



Additional Responses to Submitted Questions

[Andrew/GLOBEscientist]

Many of you asked what El Niño was. That is a good place to start. In its simplest form, El Niño is an atmospheric/oceanic phenomenon that occurs every 2-7 years off the coast of Peru. It is important to realize that El Niño is not an uncommon event. El Niño occurs regularly. It is just a different state of the ocean/atmosphere system than what is considered "normal." Under "normal" conditions, there is a large pool of warm water in the west-central Pacific Ocean. There is also a narrow band of cool water located along and off of the coast of Peru. During El Niño, the warmer water is shifted farther to the east. As a result of this shift, the water along the coast of Peru is much warmer than normal. Thus far, I have talked all about ocean currents and not very much about the atmosphere. Well, the warmer ocean waters off the coast of Peru have a big effect on the weather there. Normally, the coastal areas of Peru are arid. During El Niño, however, this region of Peru receives large amounts of rain and becomes lush with vegetation. During some El Niño events, Peru experiences severe flooding.

[Andrew/GLOBEscientist]

Many of you also asked how El Niño forms. To be honest, scientists are not exactly sure how it forms. That is why this phenomenon is a hot research topic right now. Researchers have learned a lot about some of the common features of El Niño, but do not know what physical processes cause El Niño to begin or end.

[Andrew/GLOBEscientist]

The name "El Niño" is Spanish for "the child" or "the boy." This phenomenon was named El Niño in reference to the coming of the Christ child because the ocean waters would traditionally be at their warmest during December.

[Andrew/GLOBEscientist]

Many students have asked when El Niño started or if it will ever stop. The fact of the matter is, El Niño has been occurring for as long as we know. The first accounts of El Niño come from Spanish conquerors exploring South America. They wrote accounts of atmospheric and oceanic phenomena that are similar to El Niño. The term "El Niño" was first used somewhere around the turn of the century. As far as we know, El Niño will continue occurring periodically as long as the earth and the oceans are around.

[Andrew/GLOBEscientist]

I have been talking a lot about El Niño and how it affects Peru. As many of you have heard, El Niño can affect weather around the world. Many of you have asked how this happens and how it was discovered. I'll start off with how it was discovered. A scientist named G. T. Walker (I think his first name was Gilbert) in the 19th century was wondering why the monsoons would occasionally fail in British colonies such as India and Australia. His research led to the discovery of the Southern Oscillation. The Southern Oscillation is a variation of surface pressure between the eastern and western South Pacific. When pressure is higher in the eastern Pacific (near Tahiti, French Polynesia) than in the west Pacific (near Darwin, Australia), then the trade winds blow strong. When the pressure difference is weak, then the

trade winds weaken. It is the second situation that was later found to correspond with the Peruvian El Niño (by Jacon Bjerknes, a well-regarded meteorologist). During this latter situation, the monsoons in the western Pacific and the Indian sub-continent fail regularly. How El Niño (also known as ENSO, El Niño/Southern Oscillation) affects the global weather is not well known. Most scientists study the how weather differs from the normal climate during El Niño years and come up with anomaly maps. These anomaly maps are what people use to say how El Niño effects a particular area. Even though scientists know about the changes that often occur during El Niño, they are not always sure why this happens. That's why they continue researching this phenomenon. Each time a new El Niño occurs, they try to collect more data so that they can learn a little more about the physical processes that drive El Niño.

[Susan/GLOBEscientist]

Hurricane Nora was certainly affected by the current El Niño event. The waters off the west coast of Central and North America currently are warmer than they normally are at this time of year due to El Niño. Hurricanes need warm ocean water to sustain themselves. If the waters off Central and North America are warmer, then these regions are more conducive for a hurricane to form and sustain itself. Earlier this year, the remnants of a tropical storm made it as far north as British Columbia. This kind of weather is uncommon even during an El Niño event. In general, the eastern Pacific hurricane season tends to be more active during El Niño events than during other years. The opposite is true for the Atlantic hurricane season (less hurricanes than normal during El Niño events)

[Susan/GLOBEscientist]

I can't find the original question, but someone had asked why the trade winds weaken during El Niño. The trade winds are forced by the temperature of the ocean waters. Normally, the warmest water in the Pacific is found near the equator in the western Pacific. During El Niño events, this warm pool of water moves eastward and is located more in the central Pacific. This shift in the ocean water weakens the forces that drive the trade winds and, hence, cause the trades to weaken.

[Susan/GLOBEscientist]

El Niño can be dangerous. It all depends on the effect that it has on a given region. The floods and droughts that result during El Niño events are dangerous.

[Andrew/GLOBEscientist]

Many of you have asked how El Niño will alter the weather over the coming months at your location. Instead of trying to answer this question for each location, I suggest that y'all goto the following website and check out their forecasts for the current ENSO event. The address is:

<http://www.ogp.noaa.gov/ENSO/>

[Andrew/GLOBEscientist]

[Question] Name:MARGARETE FOCHTMAN Grade:5 School:CENTRAL EL City:GRAND HAVEN
Country:USA Question:According to recent data, the ozone hole over the Antarctic was much larger than in previous years. Does this mean that the Earth is warming up?

I'm glad that someone mentioned the ozone hole. As far as we know, there is no connection between the ozone hole and El Niño. Furthermore, the ozone hole has no effect on global warming. Many people have the misconception that the two phenomena are related because of Chlorofluorocarbons (or CFCs). CFCs play an integral part in the formation of the ozone hole and are also greenhouse gases. However, the ozone hole does not cause global warming and global warming does not cause the ozone hole. They are completely different things.

[Andrew/GLOBEscientist]

[Question] Name:Matthew Breit Grade:senior School:West Chester East City:West Chester Country:USA Question:With the reported extreme nature of this year's el Niño, what, if any effect do you see from atmospheric pollution?

To be honest, we really don't know. We really do not know how pollution affects global climate. We also don't fully understand how the atmosphere and ocean interact. These are problems that need to be solved before your question can be answered.

[Andrew/GLOBEscientist]

[Question] Name:Jennifer Grade:5 School:Glendover City:Lexington Country:Ky Question:Should we be afraid of this weather event?

We should not be afraid of El Niño. That doesn't mean that the weather that occurs during El Niño might not be scary sometimes, though.

[Andrew/GLOBEscientist]

RE: [Question] Name:Class -Quest Grade:4 School: Glendover City:Lexington Country: Ky Question:Is there an inside of the event-like a tornado or hurricane? If there is, what is it like? What is the size of El Niño? Can you really see it? or hear it? What is a climate event?

El Niño doesn't really an 'eye', per se. The best analogy I can think of for El Niño is to think of it like one of the seasons. El Niño is kind of like summer or winter. It's an extreme part of a normal cycle. The size of El Niño isn't as important as the amount of warming that occurs in the eastern Pacific and how long that warming lasts. No one says that Winter or Summer is big or small. They say it was a hot or cold one, or a long or short one.

[Andrew/GLOBEscientist]

[Question] Name:Nick Gazonas Grade:12 School:West Chester East City:West Chester Country:United States Question:Because of El Niño will there be a huge snow storm this upcoming winter?

There will likely be a bad winter somewhere in the world this year. It may or may not be related to El Niño, however. Scientists still are unsure of many of the 'cause and effect' relationships associated with an El Niño.

[Andrew/GLOBEscientist]

[Question] Name:STACCI & STANLEY Grade:3 & 4 School:FOSTER ELEMENTARY City:ARVADA, CO Country:USA Question:SHOULD WE BE AFRAID OF EL NIÑO? COULD WE HAVE RAIN IN JAN. IN COLORADO INSTEAD OF SNOW?

I'm not sure where Arvada is in Colorado, but I would say it's safe to say that the higher elevations will get snow and be cold. The changes in your local climate due to El Niño are usually small. The more extreme changes are usually isolated to areas that have extremely wet or dry climates.

[Andrew/GLOBEscientist]

[Question] Name:Katrina Deaton Grade:12 School:W. Chester East High S. City:West Chester Country:United States Question:How are you going to go about preventing the damage that may occur when El Niño arrives this winter?

There's only so much that can be done. We can only react to what the weather throws at us. What people can do is limit the economic and human toll caused by El Niño. If an arid area is going to receive more rain, then the farmers in that area can plant different crops. People can make preparations to survive a flood or drought. We have control over our actions, not nature's.

[Andrew/GLOBEscientist]

RE: [Question] Name:Jayme Little Grade:12 School:East High School City:West Chester Country:USA

Question:Can we use El Niño to our advantage?

Some people do. Farmers in Peru will plant rice instead of cotton during El Niño events because of the increased rain. Adjusting to El Niño is one of the few ways we can limit the problems it causes.

[Andrew/GLOBEscientist]

RE: [Question] Name:Amber Grade:12 School:East High School City:West Chester, PA Country:USA

Question:How severe is this years El Niño expected to be?

All the indicators suggest that the warming due to El Niño will be as bad, and probably worse, than the 1982-1983 El Niño. That event is generally regarded as the most severe and triggered much of the popular interest in El Niño. I doubt this event will be just like that one, but this event may cause just as many weather calamities as the 1982-1983 event did.

[Andrew/GLOBEscientist]

RE: [Question] Name:Allison Ahlquist Grade:4 School:Anderson City:St. Charles Country:U.S.A

Question:Why do you collect our information about the clouds and temperature? The first step in the scientific process is to observe. By making observations about our atmosphere, we learn more about it.

Temperature and cloud type observations are two relatively inexpensive and helpful atmospheric observations that can be made by GLOBE participants.

[Andrew/GLOBEscientist]

RE: [Question] Name:Erica DiSciullo Grade:12 School:East High School City:West Chester Country:United States Question:Does El Niño effect the whole world or just some countries?

El Niño affects the weather over most of the GLOBE.

[Andrew/GLOBEscientist]

RE: [Question] Name:Jason Kelleher Grade:12 School:East High School City:West Chester Country:United States

Question:Does el Niño affect the tornadoes in tornado alley? If so, what levels of tornadoes are expected, and approx. how many are expected? (will it be a big year for tornadoes)

Based upon past events, El Niño events correlate well with lower frequencies of tornadoes over the U.S. Central Plains during the following spring.

[Andrew/GLOBEscientist]

RE: [Question] Name:Drew Bristol Grade:12 School:East High School City:West Chester Country:United States

Question:El Niño is said to hurt the anchovie fisherman off the coast of South America because the anchovies migrate north or die. Does the warm water cause an abundance of any other species?

I don't think so. As I understand the whole process, phytoplankton thrive in the cooler, upwelling waters normally found near Peru. The anchovies, in turn, eat the phytoplankton. When there is warmer water, the phytoplankton population is reduced significantly. Since there is less food, the anchovies and the birds that feed off them die off. I don't think there are any other plant species that thrives under these conditions. Without a source of food, no animals will thrive either.

[Andrew/GLOBEscientist]

RE: [Question] Name:kelly Grade:3 School:visser 't hooft City:leiderdorp Country:holland Question:I

would like to know how many km² the hole in the ozonlayer is going per year and if it can totoly be closed if we take more care of our inviroument

I believe the area of the ozone hole does not vary much from year to year. When scientists talk about the ozone hole being larger, they usually are referring to a larger amount of ozone being destroyed over the South Pole. The total area of the ozone hole is restricted to the area inside the polar vortex. I'm not sure exactly how large that is, off hand.

[Andrew/GLOBEScientist]

RE: [Question] Name:Yhuda & Gil Grade:9 School:Maayan City:Rishon Le - Zion Country:Isreal

Question:1.What will be the results of the "El Niño" in the Middle East and Isreal? 2.Does the hole in the ozone layer effects on the pacific's ocean's water temperture? 3.Does the "El Niño" phepomenon will last forever? 4.What will cause the "El Niño" in worldwide radius? 5.Was the "El Niño" the cause for the Drought in Isreal? 6.Did the Golf War had effected the "El Niño" of 1991? 7.Are there any Volcanic & Tactonic effects on the "El Niño"?

Most of your questions have been answered in one form or another in my previous answers except for the last question. Scientists have looked into the role of volcanoes and other geological activity on El Niño, but no evidence has been found to support a link between them.

[Andrew/GLOBEScientist]

RE: [Question] Name:ADAM MARKCROW Grade:YEAR 8 School:BLAYNEY HIGH City:BLAYNEY Country:AUSTRALIA Question:HOW SEVERE ARE THE EFFECTS OF THIS EL NIÑO COMPARED TO OTHER YEARS?

It's hard to tell. Most of the effects normally associated with El Niño aren't noticed until the end of the year. I know that Indonesia is already experiencing a major drought and forest fires. I haven't heard about any other major problems associated with El Niño yet, but that doesn't mean they aren't already happening.

[GLOBEHelpDesk]

RE: [Question] Name:Mike Young Grade:7 School:Avondale Elementary City:Avondale Estates Country:US Question: Why is there a meniscus in non-mercury thermometer? What causes it to drop?

Many liquids form a meniscus when they are in containers. The center of the meniscus drops lower than the "sides" when the container is wet and some of the liquid on the sides clings to the container. For this reason, it is more accurate to take a reading for a measurement by looking at the center of the meniscus.

[GLOBEHelpDesk]

RE: [Question] Name:Joe Stevens Grade:8 School:Smith City:Ft. Hood Country:USA Question: How many schools are in the GLOBE Project?

There are more than 4,000 schools currently participating in the GLOBE Program. They are located in more than 55 countries all around the world!

[GLOBEHelpDesk]

RE: [Question] Name: Alexis Stamblesky Grade:8 School:Smith Middle School City: Fort Hood,Texas Country:United States Questions:Why are you collecting information from all of these schools? What is its purpose and what exactly, do you do with the information that you will receive?

There are several reasons students are asked to collect data for GLOBE. First, scientists use GLOBE data in their research. You can read more about why each scientist is interested in particular data and what they hope to learn from it on the "Scientist Corner" of the GLOBE Student Data Server at <http://globe.fsl.noaa.gov/> . Another goal of the GLOBE Program is to help improve the science and math skills of the participating students, and to help people understand the Earth as a global environment. A

good example of studying the global environment is GLOBE's current project to have students all over the world track the effects of El Niño. Both the students and GLOBE scientists can learn more about El Niño through this study.

[GLOBEHelpDesk]

RE: [Question] Name:Katie Weible Grade:4 School:Anderson City:St. Charles Country:USA

Question:Where do you keep all the information that we give you?

All the data that students all over the world collect is kept in GLOBE's Student Data Archive. You can see the data from your school and other schools in this archive, which you can connect to by selecting the Student Data Archive link on the GLOBE Student Data Server at <http://globe.fsl.noaa.gov/> . The scientists also look here to see the data they need.

[GLOBEHelpDesk]

RE: [Question] NAME:Martin Laasmaa Grade:7th School: Tallinn Technical Secondary School City: Tallin Country: Estonia Question: Please compare the Eastern Time with Greenwich Time.

Eastern time is 4 hours less than Greenwich time during the U.S. "daylight savings" time, which occurs during the summer months. So, 12:00 noon (12 p.m.) Eastern Daylight Time is 4:00 p.m. Greenwich time. GLOBE usually uses the term Universal Time (UT) to refer to Greenwich time, but they mean the same thing.

[Susan/GLOBEscientist]

There were so many good questions submitted by various schools concerning El Niño. We have tried to answer these questions as best we can, but in the limited space some of our answers may not be as detailed as you would like. For those who would like additional information about El Niño and the effects it is predicted to have both in the U.S. and around the world, check out some of the following web sites: One of the best sites is the National Oceanic and Atmospheric Administration's Office of Global Programs site: <http://www.ogp.noaa.gov/enso> .

Other good sites are:

<http://naulu.soest.hawaii.edu/index.html>

<http://atmos.washington.edu/gcg/RTN/rtnt.html>

<http://pmel.noaa.gov/toga-tao/el-nino>

<http://www.cdc.noaa.gov/ENSO>

A good web page for all kinds of climate information and data is the National Climatic Data Center <http://www.ncdc.noaa.gov>

[Susan/GLOBEscientist]

RE: [Question] Name:Chris Grade:6 School:Ward Chapel City:Middlesboro Country:United States

Question:Why does it affect different countries in different ways?

I'm assuming this question refers to El Niño, and why some countries have droughts and others have floods. The answer to this is basically the same as to why even during "normal" times there are variations in weather around the globe - things like latitude, altitude, and proximity to an ocean all influence the type of weather a place experiences. During El Niño, there is a shift in what we consider

the "normal" atmospheric flow patterns. Usually the water in the western Pacific is much warmer than the water in the eastern Pacific. This warm ocean water puts lots of vapor into the atmosphere. It also helps heat the atmosphere. We know that warm air rises, so you get lots of rising air over the western Pacific, which in turn leads to cloud and precipitation formation. On the other hand, the opposite is true in the eastern Pacific under "normal" conditions - the ocean is cold and there isn't much precipitation. The definition of El Niño is a shifting in the sea surface temperature - it gets much warmer in the eastern Pacific and cooler in the western Pacific. This leads to a shift in the atmospheric patterns as well - rainier in the eastern Pacific and drier in the western Pacific. But the atmosphere over the Pacific ocean isn't isolated from the rest of the world. If changes take place in the Pacific, it affects the atmospheric patterns around the world.

[Susan/GLOBEscientist]

RE: [Question] Name:MARGARETE FOCHTMAN Grade:5 School:CENTRAL City:GRAND HAVEN Country:MI
Question:Only a few degrees in temperature seem to make huge differences in Michigan's weather. Why do such small changes make such large differences?

It is temperature differences that basically cause all of our weather. That is, weather is the response of the atmosphere to variations in temperature. Essentially, the atmosphere is trying to even out the temperature. Even a temperature difference of a few degrees will cause atmospheric motions. Depending on other things like the amount of water vapor in the atmosphere, these small temperature differences can cause very significant weather changes.

[Susan/GLOBEscientist]

RE: [Question] Name:Bobby and Chris Grade:6 School:Ward Chapel City:Middlesboro Country:United States
Question:How does it mess up the Jet Stream?

Again, I'm assuming you want to know how El Niño affects the jet stream. I'm not sure I would say that El Niño "messes up" the jet stream, it just shifts it into a different pattern. The jet stream is a region of high winds in the upper atmosphere. These high winds are caused by the fact that you have very cold air in the polar region, and warmer, moister air in the mid-latitudes. Whenever there is a difference in temperature, the atmosphere moves to try to even out the temperature (there is a jet stream in the southern hemisphere as well; and weak jet streams at about 30 degrees north and south latitudes, but these don't affect our weather as much). El Niño shifts the air patterns in the Pacific, which affects air patterns around the rest of the globe, including the jet streams.

[Susan/GLOBEscientist]

RE: [Question] Name:Drew Bristol Grade:12 School:East High School City:West Chester Country:United States
Question:How do you tell by a trees rings which years were El Niño years?

You can't really tell which years were El Niño years, but you can tell something about the temperature and precipitation, and from this you may be able to make an educated guess as to which years were El Niño years. Tree growth is affected by temperature and moisture, so when we look at the varying width of tree rings for a given tree we can make some assumptions about how warm it was and how much precipitation there was in a given year. From there we then have to rely on what we know about the effects of El Niño from more recent studies. For example, if we know that during El Niño conditions a certain region tends to be warmer and wetter, leading to increased tree growth, then we might assume that when we look at tree rings that the wide rings happened during El Niño years. We have to be careful, though. There may be other factors that could lead to increased growth in a given year other than El Niño. We could carry our study a step further and by studying more recent data we might find that during El Niño in a given region, warm, wet years are followed by unusually cold, dry years. Then we could look at the tree rings and find times when wide rings are followed by narrow rings. This would

help us be a bit more certain that the wide rings represent El Niño conditions. There are, of course, still many factors to take into consideration. For example, we have studying El Niño for less than 100 years, so we don't really know if the patterns we see now during an El Niño are the same as they were 500 years ago. This is what makes science such a challenge and so much fun!

[Susan/GLOBEScientist]

RE: [Question] Name:Lauren And Leah Grade:6 School:Ward Chapel City:Middlesboro Country:U.S.A
Question:How much damage do you expect from this El Nion

We never really know from one El Niño to the next just how severe the weather will be. Every El Niño that we have studied has been slightly different than all the others. In general, we have a pretty good idea which regions of the world will have a drought or which may experience increased flooding. The best that we can do is to be prepared for the worst and hope for the best!

[Susan/GLOBEScientist]

RE: [Question] Name:STACCI & STANLEY Grade:3 & 4 School:FOSTER ELEMENTARY City:ARVADA, CO
Country:USA Question:SHOULD WE BE AFRAID OF EL NIÑO? COULD WE HAVE RAIN IN JAN. IN
COLORADO INSTEAD OF SNOW?

I wouldn't say that El Niño is something we should be afraid of, but we need to study it so we know as much about it as possible. Like any kind of weather, we need to be prepared for things like not enough rain (or snow) or too much rain (or snow). El Niño is just a shift in weather patterns around the world. Actually, depending on where you are in Colorado, there is always a chance you could get rain instead of snow in the winter, even when there isn't an El Niño.

[Susan/GLOBEScientist]

RE: [Question] Name:Drew Babinecz Grade:12 School:West Chester East City:West Chester
Country:United States Question:How is coral used to gather clues about the el Niños of the past? Has
global pollution enhanced or hindered the el Niños in recent years?

The first part of your question is similar to the tree ring question asked by another student. We can't really use coral directly to tell us about El Niños of the past, although we can make some reasonable assumptions. Since we have been studying El Niño for less than 100 years, we can only make reasonable guesses as to what coral can tell us in terms of temperature and precipitation about El Niño. As for global pollution, again, we don't really know what if any affect that has had. Since every El Niño that we have studied has been slightly different from all the others, we don't really know what an "average" El Niño is, so we don't really know what is "enhanced" or "hindered".

[Susan/GLOBEScientist]

RE: [Question] Name:Shelley Grade:11 School:East City:West Chester Country:USA Question:What steps
are Indonesia and Australia taking to deal with the droughts El Niño causes?

Regions of the world that experience drought during El Niño face a difficult time. In Australia the government is trying to help farmers get through the hard times with "disaster relief funds" (that is, a sort of insurance payment for lost crops). Other actions that some governments are taking are starting water conservation measures sooner than they normally would. Often times a city will wait until its water reserves are pretty low to enforce mandatory water restrictions. Countries that experience drought during El Niño can begin water conservation measures almost as soon as they know an El Niño has begun. Some countries are also increasing their water reservoirs to help them through the hard times. Farmers can switch to crops that don't require as much water to grow, or can cut down the number of animals they have so they don't lose as much in livestock.

[Susan/GLOBEScientist]

RE: [Question] Name:NICCOLE COOLEY Grade:12 School:W.C. EAST City:WEST CHESTER Country:UNITED STATES Question:HOW EXACTLY DO YOU PREDICT EL NIÑO IS GOING TO ARRIVE AND HOW BAD IT WILL BE ?

This is the ,000 question! The basic problem is that we can't predict El Niño, or even how bad it is going to be. Many scientists have been working to develop computer models that will help us predict El Niño. However, we have only been studying El Niño for a relatively short time (although we have known about El Niño for nearly 100 years, we have only really been able to study it in detail for about the past 30 years). To complicate matters, all of the El Niños we have studied have had their own characteristics. That is, no two are exactly alike! This means that even once an El Niño has started up, we aren't exactly sure just how it will progress and how severe it will become. Many scientists believe that the current El Niño could be the worst one on record. However, since we don't really have that many on record, and we aren't sure this one will really progress in a similar way to past El Niños, we aren't really sure just how bad it will end up.

[Susan/GLOBEScientist]

RE: [Question] Name:shelley Grade:11 School:East City:West Chester Country:USA Question:Is the nation helping third world countries with the oncoming storms, droughts,and decreases in the fishing population from El Niño?

In terms of money, I'm not really sure how the U.S. is helping other countries deal with the effects of El Niño. I do know that we share with them all of our scientific knowledge - not just specifically about El Niño, but also about what crops might do better under El Niño conditions, and other measures they can take to help minimize their difficulties during El Niño.

[Susan/GLOBEScientist]

RE: [Question] Name:Missy Grade:12 School:East City:West Chester Country:USA Question:How are the South American fisherman preparing for the upcoming season they will encounter with a dramatic decrease in the fish population?

Good question; and I'm not sure I know the answer exactly. They may make plans to have to travel farther to find fish, or they may take up an alternative job until the fish come back. I'll bet you could find more information by surfing the web a bit.

[Susan/GLOBEScientist]

RE: [Question] Name:Amanda, Jessica Grade:6th School:Ward Chapel City:Middlesboro Country:United States Question:Why does it always come in December?

This is a great question, and I'm afraid my answer is probably going to be much longer than you expect because it isn't very straightforward. We have to go back to the history of how El Niño got its name. Way back in 1891 the first scientific article was published that talked about a change in the ocean current along the coast of Peru at the end of nearly every year. Sailors called this warm current El Niño (which literally means "the boy child" in Spanish, but in this context is translated at "the Child Jesus" because it typically happened just after Christmas). Now, notice that this was happening off the coast of Peru NEARLY EVERY YEAR. On some occasions (irregularly, but usually every 3 to 5 years or so), the sailors noted that the warm current was more intense and accompanied by heavy rains. Then in the 1960s oceanographers realized that during some years the water in the equatorial central Pacific also became unusually warm (we had to wait for satellites that could "see" large areas of the Pacific ocean before we could make this discovery). Since the name El Niño was already being used to refer to the warm waters off the coast of Peru, the oceanographers just used the same name to refer to this unusual warming in the central Pacific as well. HOWEVER, unlike the slight warming that takes place off the coast of Peru

nearly every year (probably due to the winds dying down slightly, and not carrying the warm surface waters away from the shore as quickly), the warming in the central Pacific, like the really intense warming and heavy rains along the coast of Peru, only happens about every 2 to 7 years. This made things very confusing for a while. While all of this was going on, atmospheric scientists had been studying atmospheric pressure over the Pacific region. They noticed that normally the pressure over the eastern Pacific is higher than over the western Pacific, but that about every 2 to 7 years there is a change (or an "oscillation") of pressure, so that atmospheric pressure increases over the western Pacific and decreases over the eastern Pacific. They called this switch in atmospheric pressure the "Southern Oscillation". Finally, in the late 1960s, scientists began to realize that the increases in sea surface temperature in the central Pacific were linked to the oscillation in atmospheric pressure. It was decided to call this whole phenomenon "ENSO" (El Niño - Southern Oscillation). Scientists use the term ENSO when they talk about the large-scale changes in sea surface temperature and atmospheric pressure patterns across the entire Pacific. These changes actually start to take place usually around March or April, and typically last for 18 months or so. Unfortunately, it has become convenient for newspapers, magazines, and other media to still refer to the large scale event as El Niño, which certainly gives the impression that we are still talking about something that only happens around Christmas time. Technically, the term El Niño by itself really just refers to the yearly warming off the coast of Peru (which probably comes about due to changing seasons). The term ENSO really should be used when we talk about the large scale changes that take place across the Pacific basin (which also have global implications).

[Susan/GLOBEScientist]

RE: [Question] Name:David McGill Grade:4 School:Anderson City:St.Charles Country:U.S.A Question: Why do you want us to tell you what kind of clouds we have ? Do you like your job ?

I like my job alot! I get to do all kinds of fun things like study weather and climate and meet with students from all over the country and the world. We want to know what kinds of clouds you have, because clouds tell us alot about what is going on in the atmosphere. Clouds are a way for us to tell something about how the atmosphere is moving. Big, thick clouds, like cumulus, mean that there is a lot of upward motion in the atmosphere, but stratus clouds (being thinner than cumulus clouds) mean that there is only a little bit of upward movement in the atmosphere. So we are really using clouds to figure out more about the movement of the atmosphere. The more we understand about how the atmosphere is moving in different places, and then compare that with the weather and climate in those places, the better we will be able to predict the future weather and climate.

[Susan/GLOBEScientist]

RE: [Question] Name:Matt Rowland Grade:4 School:Anderson City:St. Charles Country:U.S.A. Question:Will we have an ice age beacause of the atmosphere.

We have had periods of ice ages throughout Earth's history. The last ice age ended about 10,000 years ago, and some people think that we are due for another one in the near future. However, no one knows for sure! In fact, we aren't exactly sure what triggers an ice age. We think some ice ages start because of changes in Earth's orbit around the sun. Others may start or end because of changes in Earth's atmosphere, either a change in the gases in the atmosphere or in things like clouds, dust, or other aerosols. Right now, more scientists think that the carbon dioxide we are putting into the atmosphere because of all the fossil fuels we burn (things like coal and gasoline) will cause the planet to heat up rather than cool down.

[Susan/GLOBEScientist]

RE: [Question] Name:Sameer Gupta Grade:4 School:Anderson City:St.Charles Country:USA

Question:About how hot is the earth's atmosphere?

Although this should seem like an easy question, it is really kind of tricky. The reason is that scientists have a different definition for "temperature" than what we normally think of. We think of "hot" as what we feel when we are standing out in the sun on a summer day. In this case, a really hot day is one where the atmosphere may be as much as 120 degrees Fahrenheit. The world record high temperature near Earth's surface is 136 degrees F. HOWEVER (and this may be way more information than you really want), there is a region of our atmosphere (the thermosphere), way above Earth's surface (in fact, more than 60 miles above Earth's surface) where temperatures can be above 1000 degrees F. But these temperatures aren't really comparable to what we feel near the ground. Scientists define temperature by how fast air molecules are moving. How warm we feel depends not only on how fast air molecules are moving, but how many of them there are. Near Earth's surface, the molecules are moving moderately fast, but there are a lot of them. These molecules run into us all the time, and that is what makes us feel warm (this is kind of like playing catch with a baseball. If you throw the ball back and forth with a friend very fast, you will notice that your hands start to feel warm. That's because the moving ball gives up energy when it gets stopped by your hands, and if you throw the ball back and forth fast enough you get energy from the ball faster than your hands can cool off). In the thermosphere, however, while the air molecules are moving VERY fast, there aren't very many of them. So, technically, the temperature of the thermosphere is very high, but we would still freeze to death if we were up there without protection (not to mention the air isn't thick enough to breathe!).

[Susan/GLOBEScientist]

RE: [Question] Name:Melissa Daniel Grade:8th School:Collinwood Middle City:Collinwood Country:USA

Question:We are wanting to know if it is unusual for a town in Tennessee, during this time of year, to have a pH level of 4.5?

I'm assuming that you are referring to the pH of your rainfall. Although this may seem like a relatively low pH, I don't think it is particularly unusual for your part of the country.

[Susan/GLOBEScientist]

RE: [Question] Name:Kate Aldrich Grade:4 School:Anderson City:St. Charles Country:USA Question:How has the weather changed the clouds?

The kinds of clouds we see each day depends on the movement of the atmosphere on that day. One of the reason that we ask GLOBE students to tell us about cloud types and amounts is that we want to start building up data that tells us what the clouds normally are like on average in a given place. That way, over time, we'll be able to see if there are any changes in cloud patterns. This will then tell if patterns in the way the atmosphere moves are changing.

[Susan/GLOBEScientist]

RE: [Question] Name:Marty Smetak Grade:4 School:Anderson City:St.Charles Country:U.S.A.

Question:When was the last time El Niño effected the U.S?

The last El Niño (which was a relatively mild one) occurred in the early 1990s. It started up in about 1990, but unlike most El Niños that only last about 1-1/2 years, this one lasted for nearly 3 years.

[Susan/GLOBEScientist]

RE: [Question] Name:marlow middle school Grade:8th School:marlow middle school City:marlow Country:usa Question:Dr. Postawko Our rainfall ph has been between 4.3 and 5.0 this school year. A quarter mile away at the high school their ph is about 6.5. They washed their raingauge with soap. What do you think about this difference?

I think a high school should know better than to wash their rain gauge with soap if they want an accurate pH reading!

[Susan/GLOBEScientist]

RE: [Question] Name:H. King Grade:12 School:East City:WC Country:USA Question:Does El Niño change the weather patterns for the years following? Will the new weather patterns effect animals habits? El Niño is a shift in atmospheric weather patterns from one stable mode (what we call "normal") to another stable mode. This affects weather patterns until the mode shifts back again. A "typical" ENSO (El Niño-Southern Oscillation) event takes place over about 18 months (although the event that occurred in the early 1990s lasted for nearly 3 years). An ENSO event will affect animal habits in the same way as will any change in weather events.

[Susan/GLOBEScientist]

RE: [Question] Name:Delilah Papaioannou Grade:8th School:Nolan Middle School City:Killeen, Texas Country:United States Question:What was your reason, or motivation to start Globe.Do you collect the data of the Globe from all regions of the world?What is the farthest you have collected from the Globe. Vice President Gore came up with the idea for GLOBE back in the early 1990s. I was fortunate enough to have been selected as one of the GLOBE scientists in 1995. I was interested in being part of this program for at least two reasons: one is that I was very interested in being able to work with students and scientists around the world, and the second reason is that I was very interested in getting data about weather and climate from around the world. The GLOBE program gets data from students in many regions of the world and puts all the data into a computer so that anyone who wants to can use the data. Scientists like myself look over the data. When enough data has been collected we are able to use it to tell something about weather and climate around the globe, and how it might be changing. I'm not sure I understand the part of your question about "the farthest" data collection. Certainly schools in some pretty remote parts of the world are collecting GLOBE data. If you can check out the GLOBE web pages you can see where all the schools are around the world that are collecting GLOBE data.

[Susan/GLOBEScientist]

RE: [Question] Name:Dave Grade:12 School:Okemos High School City:Okemos Country:USA Question:1- Are there any other areas in the world where we have observed large scale periodic changes in climate like El Niño? (e.g., Arctic Ocean, Atlantic, etc.) Do you think that El Niño might just be the first of a number of such weather cycles? 2- What causes the weakening of the high pressure center in the eastern Pacific (which results in the weakening of trade winds, which starts the El Niño)? To my knowledge, no one has seen any semi-regular short-term climatic changes in other regions that have an impact on global weather. I'm not sure I understand your question about El Niño being the first of a number of weather cycles. We do know that ENSO (El Niño-Southern Oscillation) conditions represent a shift from one stable mode to another stable mode of the atmosphere. There may be other stable modes. We don't really understand what triggers this shift. In fact, often times El Niño conditions start BEFORE the trade winds weaken - so it doesn't seem like weakening of the high pressure center in the eastern Pacific is a CAUSE of ENSO, but rather it is an effect.

[Susan/GLOBEScientist]

RE: [Question] Name:RICKIE CAYTON Grade:EIGHTH School:NOLAN MIDDLE SCHOOL City:KILLEEN , TEXAS Country:UNITED STATES Question:DURING OUR LAST RAINFALL THAT OCCURED OVER A TWO DAY PERIOD (22 23 SEPT.) ABOUT 50mm OUR pH READINGS WERE 4.6 AND 4.3 (RESPECTIVELY) WE WERE VERY CAREFUL WITH THE CALIBRATION. OUR QUESTION IS: "IS THIS CONSISTANT WITH RAINFALL pH IN CENTRAL TEXAS?" ALSO, "WHAT ARE WE TO EXPECT THIS WINTER WITH EL NIÑO?"

Your pH values are a little lower than what I would have expected, but not unusually so. Remember that there may be very localized reasons for variations in pH. If you are still concerned, you might try using pH paper to get a "ballpark" figure for pH - this will at least assure you that your measurements are in the right range. As for the effects of ENSO (El Niño-Southern Oscillation) in central Texas, we have to make a best guess using our knowledge of what has happened in the past. Although each ENSO event is unique, central Texas typically experiences increased precipitation and somewhat lower temperatures, particularly in the January-March timeframe.

[Susan/GLOBEScientist]

RE: [Question] Name:Aaron Sutherland Grade:4 School:Anderson City:St charles Country:usa

Question:How many degrees does the atmosphere cool down the sun's rays?

I apologize, but I'm really not sure I understand your question. Are you asking why the sun is so hot but Earth isn't? Our atmosphere doesn't really "cool down" the sun's rays. Although the sun is very hot (the surface of the sun is nearly 10,000 degrees F), it is also a long way from Earth (93 million miles, in fact!). You know that if you stand right next to a campfire or a heater, you can get really hot, but if you stand farther away you don't get as hot. This isn't because the campfire isn't putting out as much heat or that Earth's atmosphere is cooling down the rays of the campfire, but it's because as you move farther away from the campfire its heat is being spread out over a greater and greater area. You might be able to understand this better by using a slice of bread and a teaspoon of peanut butter. If you pile the peanut butter all in the middle of the bread, it makes a pretty thick stack. Now slowly spread the peanut butter over more and more of the bread. What happens? The amount of peanut butter on any one part of the bread gets thinner and thinner. You still have the same total amount of peanut butter, it's just spread out over a larger area. It's sort of the same thing with heat from the sun - the further away from the center you go, the more spread out the heat is. So only a small part of the sun's heat even makes it to Earth. In addition, clouds in the atmosphere and Earth's surface reflect away some of the energy from the sun, so only about 70 percent of the sun's heat that even reaches Earth ends up heating up our planet. I hope this helps answer your question!

[Susan/GLOBEScientist]

RE: [Question] Name:Ares Mitchell Grade:4 School:Anderson City:st charles Country:usa Question:What do you use to know the weather?

I'm afraid that this is another question that I don't quite understand. The basic instruments that a meteorologist uses to help forecast weather are a thermometer (to watch temperature changes), a rain gauge, a barometer (which measures atmospheric pressure), a hygrometer (which measures humidity), an anemometer (which measures wind speed), and a wind vane to tell wind direction. There are other instruments, of course, but these are the main ones we use in trying to understand the weather.

[Susan/GLOBEScientist]

RE: [Question] Name:Nina Plowman Grade:4 School:Anderson City:St charles Country:usa Question:Will el Niño make some places colder than they are now?

Typically during an ENSO (El Niño-Southern Oscillation) event, the southern part of the U.S. from Texas over to Georgia and the Carolinas will experience colder than normal winters, particularly in the months of January-March. Other places, however, will have warmer than normal winters.

[Susan/GLOBEScientist]

RE: [Question] Name:Caitlin Head Grade:7 School:Mount Baker Junior High City:Acme, WA Country:U. S. Question:Would El Niño have an affect on the waves of the Pacific Ocean off the coast of Washington?

You definitely have me stumped on this one! I can certainly argue that an ENSO (El Niño-Southern Oscillation) event COULD have an affect on wave action (changing patterns of storms should mean changing patterns of waves), but I don't honestly know for a fact what if any changes take place off the coast of Washington.

[Susan/GLOBEscientist]

RE: [Question] Name:Tabitha Assink Grade:7 School:Mount Baker J H City:Deming, WA Country:U S

Question:What tools do you use to track information and data for El Niño?

Scientists use many ways to track an ENSO (El Niño-Southern Oscillation) event. The two main pieces of information you typically are interested in are the sea surface temperature and atmospheric pressure. Scientists use both satellites and surface measurements to track sea surface temperature, and primarily surface measurements to track atmospheric pressure (in particular, during an ENSO event scientists monitor the atmospheric pressure in Darwin, Australia compared to the pressure in Tahiti. The difference in atmospheric pressure between these two places is what we call the Southern Oscillation Index.)

[Susan/GLOBEscientist]

RE: [Question] Name:James Hubert Grade:7 School:Mount Baker J H City:Deming, WA Country:U.S.

Question:If we get El Niño, how long will it stay for? What would happen to the tropical fish that come north when it gets colder? If the plants and trees get used to heat in the winter, will they die the next winter?

Typical ENSO (El Niño-Southern Oscillation) conditions last for about 18 months. However, the ENSO event that started in 1990 lasted for over 3 years! Each ENSO event is unique, so we never know exactly how long each one will last. Even during the long ENSO event in the early 1990s plants and trees didn't really get used to the change in their normal conditions, so there wasn't much of a problem when conditions went back to normal. Fish can pretty much migrate from place to place in response to temperature changes.

[Susan/GLOBEscientist]

RE: [Question] Name:Colleen LeMaire Grade:4 School:Ferson Creek City:St. Charles, IL Country:USA

Question:How much of the coast line could be or would lost?

I'm not sure I understand what you are asking exactly. Throughout Earth's history sea level has risen and fallen over and over again, and coastlines are always changing. In fact, at one time the states of Oklahoma and Texas (and others) were covered by a shallow inland sea.

[Susan/GLOBEscientist]

RE: [Question] Name:Michael Oostema Grade:7 School:Mount Baker Jr. High City:Deming, WA

Country:U. S. Question:How much has the ocean temperature changed off the coast of Washington?

Will this El Niño make long-term effects?

Depending where you are along the coast of Washington, surface ocean waters are between 2 and 5 degrees F above normal. Any long-term effects from a given ENSO (El Niño-Southern Oscillation) event depend on how strong the event is and how long it lasts. Right now we don't know what, if any, long-term effects we will see from the current ENSO event.

[Susan/GLOBEscientist]

RE: [Question] Name:Kristen Ubelhor Grade:4th Grade School:Garden Road Elementary City:Poway

Country:USA Question:Why did you want to be a scientist?

Good question! I certainly didn't wake up one day and say "Gosh, I think I'll be a scientist". In a way, it just happened because I have always been interested in lots of area of science. I started out being very interested in stars and planets and wanting to be an astronaut. As I got older, though, I decided that being a scientist was a pretty cool thing (mostly because I have a tendency towards motion sickness, which is not a good thing for an astronaut to have!). I guess I see science as a way to get to do something new every day (and get paid for it!).

[Susan/GLOBEScientist]

RE: [Question] Name:Cori Jackson Grade:4th Grade School:Garden Road Elementary City:Poway Country:USA Question:How did you get involved with GLOBE?

I got involved with GLOBE even before it officially was GLOBE! I was lucky enough to be one of the scientists that first met in Boulder, Colorado in July of 1994 to try to help people in Washington,D.C. set up the details of the GLOBE science measurements. After a few of these meetings, I decided that this was going to be a great program, and I wanted to be officially involved. So when the GLOBE program asked for scientists who wanted to be involved in the program to send in a proposal, I sent mine in and was lucky enough to be chosen as the lead scientist for atmospheric science studies. Its been a lot of fun, and I hope to keep involved with the program for many years to come.