The Dryline

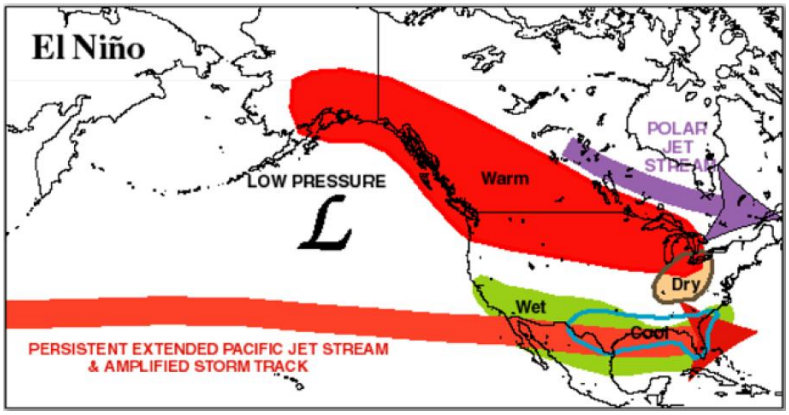
The Official Newsletter of the National Weather Service in Amarillo

Fall 2009

El Niño is Coming!

By Chris Kimble, Climate Program Leader

You may have heard that the tropical Pacific Ocean has returned to a state of El Niño this summer and is expected to continue through the winter. But what do water temperatures in the Pacific Ocean have to do with weather in the Texas and Oklahoma Panhandles? The answer has to do with the jet stream.



General jet stream patterns during El Niño.

During El Niño, water temperatures in the eastern Pacific Ocean near the equator become warmer than usual. This tends to strengthen the southern jet stream across the eastern Pacific Ocean, leading to more rainfall in the southwestern United States. The impacts are generally less dramatic farther east, but the Panhandles are also affected. El Niño often means more storm systems and more precipitation for our area. Because a large portion of the total precipitation in the winter season in Amarillo falls as snow, El Niño often leads to greater snowfall as well. The increase in storm systems also leads to slightly cooler daytime temperatures during El Niño. Impacts from El Niño and its counterpart, La Niña, are typically greatest in the winter months. This is due to the natural southward progression of the jet stream during winter, placing it closer to the tropical region in which El Niño or La Niña forms.

The current forecast issued by the Climate Prediction Center calls for El Niño to reach at least moderate strength and last through the winter. This could lead to a wet and snowy winter for the Panhandles. It is important to remember, however, that many other factors contribute to the weather in an area and that the presence of El Niño does not guarantee a wet or snowy winter. More information on El Niño, La Niña and their impact on the weather in the Panhandles is available on our website at www.srh.noaa.gov/ama/?n=elnino

In This Issue…

A Day in the Life…of a NWS Forecaster—Upper Air Observations

By Chris Nuttall, Meteorologist Intern

This article continues our ongoing series of examining the different aspects of operations at the National Weather Service (NWS) office in Amarillo. In this issue of *The Dryline*, we will take a look at the upper-air observation program. Many people have heard of weather balloons, but most are probably unaware that a weather balloon is released twice a day from the NWS office in Amarillo. Hundreds of stations across the globe take observations twice every day at the same time: 00:00 UTC and 12:00 UTC (midnight and noon in Greenwich, UK). In Amarillo, the balloon release occurs at 5 am/5 pm CST. Additional releases are sometimes made between the routine times due to special circumstances, such as research projects, the expectation of severe weather, or when a hurricane is expected to make landfall along the Gulf Coast.

A weather balloon release at NWS Amarillo.

So, what is used to take an upper-air observation? The biggest component is the weather balloon. The balloon is filled with hydrogen and is usually about six feet in diameter when fully inflated. As the balloon rises into the atmosphere, the decrease in atmospheric air pressure allows the hydrogen to expand and stretch the balloon up to the size of a bus by the time it reaches 90,000 feet or higher in altitude. It will stretch so much that eventually it will burst, allowing the instrument package (called a radiosonde) to fall back to Earth. A parachute slows its descent. Usually, the radiosonde will land in an empty field and will never be found. However, if someone does come across one of our used radiosondes, there are instructions and an envelope for mailing the instrument to a processing center where it will be recycled and reused.

The radiosonde looks like a rectangular box about half of the size of shoe box and weighs around one pound. The sonde takes direct measurements of temperature, humidity, and pressure. Winds are determined through GPS tracking. These readings are transmitted back to NWS-Amarillo by radio and are processed by computer. The entire process takes about 2 hours to complete, from the time the weather balloon is released to the time it falls back to Earth.

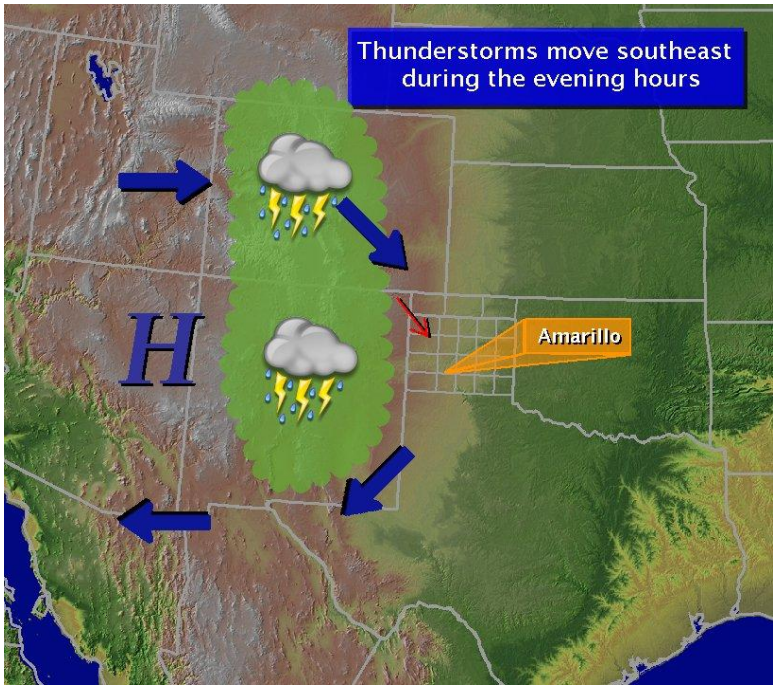
After the data comes into the NWS office, it is sent to the National Center for Environmental Prediction (NCEP) for input into numerical weather prediction. Upper-air observations are particularly useful to meteorologists for forecasting severe weather during the warm season as it allows the forecaster to assess the instability of the atmosphere. It is also useful in determining precipitation type during the winter as the forecaster can analyze layers of warm air aloft which can contribute to freezing rain or sleet.

What is Northwest Flow?

By Mike Johnson, General Forecaster

If you have been in the southern High Plains long enough, you have probably heard of the dryline and are familiar with its association with thunderstorm activity in the spring and early summer. However, the dryline is almost non-existent during most of the summer months, yet we continue to experience episodes of showers and thunderstorms, typically in the late afternoon and evening hours. Most of the time there are no frontal boundaries around the area in the summer months, so where do all of these thunderstorms come from?

Thunderstorms are a normal occurrence across many areas of the United States during the summer months. However, due to orographic (or terrain) effects, thunderstorms are more common in mountainous areas. One of these areas is the southern Rocky Mountains of Colorado and New Mexico. These thunderstorms typically form in the mid afternoon hours when heating is approaching its maximum but can dissipate quickly by sunset as the air begins to descend down the mountain slopes. So how does this have anything to do with the relatively flat Texas and Oklahoma Panhandles? The answer is what meteorologists refer to as "northwest flow".



"Northwest flow" around high pressure in the Southwest U.S. allows thunderstorms which form over the Rocky Mountains to move southeast into the Panhandles.

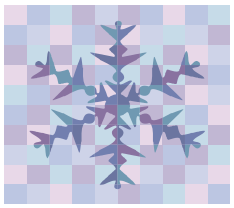
During the summer months, the subtropical ridge (upper level high pressure) typically sets up over the southwest portion of the United States. Air moves in a clockwise direction around areas of high pressure. With the high located several hundred miles to our west, the winds around this high come from the northwest over the Panhandle region. Since thunderstorms tend to move along with the mean flow, the mountain thunderstorms drift to the southeast toward the Panhandles.

Thunderstorms associated with northwest flow patterns can produce severe weather and are quite common from June through August but can last well into September. Episodes of northwest flow typically lead to several days of unsettled weather. While tornadoes are not as common with this setup as during the spring months, they may occasionally develop since wind shear can be quite strong. The primary impacts with northwest flow thunderstorms are large hail and damaging straight line winds. The other concern with any thunderstorms during the summer months is locally heavy rainfall.

To sum it all up, northwest flow really doesn't cause thunderstorms. It simply brings thunderstorms originating in New Mexico and Colorado to the Texas and Oklahoma Panhandles. So when you hear a meteorologist talk about a northwest flow pattern developing, you can expect several evenings with thunderstorms in the forecast.

Winter Weather Safety

By Chris Kimble, Meteorologist Intern



Each year there are more winter weather related deaths in the Texas and Oklahoma Panhandles than from lightning, tornadoes, and flash floods combined! Most winter-related fatalities involve automobiles, usually where winter weather directly results in a traffic accident.

For road condition reports, use the following numbers:

Texas Panhandle:	806-468-1488
Texas:	800-452-9292
Oklahoma:	405-425-2385
New Mexico:	800-432-4269

For Weather Forecast Information:
www.srh.noaa.gov/ama

When snow, sleet, or freezing rain begins to fall and transform the Panhandles into a winter wonderland, you are urged to stay home and avoid travelling. If you must travel during winter weather, you can greatly reduce your risk by taking a few precautions. Check on the latest road conditions and weather reports before you leave. Let others know where you are going and when you expect to reach your destination. Keep your gas tank near full and avoid travelling alone. Carry an emergency supply kit that contains a cell phone, non-perishable food and water, blankets, dry clothing, flashlights and batteries, first aid kit, and a snow shovel.

In an effort to protect life and property, the National Weather Service strives to alert you of hazardous winter weather conditions. This is done primarily through public forecasts and statements. Winter Weather Advisories are issued when winter weather conditions are expected to cause significant inconveniences. Winter Storm Warnings are issued when winter weather conditions are expected to be hazardous and life threatening. Winter Storm Watches may be issued ahead of the storm to alert you that significant hazardous winter weather conditions are possible in the near future.

With winter approaching, it is important that residents stay informed about expected winter weather conditions. The best way to get forecast and warning information 24 hours per day is to listen to NOAA Weather Radio or visit our website at www.srh.noaa.gov/ama. Many local television and radio stations also broadcast useful forecast information and relay National Weather Service winter weather advisory and warning statements.

STUDENTS CONTRIBUTE TO NWS

This summer the NWS was grateful for help from several students from the local area:

Matthew Day is from Fritch, Texas and is now in his sophomore year at the University of Oklahoma. He came to the NWS Amarillo this summer as part of the Student Career Experience Program. As a full time employee, he worked the Data Acquisition desk and released weather balloons, prepared climate products, answered phones, and assisted during severe weather. He also helped other NWS staff with various projects. Matthew will continue to work with the NWS in Amarillo during his summer and winter breaks from school.

Brady Kendrick is from Canyon, Texas and is a junior at Canyon High School. He has been a volunteer with the NWS in Amarillo for the past two summers. This summer he helped the NWS with various projects and also answered phone calls and assisted during severe weather. He also plans to attend the University of Oklahoma and major in Meteorology after he finishes high school.

In YOUR Community

The Amarillo National Weather Service office was busy with several outreach events over the summer. Back in June, to kick off Lightning Awareness Week, the Amarillo Weather Forecast Office teamed up with KVII news and the Amarillo Dillas baseball team to promote lightning safety. Before the game, the Amarillo office released a weather balloon from center field. Over 500 helium-filled "mini weather balloons" were provided to the kids as they entered the stadium. Numerous door prizes were given away after each inning while members of the KVII news team and the Amarillo Weather Service threw T-shirts into the crowd. In early August, representatives from the Amarillo Forecast Office participated in Kids Fest out at Thompson Park. The kids braved the crowds to collect balloons, stickers, weather-themed coloring books, and other weather paraphernalia from the Weather Service booth during the event. With the approach of September came time for our annual booth at the Chamber Barbeque Cook-off. Meteorologist-in-charge Jose Garcia and Electronics Technician Dave Wilburn made a mouth watering selection of brisket, chicken, ribs, sausage, corn on the cob, jalapeño poppers, and beans for this event. They even walked away with a third place award in the "other" category for their surf-n-turf kabobs!

In addition to the events shown below, we have information from other events as well as dates of future events located on our website at:

http://www.srh.noaa.gov/ama/?n=outreach

NWS Employees getting ready to launch the weather balloon from center field before the Amarillo Dillas played.

ESA Paul Schaafsma and OPL Tabatha Tripp serve food to the hungry crowds at the Amarillo Camber BBQ.

We would love to participate at your next event! To schedule the NWS Amarillo in your next community event, please send an e-mail to Steve Drillette at steve.drillette@noaa.gov, or call 806-335-1121.

Weather Review and Outlook

By Chris Kimble, Climate Program Leader

REVIEW OF SUMMER 2009

A heat wave brought widespread 100 degree temperatures to the Panhandles in the early and middle part of July. Amarillo saw a high of 106 degrees on July 9 which was the highest temperature ever recorded for the month of July. Many other areas off the Caprock endured temperatures over 110 degrees. By the middle of July the pattern began to change to a cooler, wetter one. This led to above normal precipitation which continued through the rest of the summer. In Amarillo, August was the wettest on record as several thunderstorms dropped heavy rain near the Amarillo International Airport. Some other areas including parts of the city of Amarillo missed out on much of the precipitation.

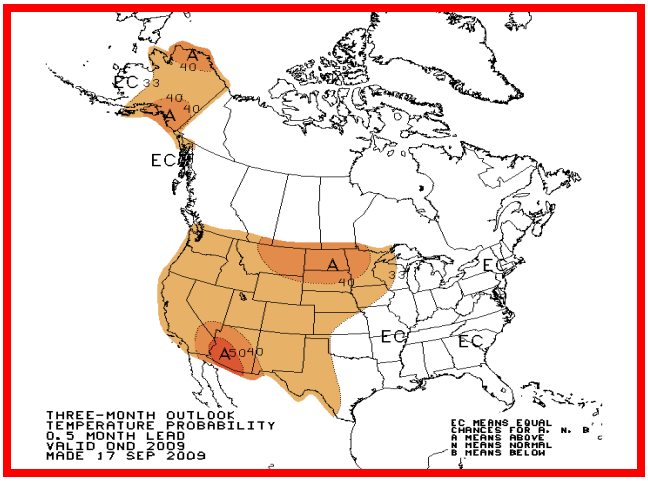
Several cold fronts began impacting the area during September, helping to keep temperatures cooler than normal. The widespread heavy precipitation of July and August finally ended along with the heat. The Oklahoma Panhandle and the western Texas Panhandle experienced their first freeze of the season on September 23, a few weeks earlier than normal. Boise City, Oklahoma dropped down to 28 degrees, while Amarillo dropped to 39.

	AVG HIGH	AVG LOW	AVG TEMP	PRECIP	90 + DAYS
JUL	92.5 (+1.5)	64.3 (-1.0)	78.4 (+0.2)	3.78 (+1.10)	20 (+0.1)
AUG	88.4 (-0.3)	63.5 (-0.3)	76.0 (-0.3)	8.07 (+5.13)	16 (-0.5)
SEP	79.7 (-2.1)	54.5 (-1.8)	67.1 (-2.0)	0.83 (-1.05)	3 (-4.0)

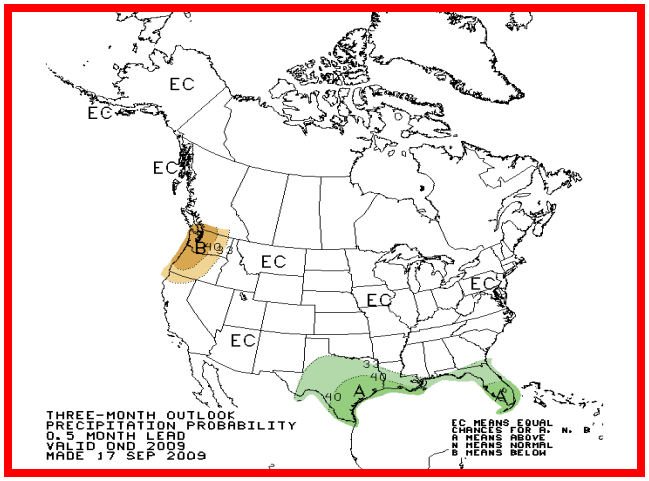
Summer 2009 statistics for Amarillo, TX

OUTLOOK FOR FALL 2009

The Climate Prediction Center has issued the three-month outlook for October, November, and December. The temperature outlook indicates a better chance for above normal temperatures through the fall. The precipitation outlook indicates a slightly enhanced chance for above normal precipitation across most of Texas. El Niño conditions have developed in the Eastern Pacific Ocean this summer and El Niño is expected to strengthen and last through the winter. El Niño often results in a more active weather pattern impacting the Panhandles, leading to more precipitation and snowfall. The increased cloud cover also results in cooler daytime temperatures.



OCT-NOV-DEC 2009 Temperature Outlook

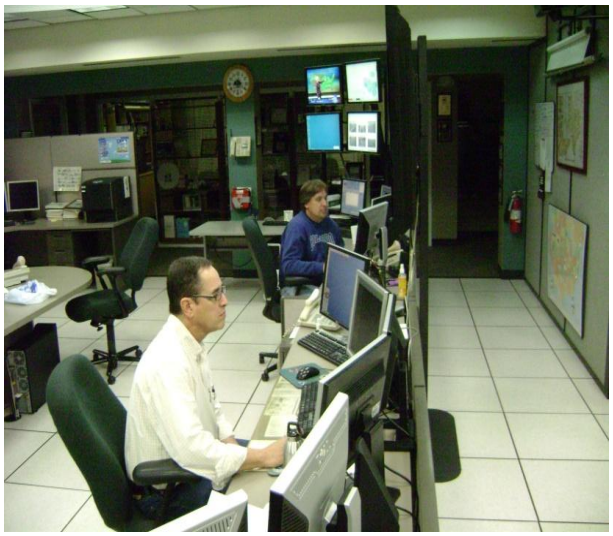


OCT-NOV-DEC 2009 Precipitation Outlook

Where Does the Forecast Come From?

By Christine Krause, General Forecaster

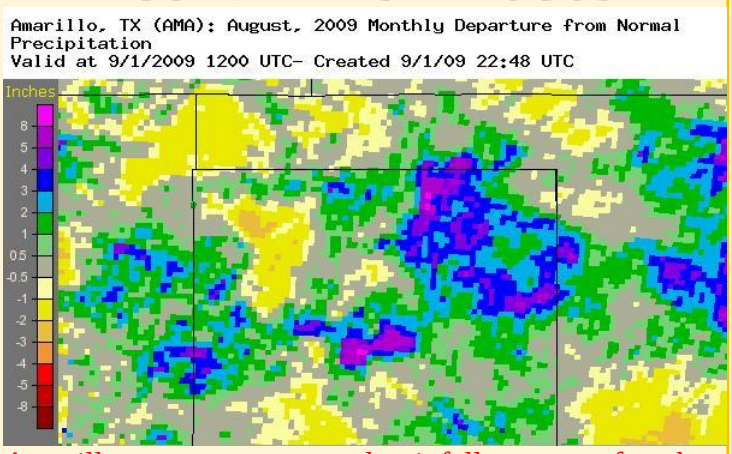
Most people are familiar with what weather forecasts and use them to prepare for the day ahead. What most people are not familiar with is the process that actually goes into creating the forecast. National Weather Service offices across the country are responsible for creating a seven day forecast twice a day and providing updates when changing weather conditions warrant. Meteorologists at the National Weather Service accomplish this by collecting quantitative data such as satellite imagery, surface and upper air observations, and radar data which reflect the current state of the atmosphere.



Senior Forecasters Lance Goehring (far) and John Cockrell (near) prepare the forecast for the Panhandles.

Meteorologists also need to predict weather conditions for the future. In order to do this, they comb through vast amounts of model data. Forecast models are used to determine weather conditions at a future time for a given location and have allowed meteorologists to vastly improve the accuracy of their forecasts over the past decade. With several forecast models to look at, meteorologists select the best model on which to base their forecast. This involves recognizing weather patterns, a knowledge of model performance, and model biases.

RECORD RAINS IN AUGUST



Amarillo set a new record rainfall amount for the month of August with 8.07 inches of rain. But the rain was very localized, as the Amarillo International Airport got hit with a few days of heavy thunderstorm rains while parts of the city remained dry. In fact, even though Amarillo set a record rainfall in August, other cities remained dry. The map above shows the departure from normal precipitation for August. The warm colors denote areas that received below normal precipitation while the cold colors indicate above normal precipitation.

Once the groundwork for a forecast has been made, a series of images are created using high-tech computer systems that depict weather elements such as maximum and minimum temperatures, dewpoints, winds, sky conditions, probability of precipitation, and type and amount of precipitation. Once the graphics are created, the meteorologist generates a series of text products, including the zone forecast product, also known as the seven day forecast. Besides the seven day forecast, meteorologists use the weather grids to create other forecasts that serve a variety of customers. For instance, fire weather forecasts are based on temperature, dewpoint, relative humidity and winds. These are important to responders at a wild fire or to officials at national or state parks. In coastal locations or areas adjacent to the Great Lakes, marine forecasts can alert mariners to gale force winds and rough seas.

DECISION SUPPORT SYMPOSIUM

The National Weather Service in Amarillo will host a Decision Support Symposium on November 3-4, 2009. It is a conference designed specifically for Emergency Management, Law Enforcement, and other disaster support services agencies to coordinate with the NWS on how to better serve the public during high impact events. Some high impact events include tornadoes, blizzards, chemical spills, terrorist attacks, or major social gatherings. For more information on this conference or to register to attend please visit our website at:

http://www.srh.noaa.gov/ama/?n=decisionsupportsymposium

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