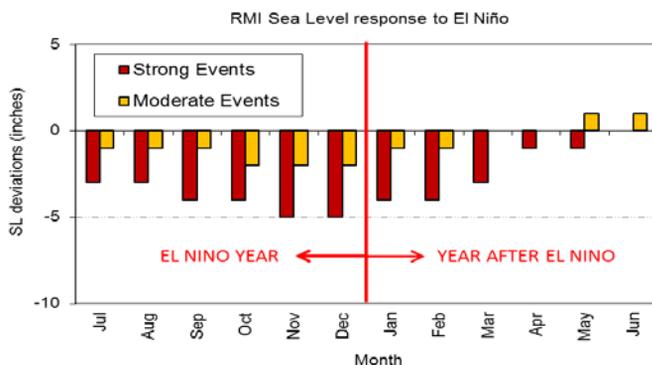
During El Niño ocean waters tend to warm in the central and eastern Pacific at both the surface and subsurface. Both warm and cold water fish species move north. Surface-oriented, schooling fish often disperse and move into deeper waters.

What does El Niño mean to you?

- **If you are a water manager**, expect adverse impacts on water availability, including increased demand on freshwater augmentation as groundwater resources become brackish and catchments dry up due to less rain.
- **If you are a disaster manager**, prepare for prolonged drought and an increased likelihood of damage to infrastructure due to tropical cyclones and coastal flooding.
- **If you are involved in public health**, prepare for reduced freshwater quality and quantity, depleted food supplies, and mosquito-borne diseases.
- **If you are a coastal and ocean resource manager**, expect an increased risk of coral bleaching and potential changes in tuna catch as tuna habitat migrates away from its regular location.
- **If you are involved in agriculture**, expect adverse impacts on crop production for several months as coconut, banana, taro, and breadfruit dry up; these effects may be extended in the year after El Niño due to rising seas.
- **If you are involved with the recreation and tourism**, drought and ecosystem impacts may negatively affect recreation and tourism.



Monthly rainfall during El Niño.



Monthly sea level variations during El Niño.

For Additional Information go to

- **Weather Station Office (WSO) Majuro:** <http://www.prh.noaa.gov/majuro/>
- Pacific ENSO Applications Climate (PEAC) Center: <http://weather.gov/peac/>
- NOAA Climate Prediction Center (CPC): <http://www.cpc.ncep.noaa.gov/>
- NOAA National Centers for Environmental Information (NCEI)

Also, Contact the Pacific Region Climate Officer,

Pacific ENSO Applications Climate Center, peac@noaa.gov

