

Weather word search

Directions: When you study new things, you can come up against some tough vocabulary words, such as the ones on this list. While you read this poster, be sure to highlight or circle words and terms you don't know. Try to figure out their meanings by looking for clues in the sentences around these unknown words. Write down your best guess, and then look the words up in a dictionary. Find these words in the word search. Look up the meanings of these words and see if you can find each word in the *Tampa Bay Times*.

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|--------------|-------------|-------------|
| Atmospheric | El Niño | Patterns |
| Catastrophic | Excessive | Rainfall |
| Circulation | Flood | Thermocline |
| Climate | Fluctuate | Tornado |
| Cycle | Hurricanes | Variation |
| Deviation | La Niña | Weather |
| Ecosystem | Oscillation | |

C F J B A U K V H P Q W M S E F O K Z C U Q N W R
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Going beyond the text



Close viewing and reading

Watch Bay News 9 and go to baynews9.com, and make a list of all the different ways science, technology, engineering and math are used at the television station. Then, look for art. What are the different types of art used in a television broadcast? Next, read the *Tampa Bay Times* and make a list of all of the examples of science, technology, engineering and math you can find. Then you can look for art in the *Times*, too. [Hint: there is a lot of it] Use specific examples from all sections of the *Times* on your list. Share what you discover with your class.

Weather: fair or foul

From rain dances performed by Native Americans to seeding clouds with dry ice to make hail form and fall quickly, the idea of controlling the weather has appealed to a lot of people. Research ways people try to control the weather. Make a list of the different methods you find. Then look in the *Tampa Bay Times* for stories and events that could be affected by the weather. Look for things such as sports competitions, farming activities or political events. If you could control the weather for each event, what conditions would you prescribe? How might ideal weather for that event interfere with other activities? Discuss these points with your class. Write a creative narrative story for one of the scenarios.

Share your narrative story with the NIE staff by having your teacher or parent email it to ordernie@tampabay.com.

Being prepared

When it comes to dangerous and unpredictable weather, it is important to be prepared. Pretend you are preparing for a storm that's approaching your area. Look through the advertisements in the *Tampa Bay Times* and find products you will need to have in case there is flooding, loss of electricity, or a lack of transportation or fresh water after the storm. Remember the essentials as well as the some fun things you may want or need if you are displaced from your home, or there is no power or supplies you can easily get for several days. Make a list of the things that your family will need. Share your list with your class.



Going deeper

Research El Niño, La Niña, climate and weather in your school media center or local library. Make a list of all of the facts you can find. Circle any facts that seem confusing. Put a star next to the facts that are new or surprising to you. Make a list of all of the new words you encounter. If you do not know the word's meaning, look it up in a dictionary. Next, look for an article about one of these topics in the *Tampa Bay Times*. Write down the main ideas from the article. Underline the information that is new to you. Share what you have learned with your class.



BAY NEWS 9 project weather



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Newspaper in Education
The Tampa Bay Times Newspaper in Education (NIE) program is a cooperative effort between schools and the Times Publishing Co. to promote the use of newspapers in print and electronic form as educational resources. NIE provides schools with class sets of the newspaper, plus our award-winning original curriculum, at no cost to teachers or schools.
The *Times* and our NIE curriculum are rich educational resources, offering teachers an up-to-the-minute, living

text and source for countless projects in virtually every content area. Our teaching materials cover a variety of subjects and are consistent with Florida's educational standards.
For more information about NIE, visit tampabay.com/nie. Follow us on Twitter at [Twitter.com/TBTimesNIE](https://twitter.com/TBTimesNIE). To learn how to sponsor a classroom or education supplement or receive NIE resources at your school, go to tampabay.com/nie, email ordernie@tampabay.com or call 800-333-7505, ext. 8138.
Teachers can order free class sets of this teaching poster by emailing ordernie@tampabay.com.

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This publication incorporates the following Florida State Standards: Science: SC.3.N.1.1-7; SC.3.N.3.1-3; SC.4.N.1.1-8; SC.5.N.1.1-6; SC.5.N.2.1-2; SC.5.E.7.3-7; SC.6.E.7.5; SC.6.E.7.6; SC.6.E.7.7 **Language Arts:** LAFS.3-5.RF.3.3; LAFS.3-5.RF.3.4; LAFS.3-5.RL.1.1; LAFS.3-5.RL.1.2; LAFS.3-5.RL.1.3; LAFS.3-5.RL.1.4;

LAFS.3-5.RL.1.5; LAFS.3-5.RL.1.6; LAFS.3-5.RL.1.7; LAFS.3-5.RL.1.9; LAFS.3-5.W.1.1; LAFS.3-5.W.1.2; LAFS.3-5.W.1.3; LAFS.3-5.W.1.4; LAFS.3-5.W.1.5; LAFS.3-5.W.1.6; LAFS.3-5.W.1.7; LAFS.3-5.W.1.8; LAFS.3-5.W.1.9; LAFS.3-5.SL.1.1; LAFS.3-5.SL.1.2; LAFS.3-5.SL.1.3; LAFS.3-5.SL.1.4; LAFS.3-5.SL.1.5; LAFS.3-5.SL.1.6; LAFS.3-5.L.1.1; LAFS.3-5.L.1.2; LAFS.3-5.L.1.3; LAFS.3-5.L.1.4; LAFS.3-5.L.1.5; LAFS.3-5.L.1.6
Credits
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The wonderful world of weather



Weather is the state, or condition, of the atmosphere, which includes the air surrounding the earth in regard to wind, temperature, cloudiness, moisture and pressure, according to the National Oceanic and Atmospheric Administration (NOAA).

People talk about weather all the time, and weather is a large focus in the news. When you hear people speaking about weather, they are referring to the atmospheric conditions at a given point in time: today, tomorrow and the weekend. Weather is what the air is like in any one place at any one time. How hot or cold is the air? How much dampness, or moisture, is in the air? How fast is the air moving? How heavily does the air press on the earth?

Sources: National Oceanic and Atmospheric Administration, United States Environmental Protection Agency and ThinkQuest



weather affects our daily lives and all things on Earth, and weather affects many of the things we do.

Sources: National Oceanic and Atmospheric Administration, United States Environmental Protection Agency and ThinkQuest

Climate vs. weather

The terms “weather” and “climate” are not interchangeable. The experts at NOAA define weather as a “specific event or condition that happens over a period of hours or days.” Climate refers to “the average weather conditions in a place over many years (usually at least 30 years).”

The experts at NOAA provide a great way to remember the difference between weather and climate. “Climate helps you decide what clothes to buy, and weather helps you decide what clothes to wear each day.”

Sources: National Oceanic and Atmospheric Administration and NASA

Atmosphere and weather

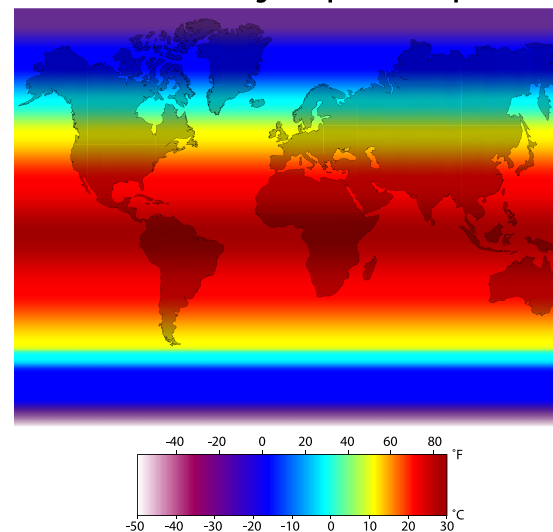
Weather is the way the atmosphere is behaving, mainly with respect to its effects upon life and human activities. Most people think of weather in terms of temperature, humidity, precipitation, cloudiness,

brightness, visibility, wind and atmospheric pressure, as in high and low pressure.

In most places, weather can change from minute to minute, hour to hour, day to day and season to season. In the Tampa Bay area, weather can change quickly and frequently. There are a lot of parts to weather. In Florida, weather includes sunshine, rain, cloud cover, wind, hail, flooding, thunderstorms, steady rains from a cold front or warm front, excessive heat as well as heat waves.

Source: NASA

Annual Average Temperature Map



Flash of electricity

As Benjamin Franklin discovered, lightning is a form of electricity. Lightning is created when cold air and warm air meet. The cold air has ice crystals. The warm air has water droplets. When the warm air rises, thunderstorm clouds are created. During the storm, the droplets and crystals bump together and move apart in the air. This rubbing makes static electrical charges in the clouds.

Just like a battery, these clouds have a positive and negative end. The positive charges in the cloud are at the top. The negative charges are at the bottom. When the charge at the bottom gets strong enough, the cloud lets out energy. The energy goes through the air to a place that has the opposite charge.

This lightning bolt of energy that is let out is called a leader stroke. The stroke can go from the cloud to the ground. Or, a leader stroke can go from the cloud to another cloud. The main bolt or stroke will go back up to the cloud. It will make a flash of lightning and heat the air.

Source: NASA

Strokes and flashes

Lightning flashes through the Florida sky on an average of 100 days a year. It sings and burns, injures and even kills. As a matter of fact, Florida leads the nation in lightning-related fatalities. But, not all lightning strikes are the same. There are actually three types of lightning.

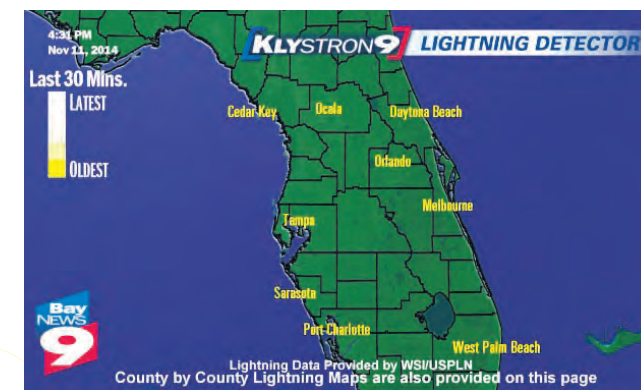
- Cloud to Cloud
- Cloud to Ground
- Cloud to Air

Source: National Oceanic and Atmospheric Administration National Severe Storms Laboratory

Growl, grumble, boom

A lightning bolt takes only a few thousandths of a second to split through the air. Although the loud thunder that follows the lightning bolt is commonly said to come from the bolt itself, the grumbles and growls we hear in thunderstorms actually come from the rapid expansion of the air surrounding the lightning bolt.

As lightning connects to the ground from the clouds, a second stroke of lightning will return from the ground to



the clouds. When that happens, the heat from the electricity of this return stroke raises the temperature of the surrounding air to around 54,000 degrees Fahrenheit.

Since this happens so quickly, the heated air has no time to expand. The heated air is compressed, and then it explodes outward, forming a shock wave of compressed particles in every direction, which, in turn, creates a loud, booming burst of noise: thunder.

Source: Library of Congress

Weather advisories

A watch advisory means weather conditions are right for a specific weather event – rain, flooding, tornado, hurricane – in the designated area. Watches are broadcasted up to 48 hours in advance of the event.

A warning advisory is issued when a specific weather event is about to happen. Warnings are broadcasted for large weather events that will result in a risk to life and property. Warnings and advisories are announced up to 48 hours in advance.

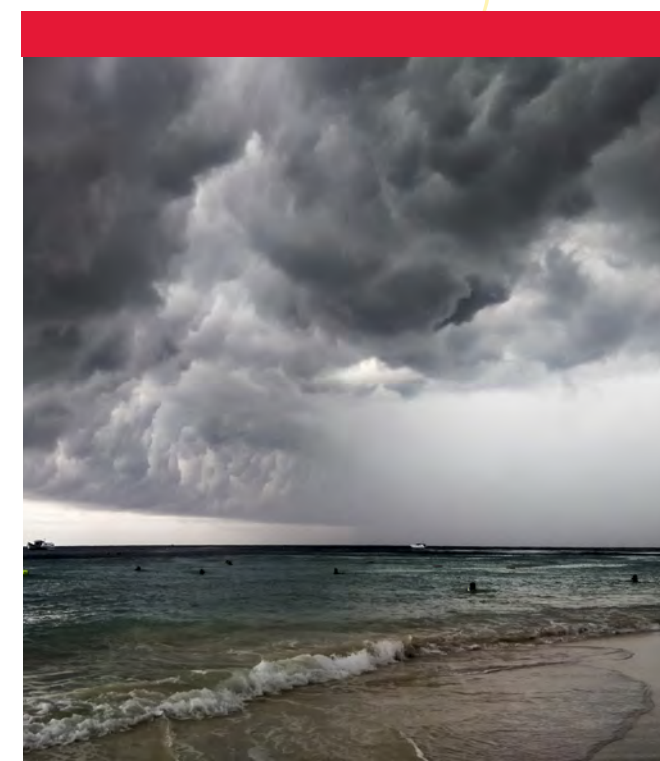
Source: The National Weather Service



Rain and floods

Water droplets form from warm air. As the warm air rises in the sky, the air cools. Warm air holds quite a bit of water. That is why the air feels wet, or humid, in the summer. When enough of these droplets collect together, we see them as clouds. If the clouds are big enough and have enough water droplets, the droplets bang together and form even bigger drops. Once the drops get heavy, they fall because of gravity, and then we have rain.

Not including wind-driven rain, raindrops fall between 7 and 18 miles per hour in still air. The range in speed depends on the size of the raindrop. When there is wind or a great deal of heavy rain, flooding can occur.



Danger!

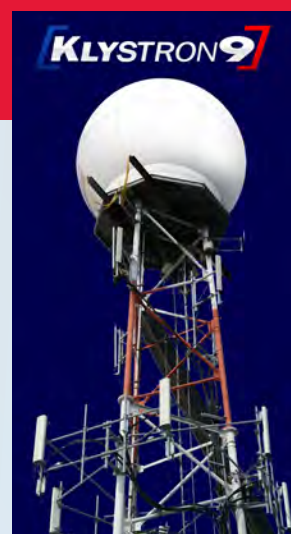


Did you know that clogged drains in the streets and overflowing rivers and lakes cause floods? When the flooding happens quickly, it is called a flash flood. Flash floods are the No.1 weather-related killer in the United States. Most deaths due to flooding in the United States are due to people driving their cars into flooded areas. It may only take 12 to 16 inches of water to cause a car to float!

Source: Florida Division of Emergency Management



The Weather Experts



Weather can be mysterious, exciting and sometimes dangerous. That's why the Bay News 9 Weather Experts team up to report the local weather conditions every 10 minutes with Weather on the 9's. The Bay News 9 meteorologists use the world's most powerful television radar, Klystron 9, to deliver the most accurate forecasts. The following questions were supplied by Tampa Bay area elementary school students.



Juli Marquez

Was it difficult at first to be on TV? Were you scared?

"I was nervous and excited! I was in a smaller television market in Illinois at the time, and I knew it was a great opportunity for me. The crew was so nice and supportive and let me practice being in front of the green screen before the newscast. That helped me feel more comfortable walking around the set and timing my weather maps for the show. A typical weathercast at that time was about three minutes, and meteorologists do not read scripts. The time flew by. I remembered to smile and didn't make any big mistakes, so I was happy. I've been in this business for 20 years, and I still love talking about the weather!"



Josh Linker

What happens when Bay News 9 predicts the weather and the results are incorrect?

"If we miss a forecast, we will go back and look at the weather conditions and information we had at the time we made our forecast. We will re-examine everything to figure out what went wrong. Then, the next time a situation like that comes up, we won't make the same mistake again. I think it is important to admit when you have made a mistake. It doesn't happen often, but when it does, we want to be honest with our viewers and let them know that they can still rely on us in the future."



Brian McClure

How much college did you do to become a weatherman? Is it hard?

"A career in weather prediction requires a college education. You will need a degree in meteorology, which usually takes about four years. It can take a little longer if you decide to take extra classes or work with a company while still in college. I received my education at North Carolina State University. While getting my education, I worked for a company where I could see how meteorology was being used in the real world. This is called an internship. It gave me a better idea of what type of job I might want to apply for after finishing college. It also helped give me experience so I understood what would be expected once I finished school. The best thing to do if you're interested in weather is to study science and math. The more science and math you learn, the more you will understand about meteorology. Meteorology can be a challenging subject to learn. However, people who have a passion for weather usually do quite well. In your spare time, you can get outside and watch the weather to see how the atmosphere operates in your local area."



Mike Clay

How long have you been a meteorologist?

"I've been doing television weather for 30 years. I started at the NBC station in Waco, Texas, in 1986 as the weekend weather anchor. Five years later I moved to a larger market – Austin, Texas – as the chief meteorologist. From there it was on to San Antonio, Tyler and Seattle. In 1997, I was tired of moving and made the cross-country trip to St. Petersburg for the launch of Bay News 9. I arrived in August, and a month later Bay News 9 went on the air. I love being a meteorologist. TV weather is a great career because no two days are the same."



Diane Kacmarik

Has anything dangerous ever happened to you when you were reporting on the weather?

"Before I moved to the Tampa Bay area, I lived and worked in Kansas City, Mo. There are lots of severe storms and tornadoes there. I was sent out on a severe weather day with a photographer, and we were told to drive into the storm to report and get video. That day, there was an area of severe storms that was not well defined. We had no access to radar in the car. As we drove deeper into the storm, our phones quit working. So there was no way anyone could tell us what we were driving into. All the cars on the highway had pulled off to the side because the rain was so hard and the winds so strong. We tried to keep going, but the winds pushed our car off to the edge of the road! The photographer decided to try and get some video, but the winds were so strong he could not get the car door open. We were so scared! After a little time passed, we turned around and drove back to Kansas City."

Your Morning News



The Weather Experts at Bay News 9 work together with the Bay News 9 Morning Team to help prepare you and your family for the day ahead. Students from Tampa Bay area schools sent questions to get to know Erica Riggins and Chuck Henson, from the morning team, better.



Erica Riggins

Was it difficult at first to be on TV? Were you scared?

"Fear is a natural emotion that will always be part of us – creeping its way into our consciousness during many different areas of life, and that can include your first big job interview and first day on the job. I personally felt fear, along with many different emotions, during my early years in the television news business, but they never represented obstacles in my career path. They fueled my determination to not just survive, but to thrive! I credit my time at the University of Texas in Austin for teaching the power of perseverance and making my transition into the real world easier. If you nurture your passion, make planning a priority and hold on to your patience, you will have the power to achieve almost anything!"



Chuck Henson

When you are reporting about traffic, how do you get the updates?

"I gather all of the information you see on TV from a variety of sources, like the police, fire and Florida Highway Patrol. I also have the advantage of 352 Real Time Traffic cameras that we have at Bay News 9 for information on what's happening on the roads. I also get good information from the viewers who use the Bay News 9 Plus App and from those who follow me on Twitter @BN9Traffic."



Project Weather



Bay News 9 recognizes the importance of teaching students the skills they need in science, technology, engineering and math. That's why Bay News 9 created Project Weather. This interactive educational resource teaches elementary students about the science behind the weather. In addition, Project Weather awards one high school senior in each of our seven counties with a \$1,000 scholarship for college. For more information on Project Weather, go to baynews9.com/projectweather.

Dangerous storms

Of Florida's 15 deadliest tornadoes in the past 65 years, 11 developed during El Niño storms. According to a recent *Tampa Bay Times* article written by Tony Marrero, "Those include the two deadliest: the February 1998 tornado that killed 42 people in the Orlando and Kissimmee areas, and the 2007 Groundhog Day twister that killed 21 in the Villages and Lady Lake. In west-central Florida, tornadoes typically are the width of a house and on the ground for less than a mile. In El Niño winters, they can span a half mile across and leave a wreckage trail 40 miles long."



Think about it

El Niño and La Niña weather patterns are predictable, but the results of those weather patterns can fluctuate from the mild to the extreme. This can result in floods, tornadoes, waterspouts and hurricanes.

Complex weather patterns

Weather is the state, or condition, of the atmosphere. When weather repeats, meteorologists call that a weather pattern. According to the meteorologists at the National Oceanic and Atmospheric Administration (NOAA), "El Niño and La Niña are complex weather patterns resulting from variations in ocean temperatures in the Equatorial Pacific."

El Niño and La Niña represent opposite stages of the El Niño-Southern Oscillation (ENSO) cycle. "The ENSO cycle is a scientific term that describes the fluctuations in temperature between the ocean and atmosphere in the east-central Equatorial Pacific." Although fluctuations, or changes, in temperature are normal, the ENSO cycle deviations can be very dangerous.

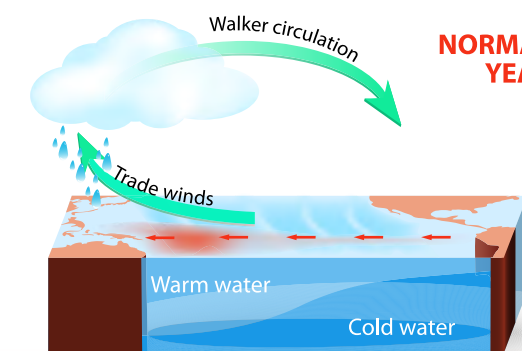
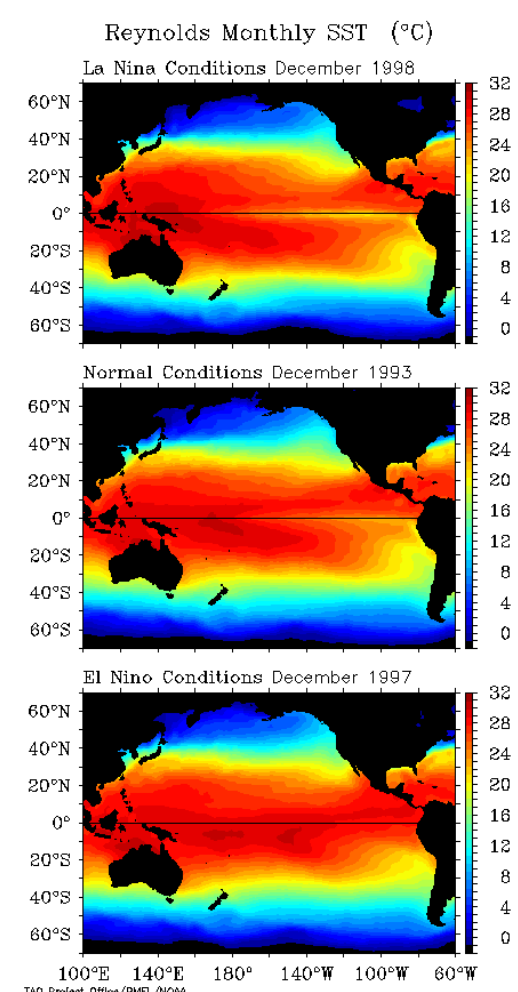
La Niña is the cold phase of ENSO, while El Niño is the warm phase. According to NOAA experts, the "deviations from normal surface temperatures can have large-scale impacts not only on ocean processes, but also on global weather and climate. El Niño and La Niña episodes typically last nine to 12 months, but some prolonged events may last for years. While their frequency can be quite irregular, El Niño and La Niña events occur on average every two to seven years. Typically, El Niño occurs more frequently than La Niña."

Source: NOAA

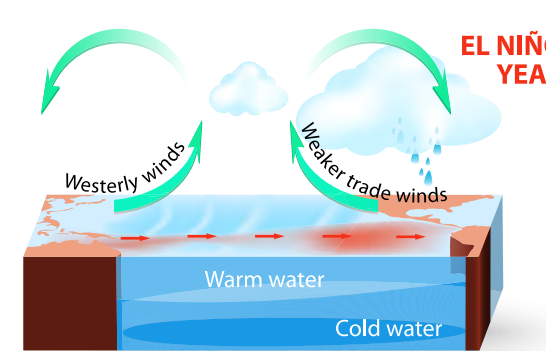
The English translation of La Niña is the Little Girl. La Niña is also sometimes called El Viejo. Globally, the impacts of La Niña are the opposite of El Niño. According to NOAA, "La Niña episodes represent periods of below-average sea surface temperatures across the east-central Equatorial Pacific. During a La Niña year, winter temperatures are warmer than normal in the Southeast and cooler than normal in the Northwest."

Source: NOAA

How are La Niña, El Niño and Normal Conditions seen in Pacific Ocean Surface Temperatures?



NORMAL YEAR



EL NIÑO YEAR

Cause and effect – El Niño

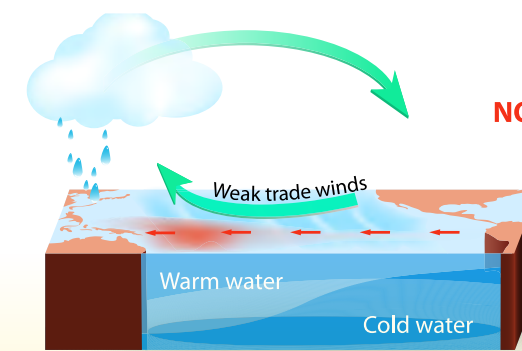
El Niño has an impact on ocean temperatures as well as the speed and strength of ocean currents. El Niño events are defined by their wide-ranging, large-scale, long-lasting climate inconsistencies or patterns.

"During an El Niño event, westward-blowing trade winds weaken along the equator. These changes in air pressure and wind speed cause warm surface water to move eastward along the equator, from the western Pacific to the coast of northern South America," according to National Geographic.

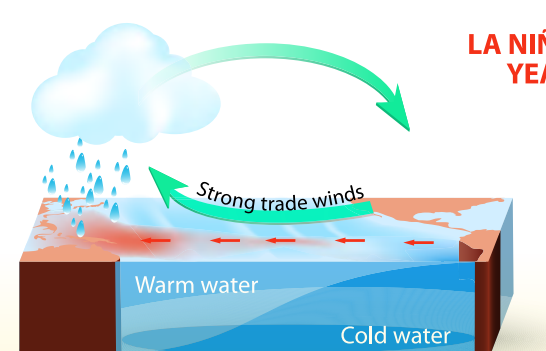
The resulting warm surface waters deepen the level of warm water, which is separated from the colder water. This is called a thermocline, which during an El Niño event, can increase as far as 500 feet. The result of this is a breakdown in the ecosystem of the water.

In addition, El Niño events produce severe changes in climate, including excessive rain and floods, which can result in destroyed property and coastal erosion. While El Niño brings flooding and colder winters to South America and the United States, it also brings drought and excessive heat to Australia and Indonesia.

Source: National Geographic



NORMAL YEAR



LA NIÑA YEAR

Cause and effect – La Niña

El Niño and La Niña affect weather patterns, including rainfall, atmospheric pressure and air movement called atmospheric circulation. Atmospheric circulation and ocean currents combine to create thermal energy on the surface of Earth. Therefore, El Niño and La Niña are responsible for the changes in climate around the world.

La Niña brings lower-than-normal air pressure over the western Pacific. As a result, there is increased rainfall. Although this is a good thing for some parts of the world, such as India, the increased rainfall has caused catastrophic floods in Australia and monsoons in Asia.

Closer to home, La Niña has brought higher-than-normal pressure over the central and eastern Pacific, resulting in decreased rainfall in Florida.

Source: National Geographic

Hurricanes

Hurricanes are large, swirling storms that produce winds in excess of 73 miles per hour. Hurricanes form over warm ocean waters and often continue over land. When a hurricane reaches land, it pushes a wall of ocean water ashore. This wall of water is called a storm surge. Heavy rain and storm surge from a hurricane can cause flooding. Once a hurricane forms, weather forecasters predict its path. They also predict how strong it will get. This information helps people get ready for the storm.



Category 1: Winds between 74 and 95 miles per hour, faster than a cheetah

Category 2: Winds between 96 and 110 miles per hour, as fast or faster than a baseball pitcher's fastball

Category 3: Winds between 111 and 129 miles per hour, similar, or close, to the serving speed of many professional tennis players

Category 4: Winds between 130 and 156 miles per hour, faster than the world's fastest rollercoaster

Category 5: Winds more than 157 miles per hour, similar, or close, to the speed of some high-speed trains



Severe weather safety tips

Hundreds of people die or are injured each year in the United States due to severe weather: heat waves, hurricanes, lightning, flash floods, powerful thunderstorm winds and winter cold. The best way for you to stay safe is to be prepared. That means keeping an eye on the weather reports, having a weather radio at home and school, having a disaster plan and kit, and knowing the following safety tips when severe weather comes your way:

- 1 Seek shelter in a sturdy building or a pre-designated shelter.
- 2 Get out of moving vehicles. Do not seek shelter under a highway overpass.
- 3 Be aware of flying debris.
- 4 Avoid electrical appliances, and use telephones or computers only in an emergency.
- 5 Do not drive or walk into a flooded area.
- 6 Do not touch downed electrical lines.
- 7 Never seek shelter under an isolated tree.
- 8 Never use a cliff or rocky overhang for shelter.



Alecia Loder Poole, Tampa Bay Times Twitter post, Tampabay.com

Tornadoes and waterspouts

A tornado, or twister, is a powerful column of winds twisting around a center of low atmospheric pressure. A tornado looks like a large funnel; the narrow end moves over the earth. The powerful winds inside a tornado spiral upward and inward. These winds create a vacuum that suck up anything under a tornado path. When the funnel touches a structure, such as a house or car, the strong winds have the ability to tear it apart. The winds inside a twister can reach speeds of up to 500 miles an hour.

A waterspout occurs when a tornado forms over a body of water. Waterspouts form when high layers of cool air meet warm, moist air from a body of water. Winds within a waterspout can spin around at 60-120 miles an hour.

Source: ThinkQuest



Fujita scale

Tornadoes are measured using the Fujita Scale:

- F0** – less than 73 miles per hour, resulting in light damage
- F1** – between 73 and 112 miles per hour, resulting in moderate damage
- F2** – between 113 and 157 miles per hour, resulting in considerable damage
- F3** – between 158 and 206 miles per hour, resulting in severe damage
- F4** – between 207 and 260 miles per hour, resulting in devastating damage
- F5** – between 261 and 318 miles per hour, resulting in incredible damage

Source: NOAA