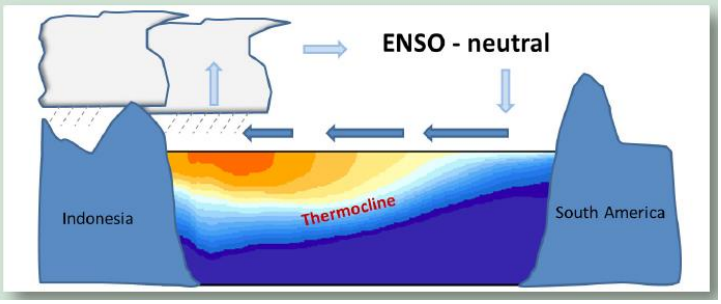
El Niño and its Impacts on American Samoa

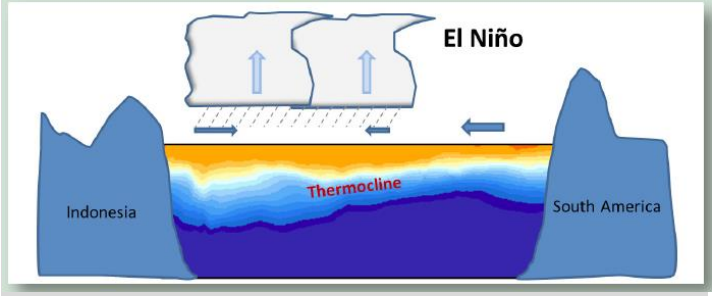
What is El Niño?

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 American Samoa

Rainfall	**Less** ↓
much less at first, then gradually recovering; drier wet-season	
Trade Winds	**Less** ↓
weaker, with occasional gusty periods	
Tropical Cyclones	**More** ↑
increased risk, as more storms form closer to the islands	
Sea Level	**Less** ↓
lower starting late in the El Nino year, staying low the entire year after the El Nino.	
Ocean Conditions	**Less** ↓
cooler at and below the surface	

See back page for more details

Every El Niño is a little bit different!

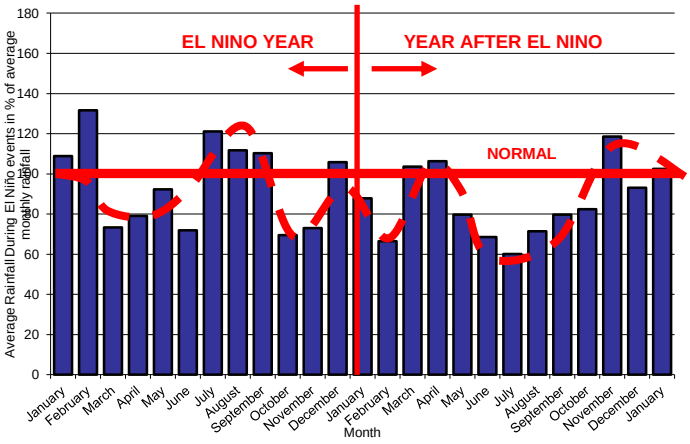
El Niño conditions can start to develop as early as May or June and typically reaches maximum strength during December; the conditions then subside towards normal conditions by June of the following year. However, the evolution and duration, strength and impacts of individual El Niño events can vary,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

El Niño and Rainfall in AS

Rainfall during the year of a strong El Niño starts out below normal in August and dryness continues through June of the year after El Niño. These long term dry conditions may be punctuated with intermittent wet conditions. The level of these dry conditions depends on the intensity of the El Niño event. For strong El Niño's, rainfall begins to return to normal by August of the year following that strong El Niño event. With weak and moderate El Niño's rainfall can be above normal, however this response is not consistent.

El Niño and Tropical Cyclones in AS

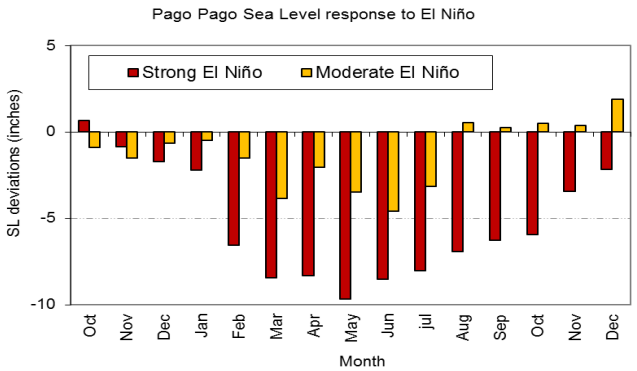
During strong El Niño's, the tropical cyclone season exhibits an enhanced risk of a damaging tropical cyclone from November through January. The risk falls away to near or below average from February through April as TC activity pushes farther to the east. These features of the tropical cyclone season are less distinct during weak El Niño's.



Monthly rainfall during El Niño.

El Niño and Sea Level in AS

Sea level in American Samoa usually starts falling during October or November of the El Niño year. The fall is 3-6 months later, when compared to North Pacific islands. Sea levels are lower than average for the entire year after El Niño. Taimasa is the local term given to these conditions.



Monthly sea level variations during El Niño.

El Niño and Ocean Conditions in AS

During El Niño, ocean waters tend to warm substantially in the central and eastern equatorial Pacific at both the surface and subsurface. In AS however, near or even slightly cooler than normal ocean waters are commonly observed during strong El Nino's.

What does El Niño mean to you?

- **If you are a water manager**, expect adverse impacts on water availability, including increased demand on groundwater resources due to reduced rainfall and increased potential for seawater instrusion.
- **If you are a disaster manager**, prepare for an increased likelihood of damage to infrastructure due to tropical cyclones and coastal flooding.
- **If you are involved in public health,** prepare for increased incidences of water borne disease and other ailments typically associated with natural disasters.
- **If you are a coastal and ocean resource manager**, expect an increased risk of coral bleaching and other ecosystem impacts associated with low sea-level stands.
- **If you are involved in agriculture**, expect defoliated trees and crops with increased chance of wildfires, especially from November-February as a result of anticipated dry conditions.
- **If you are involved with the recreation and tourism,** minor impacts are expected to coastal resources from damages to beaches and coral reefs.

For Additional Information go to

- Weather Station Office (WSO) Pago Pago: http://www.weather.gov/ppg/
- 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