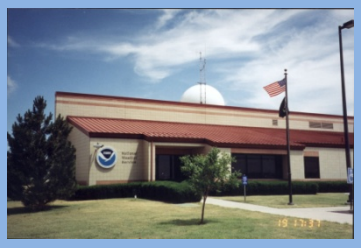

High Plains Wind

(Weather Information News Data)

May 13, 2009
Volume 3 Issue 2

National Weather Service, 920 Armory Road, Goodland, KS 67735
http://www.weather.gov/gld/ w-gld.webmaster@noaa.gov 785-899-7119

A Message from the Meteorologist-in-Charge

By Scott A. Mentzer

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"…flooding kills more people nationwide than any other weather phenomenon except for heat waves."

Flash Flood Forecasting

The mission of the National Weather Service (NWS) is to: 1) protect lives and property, and 2) enhance the national economy. Accurate weather warnings and forecasts achieve this mission. The agency also provides hydrologic forecasts and warnings to achieve the same mission. In fact, hydrologic warnings are extremely important since flooding kills more people nationwide than any other weather phenomenon except for heat waves. The national 30-year average (1978-2007) for flood fatalities is 99. That compares with a 30-year average of 62 fatalities for lightning, 54 for tornadoes, and 49 for hurricanes. Approximately one half of all flooding fatalities are vehicle related.

Most readers will be familiar with Flash Flood Warnings issued by the NWS. These warnings are issued when flooding occurs due to heavy or excessive rainfall in a short period of time, generally within six hours of the rain event. Flash Flood Warnings are also issued when a dam failure is imminent or is occurring.

Although the extreme eastern Colorado, northwest Kansas, and southwest Nebraska area is considered to be semi-arid, flash floods occur. There have been 141 flash flood events recorded in the Tri-State area between 1994 and 2007, an average of 11 per year.

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Cooperative Observer News

Unmanned Aerial Systems

This severe weather season, a new tool may be available to help those responding to natural disasters -- **U**nmanned **A**erial **S**ystems (UAS). The Federal Aviation Administration (FAA) is expected to issue a certificate allowing UASs (also known as UAVs) to be used in otherwise restricted air space in Kansas. This would allow emergency teams to gain information about disaster sites where people might be trapped without endangering the lives of the emergency response teams.

At a recent symposium in Wichita, Kansas, Adjutant General Tod Bunting stated that he envisions the day the state has unmanned aerial vehicles in every corner and region. Flying an unmanned air system takes just as much skill as flying any other type of aircraft. UAS pilots must check weather briefings, know rules and regulations, and takes care of preflight information just as if they were flying a full size traditional craft. Operators go through a preflight-checklist and makes sure their aircraft is in tip top shape before each flight.

Unmanned aerial systems come in many shapes and sizes, including those which look like helicopters or small airplanes. Some are launched from the top of a vehicle. Most are equipped with cameras and may carry other specialized equipment. UAS are becoming an important part of the aircraft industry, and more and more pilots are being trained to fly both types of aircraft.

UAS can revolutionize NOAA's ability to monitor the global environment, while increasing national security, individual safety, profits, and economic competitiveness for U.S. companies. UAS have the potential to fill critical observation gaps in climate change research, weather and water resources forecasting, ecosystem monitoring and management, and coastal mapping. These information gaps usually exist over remote and often dangerous areas, such as the Polar Regions, the mid-oceans, expansive wild lands, volcanic islands, and other remote reaches of the Earth. Manned aircraft flights are not possible in these areas due to long flight durations and hazardous conditions.

For more information about UAS please check out the NOAA UAS website at:

http://uas.noaa.gov/

Would you like to be a Phenology Reporter?

What is phenology you ask? Phenology is the study of periodic plant and animal life cycle events that are influenced by environmental changes, especially seasonal variations in temperatures and precipitation driven by weather and climate. Phenology reporting networks have been in existence for decades and many National Weather Service Cooperative Observers have participated for many years; most notably in the Western States Phenological Network and the Eastern USA Network. Wide ranges of phenomena are included, from first openings of leaf and flower buds, to insect hatchings and return of birds. Each one gives a measure of the environment as viewed by the associated organism. Thus, timings of phenological events are ideal indicators of the impact of local and global changes in weather and climate on the Earth's biosphere. The program is also an extensive effort to track the seasonal progression of various plants as well as some migratory birds and insects.

If you are a devoted nature lover, please consider sharing your time, talents and interests to help track seasonal changes. If you know of other plant and animal watchers or someone who is a devoted record keeper, please let them know about the project. The more people from more places that participate, the more and quicker scientists and participants are able to get a handle on what's going on in our world. Volunteers across the nation are being recruited to get outdoors and help track the effects of climate on seasonal changes in plant and animal behavior. Changes in patterns, caused by climate change or other factors, can significantly affect human economies and health. In some areas, such changes have already imperiled species.

The USA-National Phenology Network (USA-NPN), a consortium of government, academic and citizen-scientists, is launching a new national program built on volunteer observations of flowering, fruiting and other seasonal events. Scientists and resource

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managers will use these observations to track effects of climate change on the Earth's life-support systems. "This program is designed for people interested in participating in climate change science, not just reading about it," said USA-NPN Executive Director and U.S. Geological Survey scientist Jake Weltzin. "We encourage everyone to visit the website and then go outside and observe the marvelous cycles of plant and animal life."

The USA-NPN monitoring program harnesses the power of people and the Internet to vastly increase the data available to scientists and the public alike. The program provides easy-to-use methods to track the life cycles of nearly 200 species of plants, and will begin monitoring animals next year. Mark D. Schwartz, a professor at the University of Wisconsin-Milwaukee and chair of the USA-NPN board of directors, said "My work with lilac phenology and models has shown that by monitoring these events across large areas over time, researchers can better understand and predict global climate change impacts. Once the USA-NPN has collected enough data, we will be able to develop tools to help mitigate and adapt to ongoing and future climate change." For example, data collected by USA-NPN will help resource managers predict wildfire risk and pollen production, detect and control invasive species, monitor droughts, and assess the vulnerability of various plant and animal species to climate change.

The USA-NPN National Coordinating Office is based at The University of Arizona in Tucson. USA-NPN is built upon partnerships among citizen scientists, government agencies, non-government organizations, academic researchers, educators and the public. The rapidly expanding network includes collaborations among the U.S. Geological Survey, University of Wisconsin-Milwaukee, The University of Arizona, U.S. Fish and Wildlife Service, and The Wildlife Society.

Joy and Dick Hayden, Cooperative Observers for the National Weather Service in Goodland, participate by observing cloned lilacs furnished for the project. The lilac bushes were planted by the couple in 2008. One of the bushes, pictured above, is in Goodland's Gulick Park in the flower bed maintained by National Weather Service employees. The other is in the couple's backyard located about seven blocks away. Observation of the plants are documented and recorded on the USA-NPN to record the plant's lifecycle in 2009. If you are interested in participating, please contact the USA-NPN at http://www.usanpn.org/ and you can become a participant in this project too!

This spring...

You may soon see a small army of scientists traveling the roads and byways of Kansas, Colorado, and Nebraska as they follow developing storms over the next few weeks! A collaborative nationwide project exploring the origins, structure and evolution of tornadoes will occur from May 10 through June 13 in the central United States.

The project, **Verification of Origin of Rotation in Tornadoes EXperiment2** (VORTEX2 or V2), is the largest and most ambitious attempt to study tornadoes in history and will involve more than 50 scientists and 40 research vehicles, including 10 mobile radars.

"Data collected from V2 will help researchers understand how tornadoes form and how the large-scale environment of thunderstorms is related to tornado formation," according to Louis Wicker, research meteorologist with NOAA's National Severe Storms Laboratory and V2 co-principal investigator.

Scientists will sample the environment of supercell thunderstorms — violent thunderstorms capable of producing damaging winds, large hail, and tornadoes — that form over more than 900 miles of the central Great Plains. Areas of focus include southern South Dakota, western Iowa, eastern Colorado, Nebraska, Kansas, the Texas panhandle and western Oklahoma. The V2 Operations Center will be at the National Weather Center in Norman, Oklahoma.

The VORTEX2 teams will be looking to understand how, when and why tornadoes form. **High resolution**

(Credit: NOAA)

Preliminary results from V2 are scheduled for presentation at Penn State University during fall 2009. At that time, organizers will begin planning details of the second phase of V2 scheduled for May 1- June 15, 2010.

Supercell Thunderstorms

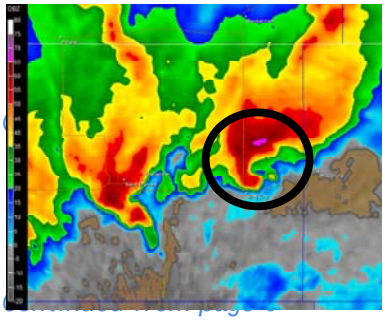
Big Storms … Big Impact

by David L. Floyd, WCM

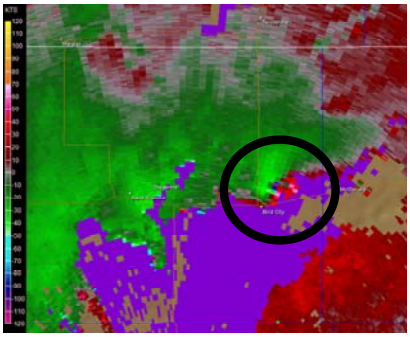
There are thunderstorms, and then there are supercell thunderstorms. As the name implies, supercells are a cut above the rest in terms of strength, organization and severity. If baseball hail, a long-track damaging tornado or a swath of 100 mph wind damage is reported, you can bet that a supercell was involved. It is estimated that approximately 100,000 thunderstorms occur each year across the United States. While supercells are not the most frequently observed storm type, they produce a disproportionate amount of damage, injuries and fatalities. The bottom line is that supercells deserve respect.

A supercell is a thunderstorm possessing a deep, persistent mesocyclone. A mesocyclone is a region of rotation within a thunderstorm, typically about 2-6 miles across. Mesocyclones are observed on Doppler radar, and the presence of a mesocyclone is often inferred by storm spotters when curved inflow bands and mid-level striations are observed, such as those seen in the photo. If environmental parameters such as wind shear and buoyancy are favorable on any given day, storms which develop will have a tendency to acquire rotation as they grow and develop, and become a supercell. Once the storm begins to rotate, other forces come into play, strengthening the storm's updraft and persistence.

The two images below show a supercell thunderstorm as viewed by Doppler radar. The left image displays radar reflectivity while the right image displays velocity.



The presence of a hook echo (left, circled) often implies storm-scale rotation. This feature has been viewed on radar displays since the late 1950s. A Doppler velocity display (right) now can confirm the presence of rotation in storms, seen as the red-next-to-green signature, circled.



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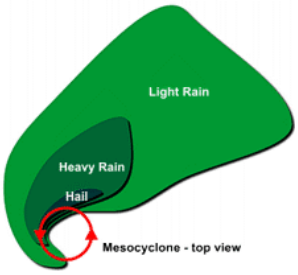
Storm spotters are taught how to recognize supercell storms, their cloud formations and to be familiar with the threat areas. The diagram (below, right) shows the typical location of the heavy rain and large hail. The mesocyclone location is shown with a red circle and is the most likely region for tornado formation. Most often, the center of storm-scale rotation is on the rear flank of the storm as shown here, but in some cases (High Precipitation Supercells) the circulation is on the forward flank.



When viewed on Doppler radar, supercells often display a deviant storm motion when compared to other non-supercell storms, veering to the right or left of the mean storm movement. In the early days of radar, it was this deviant motion which alerted radar operators that a potentially severe storm existed.

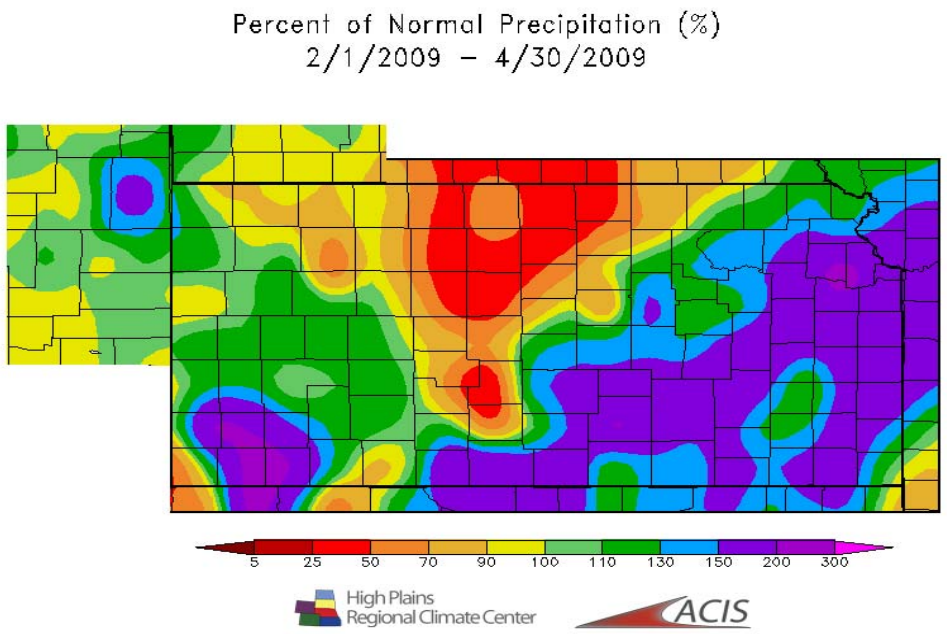
Have you heard the news?

On April 7, 2009, our Science and Operations Officer, Albert Pietrycha, was the recipient of the 2008 NOAA Bronze Medal Award - the highest honorary recognition given by the NOAA administrator - for integrating the Spotter Network into National Weather Service operations for use in tracking the location of mobile storm spotters during critical weather events. For more information on the Network check out the website at:
http://www.spotternetwork.org/

Updated Drought Outlook for Tri State Area

By Jerry Killingsworth, Meteorologist

A wet April across the Tri-State area reversed many of the rainfall deficits which had accumulated during the winter months. In particular, a soaking rainfall in the middle of the month brought 1-3 inches of much needed precipitation, with additional rain occurring at the end of the month. In total, the entire Tri State area ended the month of April with above normal precipitation, some areas as much as 3 inches above normal. As a result, dramatic improvements were made in the running 3-month percent-of-normal precipitation (February through April) which all but ended any immediate threat of drought development. Areas along and west of a Benkelman, Nebraska to Gove, Kansas line were above normal in that three month period, while areas east of that line were still below normal. However, even in those areas much improvement was made, with percent-of-normal precipitation running at least 70%. Previously, those areas had received less than 25% of normal precipitation during the first three months of 2009. However, parts of north central Kansas remain well below normal for the most recent three month period, as shown in red on the map below.



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The April release of the U.S. Drought Monitor indicated no drought development in the Tri-State area through July 2009. Areas in the Southern Plains which had been experiencing drought over the winter were also expected to improve.

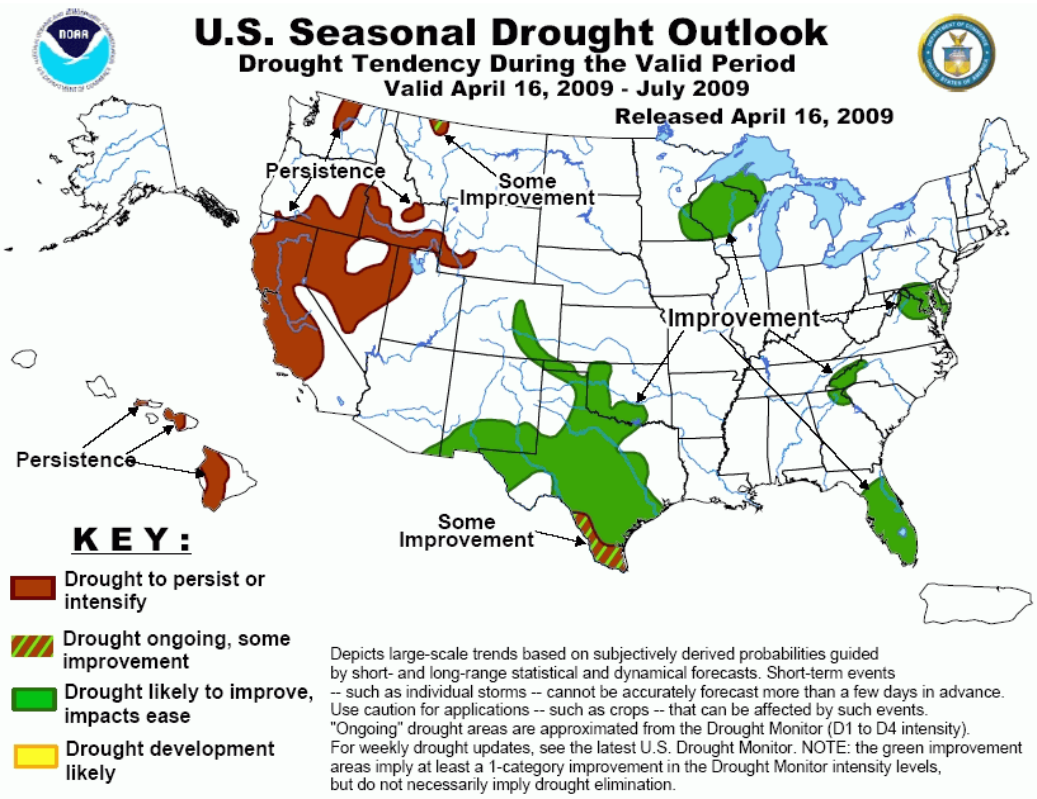

Photo by Jason Frederick

When severe weather moves into your area this spring and summer tune in to NOAA Weather Radio or click on our website for the latest watches and warnings. You can find information for your area at:

http://www.crh.noaa.gov/gld

The Challenges of Nighttime Storm Spotting

By: Scott F. Blair, General Forecaster, Topeka, KS

Nighttime storm spotting can contain some of the most difficult and dangerous tasks involved in observing storms. It is strongly recommended individuals have an advanced knowledge of storm structure and behavior before attempting to look at storms in the dark. In other words, if a storm spotter lacks experience when observing storms during the daytime, then nighttime observing should not be attempted. The following narrative is applicable to both stationary and mobile storm observers. Safety should always be the number one priority for any storm spotter, hence a safe shelter should be sought at any time dangerous weather is approaching or the situation feels unsafe.

While the time of day is generally irrelevant to storm behavior, a spotter's behavior should change at twilight. Here are a few tips to assist keeping you safe at night.

1) During the day, rapid changes in a storm's evolution can be easily observed. After sunset, the changes are much harder to see and the reaction time and 'room for error' significantly decreases. As a spotter, this means providing a larger buffer zone between you and the storm is a must. For example, satellite tornadoes can form well away from the parent tornado. As such, these can be a significant threat to an observer at a modest distance away from the main tornado, especially in the dark.

2) Clearly know your position relative to a tornado (whether Doppler-indicated or visually-confirmed). If a tornado is expected to approach your location, do NOT attempt to look for it as the storm nears. There is a good chance it will not be illumined sufficiently and precipitation may obstruct the feature.

3) Understand the natural source for illumination in the dark. Lightning flashes are typically the primary source to observe storm features at night. However, ample amounts of lightning are never guaranteed. Sometimes low-topped tornadic storms produce only a meager amount of lightning on the order of a couple flashes per hour! When sufficient lightning is present within the storm, it can be used to "backlight" the area of interest. A good concentration of lightning is usually found within the downdraft region and near the updraft's vault. By positioning *behind* the storm's predominant movement (i.e. southwest of a northeast-moving storm), one can utilize this lightning to backlight the updraft and low-level base of a storm. This also places the observer in a safer position as the storm moves away from the individual, as long as no other storms are approaching.

4) Understand the artificial sources for illumination in the dark. On rare occasions, urban areas can help illuminate the low-levels of a storm with the glow of city lights. This can be beneficial to studying low-level storm features for longer periods of time than lightning flashes provide.

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Additionally, power flashes underneath a storm's base may signify areas where wind damage is occurring. It's important to remember the presence of power flashes doesn't equate to the existence of a tornado. Straight-line winds from the rear-flank downdraft can reach over 100 mph and result in concentrated areas of wind damage. Report power flashes related to severe weather, but be careful to convey any uncertainty to the cause, unless absolutely certain.

5) Remain aware of abrupt wind direction or speed changes. Surface winds will respond to a strong updraft, especially modest low-level rotation. By understanding one's position relative to the storm, it is possible to deduce the origin or response of a sudden wind shift/gust. For instance, if the prevailing wind direction has been from the south and the winds abruptly increase in velocity from the northeast as an updraft is approaching, this is a signal that the low-level winds have been augmented as inflow is going into the storm. Understanding the surface wind relative to an observer's position can assist in keeping good situational awareness while spotting at night.

6) The dangers related to severe weather increase at night. Flash flooding gives very few warning signs in the dark. Be aware of posted low-water crossings and areas that have experienced very heavy rain, even if the precipitation has ended. If one encounters a flooded roadway, turn around and find an alternative route. Additional hazards, such as hail-covered roadways and downed power poles and tree limbs, can result in very dangerous conditions and hydroplaning. Remember to be watchful for these hazards and reduce driving speeds when entering areas where storms have recently departed.

7) In addition to the visual aspect of spotting, supplemental weather information in the form of NOAA All-Hazards Radio, television, or radar imagery can greatly assist in safe nighttime storm spotting. Have several methods to obtain severe weather information in case communication is compromised due to severe weather. This information can help better anticipate the general placement and movement of a severe storm. Keep in mind that radar imagery may be several minutes old, so do not solely rely on radar to make critical spotting decisions.

8) Lastly, when spotting storms at night, remain patient and vigilant to your observations. Between the quick lightning flashes and darkness, it's easy to jump to incorrect conclusions. What might appear as a tornado could just as easily be low-level scud clouds or a distant telephone pole. Careful observations over a couple minutes typically allow 'putting the pieces together' by using the existing environmental clues. Additionally, a storm spotter should never let their guard down in the presence of severe weather, especially at night. Following these general nighttime storm spotting tips, along with a healthy understanding of storm spotter techniques and storm behavior, should assist in keeping everyone safe. Remember, the main priority of all storm spotters is safety and it is each spotter's responsibility to ensure they remain safe at all times.

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In the photo: a tornado is illuminated by a brilliant flash of lightning. The tornado is northeast of the storm spotter, moving away from the observer.
(Photo copyright 2007 Amos Magliocco, used with permission)

Reminder for Cooperative Observers

If you have a standard 8-inch rain gauge it is time to place the inner measuring tube and funnel inside the gauge. This will make observing easier and keep moisture from evaporating.

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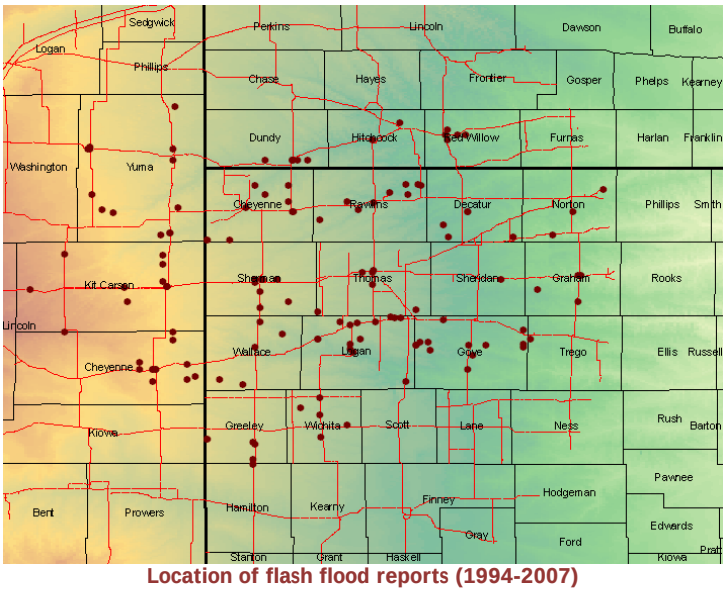
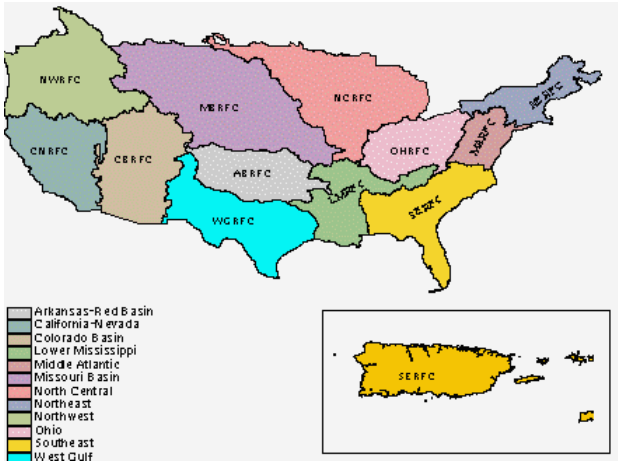


Location of flash flood reports (1994-2007)

Flash flood forecasting is complex. Before the first thunderstorms of the day even develop, NWS meteorologists use their experience to recognize patterns favorable to produce heavy rain. They then review the antecedent conditions of the ground. Finally, they collaborate with their colleagues at River Forecast Centers (RFCs) to determine how much rain would produce flash flooding. The Tri-State area is served by the Missouri River Basin River RFC located in Pleasant Hill, Missouri, and the Arkansas- Red River Basin RFC.



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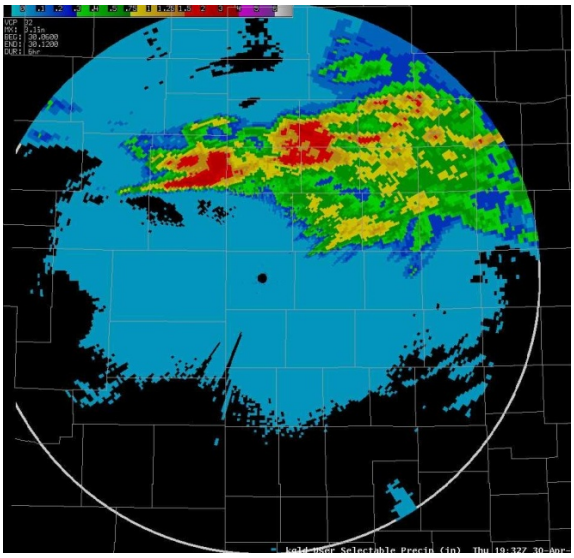
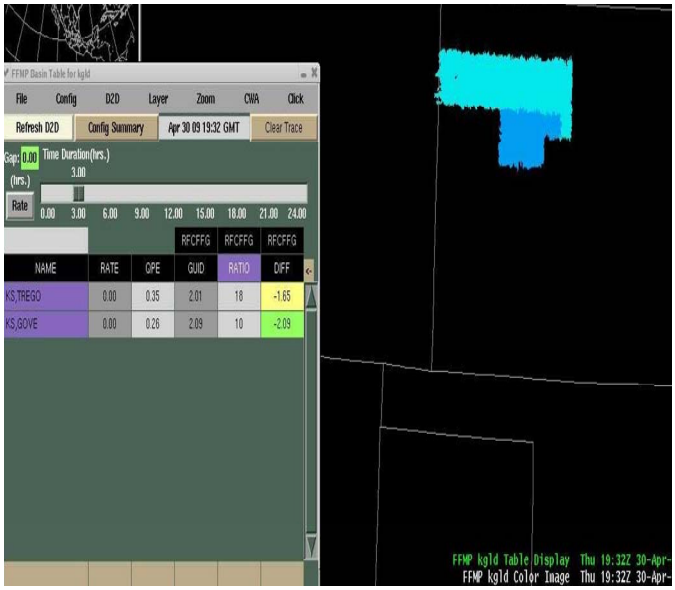


Once thunderstorms develop, meteorologists are continually monitoring how much rain is being produced as determined by the local Doppler radar. As ground truth rainfall reports are received, the radar estimates are adjusted. The adjusted amounts are then compared with flash flood thresholds to aid in the flash flood warning decision-making process.



Although the meteorologist has many tools available to assess flood potential, nothing compares with receiving actual reports of excessive rain or flooding. Be sure to report floods across the Tri-State area to the National Weather Service at 1-800-272-7811.

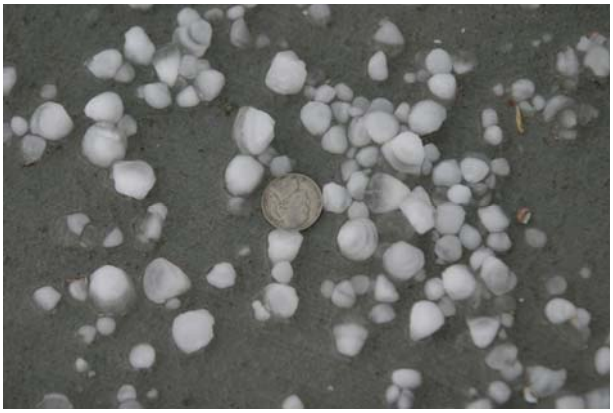


Photo by Jason Frederick

When calling in reports of hail, please remember to refer to coin size. This helps us to accurately understand the size of the hail you are receiving.

Student Volunteer Joins Goodland Staff

Ben Carr, Student Volunteer (standing on right), with other students at the AMS meeting in Phoenix, Arizona

My name is Benjamin Carr and I am a senior at Metropolitan State College of Denver. My meteorological beginnings started when I was seven while watching clouds, wind, and rain in my hometown of Tualatin, OR, a suburb of Portland. Tualatin is a pretty wet climate with about 40 inches of precipitation a year. It has warm and dry summers, with very wet and mild winters. It hardly ever snows in Portland – it would shut the city of two million down when it did!

Some events that intrigued me when I was a kid were the floods of 1996 which enveloped downtown Tualatin, and the wind and ice storms of 1998. The most snow I ever saw in Tualatin was last Christmas. It snowed 7 inches, then changed over to a half inch of freezing rain, and finally snowed another 8 inches on top of that. It was amazing. Through my fascination with weather, I decided I wanted to go into the meteorological field. I pursued a volunteer position over the summers with the National Weather Service Office in Portland during my high school years to see if I liked what they do. They were some of the friendliest people and they helped me cultivate a desire to study the weather.

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When it came time to decide where I was going to go to college for meteorology, I had a make a decision about the price, my sports of swimming and water polo, and the meteorology program. No Oregon school has meteorology as a major, so going out of state was going to be expensive. My first choice was University of Washington, so that I could stay in the Pacific Northwest, but it was going to cost me $30,000 a year. Metro State is a less expensive option, has a meteorology program with small class sizes, and had a division II swimming team when I came in 2006.

I have really liked studying meteorology at Metro State. With the small classes, you get a better education with more availability of the teachers and better friendships with classmates. I have found that meteorology is a mixture of many sciences, like physics, chemistry, and environmental science, with a major focus on math. One thing many professors and potential employers tell me is to get involved outside of the classroom. I have tried to do that by being a part of the Student Chapter of the American Meteorological Society (AMS), going to the 2009 AMS student conference, and now volunteering at the NWS Goodland Office. The AMS student conference is an event that was held in Phoenix, AZ this year. It is a great place to network with potential employers and graduate programs, look at opportunities in the meteorological field, and learn about recent research developments in the field.

It is extremely important to make yourself stand out in any way you can when you want to get a job. Good grades, weather jobs, and student club activity can all contribute to a good resume and help you get to the next step, whether that is graduate school or a career job. For me, I will be getting married at the end of May before going to get my master's degree next spring semester. I do not know where I will be getting my master's degree, but there are many options that I will start pursuing this summer. In several ways, a master's degree is becoming the norm for the meteorological field, especially with the competitive job market right now. I have immensely enjoyed learning about meteorology in my daily life and in the classroom. If it is something that you, or your children, are interested in, pursue it. It is not an easy road to take, but it is worth it. My favorite saying about this intriguing field is: weather never repeats itself.

Did you know?

In May, severe weather occurred on 33% of days across the Goodland County Warning Area during the past 5 years.

National Weather Service
920 Armory Road
Goodland, KS 67735

Phone:
785-899-7119

Fax:
785-899-3501

E-mail:
w-gld.webmaster@noaa.gov

Please don't forget, if you have pictures or video to share of any severe weather events that take place this year, please contact ***david.l.floyd@noaa.gov***

With your permission, your pictures and video will provide information and training materials for future storm spotters and meteorologists!

The National Weather Service provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community. It is accomplished by providing warnings and forecasts of hazardous weather, including thunderstorms, flooding, hurricanes, tornadoes, winter weather, tsunamis, and climate events. The NWS is the sole United States OFFICIAL voice for issuing warnings during life-threatening weather situations.