

A Donkey in a Hailstorm

By Jeff Swanson

El Nino is a subject thrown around in conversations all around the world now. Having recently been on vacation in the South Pacific, the discussion of cyclones (hurricanes to us) was on the minds of many. Where beaches with tall standing coconut trees once stood, 8 foot deep channels of water took their place. Where small atolls existed - spotted with palm trees, only seawater was to be seen. High water temperatures have killed off the corals and thereby eliminated the dependant fish life. The strong storms that have wreaked havoc in the southern hemisphere in the past several years have only been outdone by those that have hit close to home such as hurricane Katrina. Property and lives have changed in the shadow of these storms or droughts all over the world. While some have suffered from too much precipitation in some areas of the world, other countries such as Australia and Chile in the southern hemisphere and southern regions of the United States in the northern hemisphere have suffered from extreme drought. El Nino seems to be the “buzz” word that is spoken internationally as the reason for these extremes. While listening to a conversation about the reasons for, “Why is it so wet and windy this time of year?” and “Why have there been so many cyclones this time of year than in the past?” The subject of El Nino came up. One person tried to comfort another by explaining the meaning of El Nino. “Well, it means ‘The Little Boy’. And La Nina means ‘The Little Girl’.” Boy, that says it all – doesn’t it?

El Nino was originally recognized by fisherman off the coast of South America as the appearance of unusually warm water in the Pacific Ocean, occurring near the beginning of the year. El Nino means The Little Boy or Christ child in Spanish. This name was used for the tendency of the phenomenon to arrive around Christmas. La Nina means The Little Girl. La Nina is sometimes called El Viejo, anti-El Nino, or simply “a cold event” or “a cold episode”. El Nino is often called a warm event”. To better understand El Nino, let’s look at a brief overview of global weather creation itself first.

We live in an ocean of air, flowing around us, changing-sometimes violently-every day. In the

heart of dynamics of rain clouds and jetstreams, hot desert winds and frozen arctic storms, there is one constant: An estimated trillion and a half days have passed since the Earth was born, and no two of those days have ever had the same weather.

Driven by the heat of the sun, weather is a diverse yet interconnected system of cycles. Water evaporates, raises, cools, and falls as rain, only to evaporate once again. The sun rises and sets every day, with the air warms and cools in response, and the cycle is endlessly repeating. Low pressure systems suck high pressure systems into their vacuum, creating spinning masses of wind and clouds bigger than Texas; these hurricanes are swept across the skies by persistent high-speed winds miles up in the atmosphere called jetstreams. The cycles are due to the sun heating some parts of the Earth more than others. Since the earth is round and not flat, the sun shines almost straight down on the tropics, baking them every day of the year. But at the poles, the angle is small and the sun's rays are weak, and the poles are therefore cold. Nature doesn't like this imbalance, and tries to fix it. As quickly as solar heat flows in to the tropics, it begins flowing out toward the poles, seeking to equalize the difference. The constant merging of this energy, from high concentration to low concentration, is what propels the weather. As the earth continues to rotate, turbulent mixing of the winds and temperature differentials lead to the organization of storm centers. This is due to the unevenness between warm and cold.

When warm air leaves the tropics and heads toward the poles, cold air from near the poles is sucked back toward the tropics. This exchange sets up two-lane highways for air rushing to and from the tropics. These highways of air are called convection cells, and they are the reason wind blows.

Air flowing back and forth in these cells is pushed sideways by the Earth's rotation, dragged by friction with the land and the sea, and squeezed by gravity. All of these distortions cause turbulent mixing of the winds, and soon lead to the organization of storm centers due to unevenness between warm and cold. The sideways push is given to the winds by the spinning of the planet-called the Coriolis Effect. This causes the constant convective flows to organize in bands, where the flow direction varies according to latitude. These bands are responsible

for prevailing winds on the surface, and jetstreams high in the atmosphere.

Add to this concert of rising and falling temperatures and subsequent winds and you have the phenomenon called El Nino. El Nino exploits and diverts this organization of wind bands and causes major weather changes around the world. Specifically, El Nino can affect the path of flow in these bands, and the hurricanes that are blown across the surface by them are now delivered to different areas than normal. Think of the wind bands - both at the surface and high in the sky – like a locomotive (the storm) on a track (the wind bands). The answer to how this happens is literally blowing in the wind.

El Nino is basically a giant puddle of heated water that migrates across the Pacific Ocean. It is a pool of warm ocean water, half again as large as the United States, and builds up over a period of months. It can contain 20 or 30 times as much water as all the Great Lakes put together. Like an iceberg; most of it is submerged, but part of it sticks out above the sea's surface, as the wedge floats in the surrounding ocean. Warm water is less dense than cool water, and El Nino waters are less salty than normal seawater. (It's always raining over an El Niño, and the rainwater dilutes the ocean waters.) This causes buoyancy. The top layer of water can be 150 centimeters above sea level. The amount of energy needed to heat this body of water is equivalent to the energy produced by about half a million 20 megaton hydrogen bombs. Scientists are still struggling to reach an agreement as to what starts this build up. The huge build up of warm water may affect the winds or the winds may affect the build up of warm water. Whatever the explanation, no one really knows what really causes El Nino.

The main issue is that there is a reverberation or oscillation (El Nino-Southern Oscillation or ENSO) back and forth between the two natural states as in winter and summer. The struggle of the scientists to fully understand this phenomenon mirrors the struggle within the natural processes itself. As the trend continues, the huge amounts of warm waters can no longer be held in their position and something snaps. Wind directions change and uplifts occur. Higher water levels around Australia drop and levels towards South America rise.

El Nino is one extreme of a years-long oscillation in the entire Pacific basin and the atmosphere above it. As the cycle unfolds, an "anti-El Nino," called La Nina, appears as El Nino disappears. Like a mirror image of El Nino, it produces extreme weather and abnormal conditions in the western Pacific similar to those El Nino produces in the east. Back and forth, east and west, this cycle has run continuously for thousands of years. There are many theories about what causes El Nino but most are in agreement that two things seem common – it has been around for a long time and the results are like a dog chasing its own tail. Although the cycle is not as regular as the seasons, scientists think that we can count on El Nino and its sister La Nina appearing about 30 times per century, with intervals as short as two years and as long as 10. It is when an appearance such as in 1997 that it really gets our attention. When "normal" or "average" weather events are affected by this phenomenon, "extreme" results can take place. At that time, people and property will be in the path of a locomotive on a changed course. Others may be doomed to suffer the effects from persistent drought. A smaller tropical storm can become a violent killer, or life-giving rains can once again fall on a parched and drought stricken area.

The challenge still remains however. Predictability and probability play the biggest role with which choices we make for both short-term and long-term planning when it pertains to El Nino and any other weather related phenomena. Since most of this is still in theory, percentages of predictability go up and down. If there is a 60% chance of rain, should I take an umbrella? If there hasn't been a flood in the area for 100 years, should I build my house next to a river? If the tree next to my house is 100 years old, should I be concerned about cutting it down before the next wind storm? If I build my house close to the beach, will I be hit by a category 5 hurricane? If I locate my water intake for the treatment plant at a certain location in a stream, can I count on the stream never changing its course? If I build my house in a desert, will I always have plenty of water?

One thing always seems to hold true. We as humans did not *create* the Web of Life, but rather we are a living part of the Web! What has happened in history and what continues to happen in the future will depend on how we think about it

and deal with it. If I think that I can change the weather rather than change the way I think about it – I might as well be like “a donkey in a hailstorm”. Have we really done much to change the weather or climate in the grand scheme of things? – Maybe or maybe not. We are but a mere spec in time. Nature always seems to have a way of keeping things in a dynamic state of equilibrium. Matter can neither be created nor destroyed – it can only change in form. Sometimes when I try to comprehend the complexity of weather and climate changes, I am just happy when I can feel the sun and rain on my face. I believe in global warming as much as I believe in global cooling!

Just for Fun! How did hurricanes get their names?

- ❖ For hundreds of years in the West Indies, hurricanes were named after the Saints Day which each hurricane hit.
- ❖ Later, they were named after their latitude-longitude positions, but the practice was too confusing.
- ❖ Published in 1941, the novel “Storm” started giving women’s names to hurricanes.
- ❖ Then in 1979, male names were added to the list after protests by feminist groups.