

El Niño and La Niña, Children of the Tropics in Persian Gulf

Maryam Sadat Masoudian, Tehran/ Iran

ABSTRACT

As we know the weather is going to be hot so the worst hurricanes, floods and other bad and new events will happen. In this work, attempt was made to study El Nino and La Nina in Persian Gulf. Iran is a country with normal weather and El Nino and La Nina will happen in areas that have abnormal changeable weather.

Key Words : *El Nino, La Nina, Persian Gulf, hurricanes*

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Participated and was awarded in First Step to Nobel Prize as high school student (2006-2007)
Accepted in country selection by Ariaian Young
Innovative Minds Institute , AYIMI
<http://www.ayimi.org.info@ayimi.org>

1 Introduction

El Niño is an oscillation of the ocean-atmosphere system in the tropical Pacific having important consequences for weather around the globe. El Nino is a shift in ocean temperatures and atmospheric conditions in the tropical Pacific that disrupts weather around the world (Fig.1). It is a poorly understood recurrent climatic phenomenon that primarily affects the Pacific coast of South America, but has dramatic impacts on weather patterns all over the world.

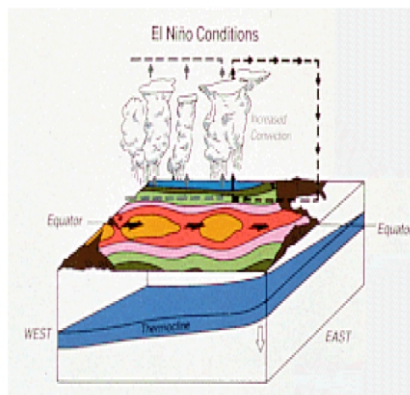


Fig 1: El Nino condition

Pronounced 'El -Nino', it means 'the boy' in Spanish and was named so by Peruvian fishermen after the Christ child since its effects are generally first felt around Christmas. It is a periodic warming of the Pacific Ocean that leads to terrible extremes of weather. The precise causes, intensity, and longevity of El Nino are not very well understood. The warm El Nino phase typically lasts for 8–10 months or so.

Normally, trade winds blow towards the west, across the Pacific, pushing warm surface water away from the South American coast towards Australia and The Philippines. Along the Peruvian coast the water is cold and nutrient-rich, supporting high levels of primary productivity, diverse marine ecosystems, and major fisheries. During El Nino, the trade winds relax in the central and western Pacific. This allows warm water to accumulate in the surface, which causes the nutrients produced by the

upwelling of cold water to significantly come down, leading to the killing of plankton and other aquatic life such as fish and the starvation of many sea birds. This is called the El Nino effect, which is also responsible for destructive disruptions of worldwide weather part.

In the 1500s, fishermen who lived in South America began to wonder about a current of unusually warm water that came to their shore every few years near Christmastime. Since the fishermen believed in the birth of the Christ child at Christmas, and since they spoke Spanish, they named the hot water El Nino, which means "the infant" in Spanish.

2 Where Do Scientists Look for El Niño?

The hot water usually comes first to the coasts of Peru and Ecuador in South America. But if we have known about El Niño for four hundred years, why is everyone talking so much about the hot water this year? The 1997-1998 El Niño may or may not be stronger than ever before. Scientists are still deciding. One thing that is definitely different about this El Niño is the technology that scientists are using to study it. Scientists and governments from around the world—United States, France, Japan, Korea and Taiwan are sharing knowledge and funding for The Tropical Atmosphere Ocean (TAO) array. When 1998 began, East Africa should have been at its most beautiful. Normally the short rainy season ends in December, the rivers subside, and the country sparklers; farmers raise crops, animals graze, tourists go on safaris. But this year was different. The rains were heavy and long. The water spread out for miles in places in Kenya and Somalia, cutting off villages and forcing herders to crowd with their livestock onto a few patches of dry land. Things quickly turned ugly. Camels, cows, sheep, and goats all started dying of violent fevers. Soon people, too, began to get sick. Some went temporarily blind; others began bleeding uncontrollably.

The disease was Rift Valley fever, caused by an obscure mosquito-borne virus. It pops up every few years in Africa when standing water encourages mosquito eggs to hatch. This year's huge flood brought a spectacular outbreak: according to official (albeit rough) estimates, at least 89,000 people caught the disease. Two hundred died, but then the disease is not usually fatal to humans. Animal losses, however, were almost certainly vast—owners

probably the worst outbreak of Rift Valley fever in recorded history," says Ali Khan, a medical epidemiologist at the Centers for Disease Control and Prevention in Atlanta. Yet catastrophic as the East African floods were, they had to jostle for the world's attention with other cases of strange weather with unusual occurrences of droughts, fires, rains, cold snaps, and heat waves. Every year brings its own grab bag of such anomalies, but this year many of them could be linked to a phenomenon in the empty expanses of the equatorial Pacific--a change in the ocean currents and winds that began in the early months of 1997 and that altered weather patterns around the world. The change in the weather was, of course, the work of El Niño. By the end of 1997, El Niño had already become a celebrity of sorts--in storm-battered California, television news programs offered a tabloid flurry of El Niño updates. In 1998, however, El Niño's effects on the world came into full flower. It helped make the year the hottest ever recorded. In addition to Rift Valley fever, El Niño has been linked to an upsurge in diseases ranging from cholera to malaria to dengue fever, in Kenya, Cambodia, Peru, and other countries scattered around the globe. Scientists are now trying to figure out how they can use this year's experiences to predict what the future will bring--both in the next few months and in future decades. The good news is that they can now forecast an El Niño with some precision, and during El Niño years predict its effect on the world's weather months in advance. The bad news is that according to some research this latest El Niño might be a preview of the weather to come in the next century El Niño is caused by an erratically swinging pendulum made of air and water. Under typical conditions a giant pool of warm water sits in the tropical western Pacific.

The heat makes the seawater evaporate and build massive thunderclouds. As rain falls from the clouds, the air both dries out and is pulled upward by the storm's violent updrafts; when the air reaches higher altitudes, it gets blown eastward, until it sinks back down off the coast of South America. This dry air is now blown back west over the Pacific by trade winds, replacing the air carried up and away by the thunderstorms. This cycle is similar to ones found all along the equator, all powered by thunderstorms rising over warm water or on the edges of mountain ranges, and all rotating side by side like a set of interlocking cogs. In the Pacific the atmosphere and the ocean normally reinforce this circulation pattern. As the trade winds travel west, they push the warm surface water of the ocean ahead of them toward the warm pool, making the pool even warmer. As a result of the winds, sea level in the warm pool is actually a few inches higher than in the eastern Pacific. Meanwhile, off the coast of South America, cold water from the deep ocean wells up to replace the surface water pushed west by the trade winds, creating an even bigger temperature difference between the two ends of the ocean. Loaded with nutrients, these upwelling waters support the healthy stocks of fish that Peruvians have depended on for centuries.

3 When Does an El Niño Arrive?

El Niño arrives when the pendulum begins to swing away from this arrangement. Every three to seven years or so, the easterly winds die down. The warm pool is no longer penned in its western Pacific corral and can spread east along the equator. Less cold water rises from the deep along South America; without it, the ocean surface warms even more. With less of a temperature difference between the eastern and western Pacific, the trade winds decrease yet

further. That lets the warm pool push farther east. Eventually this collapse of the old arrangement looses a colossal underwater wave of warm water, which races across the ocean until it slams into South America brief.

El Niño is thought to occur due to changes in the normal patterns of trade wind circulation. Normally, these winds move westward, carrying warm surface water to Indonesia and Australia and allowing cooler water to up-well along the South American coast. For reasons not yet fully understood, these trade winds can sometimes be reduced, or even reversed. This moves warmer waters toward the coast of South America and raises water temperatures. Warmer water causes heat and moisture to rise from the ocean off Ecuador and Peru, resulting in more frequent storms and torrential rainfall over these normally arid countries(Figs.2 and 3).

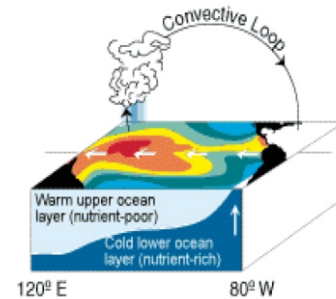


Fig2: Normal condition

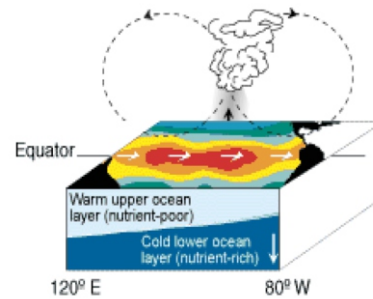


Fig 3: El Niño conditions

4 Why El Niño Occurs and What is La Niña?

La Niña is characterized by unusually cold ocean temperatures in the equatorial Pacific, as compared to El Niño, which is characterized by unusually warm ocean temperatures in the equatorial Pacific.

El Niño and La Niña events vary in strength. For example, the La Niña in 1988 was stronger than the La Niña in 1995, and the 1997-1998 El Niño is unusually strong.

La Niña impact on the global climate: In the U.S., winter temperatures are warmer than normal in the Southeast, and cooler than normal in the Northwest.

Global climate La Niña impacts tend to be opposite those of El Niño impacts. In the tropics, ocean temperature variations in La Niña tend to be opposite those of El Niño.

At higher latitudes, El Niño and La Niña are among a number of factors that influence climate.

However, the impacts of El Niño and La Niña at these latitudes are most clearly seen in wintertime. In the continental US, during El Niño years, temperatures in the winter are warmer than normal in the North Central States, and cooler than normal in the Southeast and the Southwest. During a La Niña year, winter temperatures are warmer than normal

year, winter temperatures are warmer than normal in the

in the Southeast and cooler than normal in the Northwest. An anomaly is the value observed during El Niño or La Niña subtracted from the value in a normal year La Niña means The Little Girl. La Niña is sometimes called El Viejo, anti-El Niño, or simply "a cold event" or "a cold episode".

5 Experiment

Instructions:

Fill one cup with cool water. Fill the other with hot water. (Not boiling, just good and hot.) Place them on a table. Hold each of your hands over one cup and feel the difference in the air above the water.

(Don't actually touch the water. Just feel the air.) The hot water warms the air above it but the cool water doesn't.

Now, fill your bathtub with hot water. Think about how warm and steamy the air in the bathroom gets. Now, imagine millions and millions of bathtubs-full of hot water. All of that moist, hot air has to go somewhere. Scientists know that hot air rises and carries the moisture with it. Once the moisture gets into the air and starts to cool, rain clouds start to form. Then hold a small mirror over the cup of hot water for a few minutes. The moisture in the air should collect on the mirror, and, as it cools, form tiny droplets. Imagine the bathroom mirror after filling the bathtub with hot water. The "water" on the mirror is caused by the water vapor in the air gathering and cooling. Now imagine the air over the hot water of the tropical Pacific Ocean. Huge rain clouds start to form and flooding results in South American countries along the coast.

6 What is the Relationship between Coral Bleaching and El Niño /La Niña?

Coral bleaching results when sea temperature rises above a threshold (about 28C) beyond which corals expel colorful symbiotic algae (hence the bleaching). Deprived of metabolic by-products generated by algae for extended periods, corals die.

Coral bleaching was particularly pronounced during 1997-98 because a very strong El Niño occurred that year and the El Niño related rises in sea temperature were superimposed on a slow upward seatemperature warming trend in some parts of the Pacific and Indian Oceans that may be linked to global warming.

7 What is the Relationship between Greenhouse Warming, El Niño /La Niña and Climate Prediction?

There is a lot of confusion in the public about the interrelations connecting climate phenomena such as El Niño, La Niña and greenhouse effect. Is it true that a warmer atmosphere is likely to produce stronger or more frequent El Niños? It is certainly a plausible hypothesis that global warming may affect El Niño, since both phenomena involve large changes in the earth's heat balance. However, computer climate models, one of the primary research tools for studies of global warming, are hampered by inadequate representation of many key physical processes (such as the effects of clouds on climate and the role of the ocean). Also, no computer model yet can reliably simulate both El Niño and greenhouse gas warming together.

So, depending on which model you choose to believe, you can get different answers. For example, some scientists have speculated that a warmer atmosphere is likely to produce stronger or more frequent El Niños, based on trends observed over the past 25 years. However, some computer models indicate El Niños may actually be weaker in warmer climates.

8 Average El Niño and La Niña

El Niño is characterized by a large scale weakening of the trade winds and warming of the surface layers in the Equatorial eastern and central Pacific Ocean. El Niño events occur irregularly at intervals of 2-7 years, although the average has been, until recently, about once every 3-4 years and lasting 12-18 months. Winters are generally warmer than normal in the northern half of the US. During El Niño years, there are fewer hurricanes in the Atlantic (Figs.4 and 5).

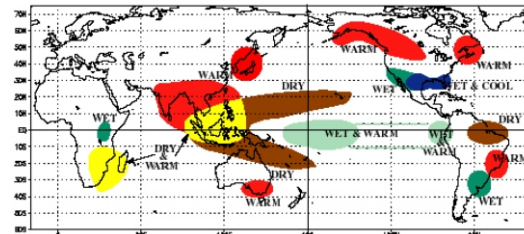


Fig 4: Average El Niño Winters Worldwide

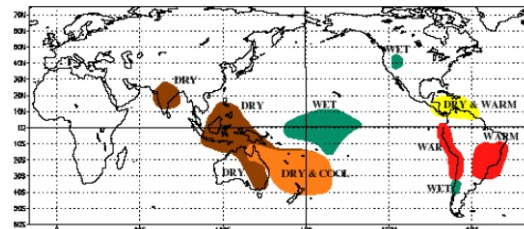


Fig 5: Average El Niño Summers Worldwide

There has been a confusing range of use for the term "El Niño" by both the scientific community and the general public. Originally, the term El Niño denoted a warm southward-flowing ocean current that occurred every year around Christmas off the west coast of Peru and Ecuador. The term was later restricted to an unusually strong warming that disrupted local fish and bird populations every few years. However, as a result of the frequent association of South American coastal temperature anomalies with inter annual basin-scale equatorial warm events. El Niño has also become synonymous with larger scale, climatically-significant, warm events.

9 What is the Relationship between Hurricanes and El Niño?

It is believed that El Niño conditions suppress the development of tropical storms and hurricanes in the Atlantic; and that La Niña (cold conditions in the equatorial Pacific) favor hurricane formation. The world expert in this area of study is Prof. Bill Gray of Colorado State University. Please see their Web pages, including. Conversely, La Niña is the cold counterpart of El Niño where sea surface temperatures in the tropical Pacific fall below normal. This phase is characterized by warm winters in the southeastern United States, colder-than-normal winters from the Pacific Northwest to the Great Lakes, and unsettled winters in the Northeast and Mid-Atlantic states. Could the problem of disentangling the many factors and dynamics at play in El Niño and global warming can be compared to writing down the scores of many different tunes whilst they are played all at the same time. Might cacophony be a good image to describe circulation patterns?

That's a nice analogy. However, it could be refined in the following way: when the scores are played together, they not only become entangled, but they may actually metamorphose into a slightly different tune, one for which no score existed at the start of the piece. That is to say, that El Niño, global warming, and other climate signals are actually physically altered by their interaction in ways you would not expect by considering them in isolation. Sorting out these complex interactions is in fact one of the major challenges of climate research today.

At higher latitudes, El Niño is only one of a number of factors that influence climate. However, the impacts of El Niño and La Niña at these latitudes are most clearly seen in wintertime. In the continental US, during El Niño years, temperatures in the winter are warmer than normal in the North Central States, and cooler than normal in the Southeast and the Southwest. During a La Niña or El Viejo year, winter temperatures are warmer than normal in the Southeast and cooler than normal in the Northwest El Niño and La Niña are opposite phases of the El Niño-Southern Oscillation (ENSO) cycle, with La Niña sometimes referred to as the cold phase of ENSO and El Niño as the warm phase of ENSO (Figs. 6 and 7).

The maximum temperature was in 1987 (31.5) and the minimum was in 1983(21.3).As you can see there was a little change between the temperature from the year 1981 until 1991 and hurricanes happen when the temperature increases or decreases a lot. SO it hasn't happen yet but will occur later because of increasing temperature of the world.

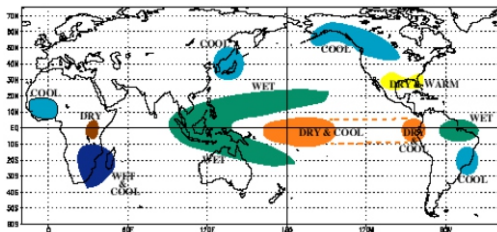


Fig 6 : Average La Niña Winters Worldwide

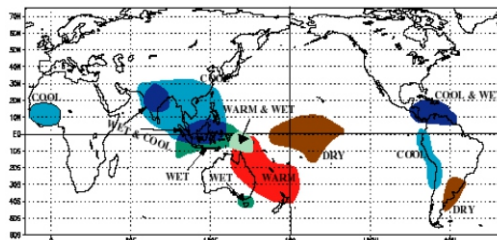


Fig 7: Average La Niña Summers Worldwide

9 Persian Gulf

In this work, attempt was made to study El Niño and La Niña in Persian Gulf. As it shown, you can understand that Iran has normal weather and El Niño and La Niña occur in hot or cold lands. As a result you can recognize that El Niño will happen when the temperature increased from its normal in a distinguished season .It is obvious about La Niña. The maximum and minimum temperature of Persian Gulf are shown in Table (1).

Table 1: Temperature in Persian Gulf

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
max	31.3	29.7	30.2	31.1	31.5	31.3	31.8	31.4	31	31.5	30.5
min	22.3	21.9	21.4	22.1	22.1	22.3	22.4	22.5	21.7	22.4	21.7