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The Rising Barometer

NATIONAL WEATHER SERVICE—CHEYENNE, WY

Bringing a Fair Look at Weather in Southeast Wyoming and the Western Nebraska Panhandle

What To Listen For This Spring & Summer

When conditions are favorable for severe weather to develop, a severe thunderstorm or tornado **WATCH** is issued. National Weather Service personnel use information from weather radar, spotters, and other sources to issue severe thunderstorm and tornado **WARNINGS** for areas where severe weather is imminent. Severe thunderstorm and tornado warnings are passed to local radio and television stations and are broadcast over local NOAA All Hazards Weather Radio stations serving the warned areas. These warnings are also relayed to local emergency management and public safety officials who can activate local warning systems to alert communities. If a tornado warning is issued for your area or the sky becomes threatening, move to your pre-designated place of safety.

TORNADO WATCH: Tornadoes are possible in your area. Remain alert for approaching storms. Know what counties are in the watch area by listening to NOAA All Hazards Weather Radio or your local radio or television outlets.

SEVERE THUNDERSTORM WATCH: Tells you when and where severe thunderstorms are likely to occur. Watch the sky and stay tuned to know when warnings are issued.

TORNADO WARNING: A tornado has been sighted or indicated by weather radar.

SEVERE THUNDERSTORM WARNING: Issued when severe weather has been reported by spotters or indicated by radar.

Warnings indicate imminent danger to life and property to those in the path of the storm.

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SkyWarn Spotters

Scott J. Carpenter, Lead Forecaster

If you are an FCC licensed operator, one of the most efficient ways to submit a severe weather report is through Amateur Radio. Across Southeast Wyoming and the western Nebraska panhandle, Skywarn spotters provide exceptional detailed and timely information about on-going severe weather events to the forecast staff at the National Weather Service Forecast Office in Cheyenne. The NWS is grateful to the SHY-WY Skywarn team for their numerous hours spent manning the radio equipment at the

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Storm Based Warnings

John Griffith, Warning Coordination Meteorologist

The National Weather Service (NWS) mission is defined as the provision of weather forecasts and warnings for the protection of life and property and the provision of weather information for the Nation's economic well-being.

Beginning last October, the NWS implemented Storm-Based Warnings. Prior to this time, warnings were issued and disseminated using geopolitical boundaries. Storm-Based Warnings show the specific meteorological or hydrological threat area and are not restricted to geopolitical boundaries. By focusing on the true threat area, warning polygons will improve NWS warning accuracy and quality. Storm-Based Warnings will promote improved graphical warning displays, and in partnership with the private sector, support a wider warning distribution through cell phone alerts, pagers, web-enabled Personal Data Assistants (PDA) etc.

President George W. Bush participates in a briefing at the Emergency Operations Center in Greensburg, Kansas, during his visit to the tornado-ravaged area.

Storm-Based Warnings will reduce the false alarm area by having less total area covered by the warning. This has been described as a "Blue Sky" warning when the warning only threatens one portion of the county while the remainder of the county has no threat of severe weather. One study conducted in 2004, showed that Storm-Based Warnings would have reduced the total warning area by 22,

Continued on Page 3

Do You Measure Your Rainfall or Snowfall Daily?

Mike Weiland, Lead Forecaster

If this sounds like you, then you definitely have a big interest in weather. Perhaps there is a program that might be of interest to you and you may have heard of it. It is called the Community Collaborative Rain and Hail Study, or CoCoRahs for short. It is a nationwide effort to get a detailed daily network of volunteer reports. It is easy, interesting and fun. What is nice is that it helps researchers and water managers as well allowing you to see your daily rain or snow information plotted on a map. If this program sounds like something you'd like to do, check out their webpage at www.cocorahs.org, or call Mike at 772-2468 extension 516.

SkyWarn Spotters (continued from Page 1)

forecast office during hazardous weather events. This "live" information about storm structure and other visual aspects of thunderstorms can then be combined with over 150 years of forecast experience at the forecast office in Cheyenne to make the most accurate decisions about whether or not the storms will become severe and whether or not to warn the public.

If you are an amateur radio operator in southeast Wyoming or the western Nebraska panhandle, please be aware of the appropriate frequencies that will be monitored during severe weather or potential severe weather events. In southeast Wyoming, please use 146.775 MHz or 147.105 MHz and in the western Nebraska panhandle, please use 147.165 MHz

Your accurate and timely reports play a significant role in assisting the NWS forecasters in completing our mission to protect your lives and property.

Electronic Spotter (e-Spotter)

John Griffith, Warning Coordination Meteorologist

E-Spotter is a system to facilitate the submission of spotter reports online. The system is designed to enhance and increase timely and accurate online spotter reporting and communications between spotters and the NWS Cheyenne office. The use of the system is currently available for trained spotters and emergency managers.

To register as an e-Spotter, you must attend a spotter training class. After completing the training, go to our web page (www.weather.gov/cheyenne) and in the upper left hand corner under "Current Hazards" click on "Watches/Warnings". On the next page, under the map, you will see a section called "Local links", there you can click on "E-Spotter". The next step will be to click on the "Register Here" on the next page. From there follow the instructions. Once you are done, a request will be sent to WFO Cheyenne. When it is confirmed that you have completed spotter training, you will be given permission to submit your spotter reports electronically and you will receive an email informing you that you are registered.

The process is simple and should only take a few minutes. If you have any problems registering as an e-Spotter, you should contact John Griffith at (307)-772-2468 extension 726 for assistance.

What you should report:	
Tornado	Either on the ground or a funnel cloud aloft
Heavy Rain	A **half an inch or more**, if it fell in less than an hour
Hail	**Small Hail** (1/4 inch) or larger
High Wind	Estimated or measured **40 mph or greater**
Flooding	**Any** kind of flooding
Snow	**Two inches** or more (5 inches or more if above 7000 ft.)
Visibility	**Less than one mile** for any reason (fog, dust, snow)
Death/Injury	**Any** weather-related reason
Damage	**Any** weather-related reason (most often from wind)
Earthquake	**Any** tremor

When you spot severe weather, give us a call! As a trained spotter, you are the eyes and ears of the National Weather Service.

1-800-269-6220

Storm Based Warnings (continued from Page 2)

490 square miles and 242 towns would have been needlessly warned.

The NWS issues warnings not only to protect life and property, but also to provide critical weather information to public decision makers. Public officials such as emergency managers, city mayors, and county executives have to the authority and responsibility to evacuate or direct recovery and relief resources to areas impacted by hazardous weather. Storm-Based Warnings will allow these decision makers to make more informed decisions.

There are still challenges though with Storm-Based Warnings. The biggest challenge is dissemination technology. NOAA All Hazards Weather Radio and Emergency Alert System (EAS) activation and many tornado siren systems are based on the whole county warning standard. It will take several years for a complete transition.

With Storm-Based Warnings it will be possible to have more than one warning in effect at one time for a county. When there are multiple warnings over the same county, there is potential for confusion.

The bottom line is that Storm-Based Warnings will save lives. Citizens will be more likely to take cover during warnings when they perceive a reduction in false alarms. Storm-Based Warnings will save our country money. Businesses will shut down less often with finer resolution warnings.

NOAA All-Hazards Radio Frequencies

Cheyenne/Laramie.....162.550 MHz

Rawlins.....162.425 MHz

Douglas/Torrington.....162.450 MHz

Scottsbluff.....162.475 MHz

What Happens When You Report Severe Weather?

Mike Weiland, Lead Forecaster

First of all, your reports of significant weather are always appreciated and very valuable. If you are uncertain about whether to call information into our office, go ahead and call as it is likely new information to us and will be useful! As a reminder, our phone number is 800-269-6220 extension 782, or just 772-2227 within Laramie County. We are here 24 hours a day, 7 days a week.

Our main responsibility to the people of southeast Wyoming and the western Nebraska panhandle is to provide timely information on hazardous weather in the area and to protect life and property. We do our best for you and part of the information cycle is the reports of weather that you call or send in to us.

When you call or send in a report of weather to us, remember that we are keeping an eye on your storm with our radar at our office. We have a fairly good idea of what might be happening under that storm, but we do not actually know until we hear from you. The information that you provide is used in warnings and other information and it will help your neighbors and others in the area. Your part of the severe weather information cycle is vital!

Hail Size Estimates

(Size stated in inches)

0.25 ~ Small Hail

0.50 ~ Dime

0.75 ~ Penny

1.00 ~ Quarter

1.25 ~ Half Dollar

1.50 ~ Ping Pong Ball

1.75 ~ Golf Ball

2.00 ~ Lime

2.50 ~ Tennis Ball

When your call or your message is received, a meteorologist will record the information and your location. They will then assign that information to the particular storm. The information is then sent out to the media very soon after you call in and also is placed on our web page (www.weather.gov/cys). The information also is sent immediately to the Storm Prediction Center in Norman, OK (they are the severe weather experts and advise us of storm potential). If your report was of severe weather, and we didn't as of yet have a warning on that particular storm, your information will make it necessary to generate a warning for your area (usually within 1 minute). The report that you call in as well as your location will be noted in warnings and other information that we issue (this does not include your name, etc.).

If it is a long duration storm, or flooding, we may call you back several times or you may call us to keep us posted. This new information will also be distributed to the media, SPC and our web site and may make it necessary to generate additional warnings or products. There are probably some storms that may not appear to be strong enough to produce severe weather, that actually do and are missed in warnings and other information that is sent out from this office.

Bottom line is that your simple call is very important to us and if you watch the TV, listen to the radio or look at our web site, you may notice your location and report. Some people in the past have taken a digital picture of an event and then sent it to us. This is also very helpful and we may put it on our website as well. In one instance last year, a very nice picture of a tornado was sent to the Weather Channel and they placed it on TV for the next day or two.

Tornado Look-Alikes

Jim Hatten, Lead Forecaster

An estimated 100,000 thunderstorms occur each year in the United States. Of those, about 10 percent are classified as severe thunderstorms with only a little more than 1 percent of them (roughly 1200) being "tornadic". While Doppler weather radar has definitely aided in the detection of tornadic thunderstorms, ground truth is still most helpful. A big challenge in spotting a tornado is determining whether you are indeed seeing the real thing or just a tornado look-alike. There are several cloud types and other features that can be misinterpreted as a tornado and some of them are discussed here. Two main things to remember being present with a tornado are rotation about a vertical axis and a debris cloud near the ground. A tornado must also have a parent thunderstorm or at least a cumuliform type (thunderstorm precursor) clouds. Scud clouds (Figure 1) are probably the most often mistaken for tornadoes. These are small, detached, wind-torn clouds that form near the lower levels of thunderstorms. These clouds can change shape rapidly, sometimes briefly taking on the appearance of a wall cloud or funnel cloud. The key item with these clouds is that they remain detached from the

Figure 1 - Example of a Scud Cloud

Tornado Look-Alikes

thunderstorm whereas wall clouds and funnel clouds are attached to the storm and rotating.

Rain shafts and virga (which is rain evaporating before it reaches the ground) can give the appearance of a tornado, especially if they are dark and in the distance

Figure 2 - Example of a Distant Rain Shaft

(Figure 2). The thing to remember here though is that neither of these will be rotating.

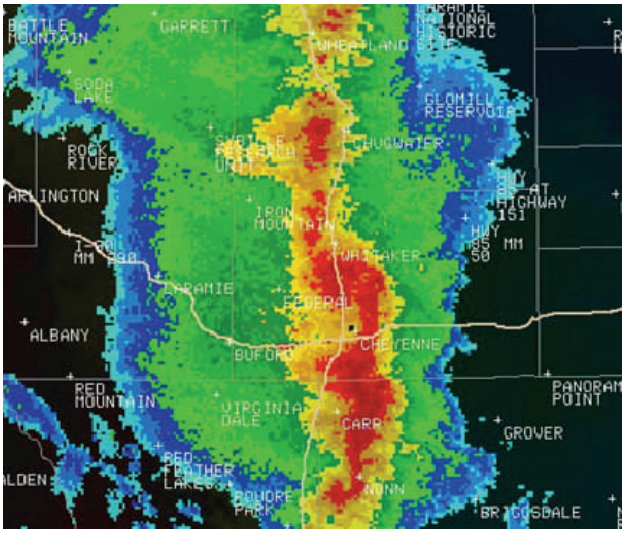
Roll clouds and shelf clouds both have an ominous appearance. Roll clouds form due to the cool air outflow along the gust front of a thunderstorm and will sometimes exhibit a horizontal rotation (not vertical). Shelf clouds develop from a similar process but they take on more of a wedge shape. While there will usually be a considerable amount of turbulent motion near the base of a shelf cloud, persistent organized rotation is not seen.

A column of smoke being drawn into the updraft of a thunderstorm (Figure 3) may also give the appearance of a tornado, but with closer inspection in time and proximity, rotation is not seen. Finally, jet contrails can sometimes look gray and tubular when the sun goes behind other clouds, but clearly these are not attached nor associated with any parent thunderstorm.

Figure 3 - Example of Distant Smoke Column

Severe Weather and You!

Melissa Goering, Science and Operations Officer



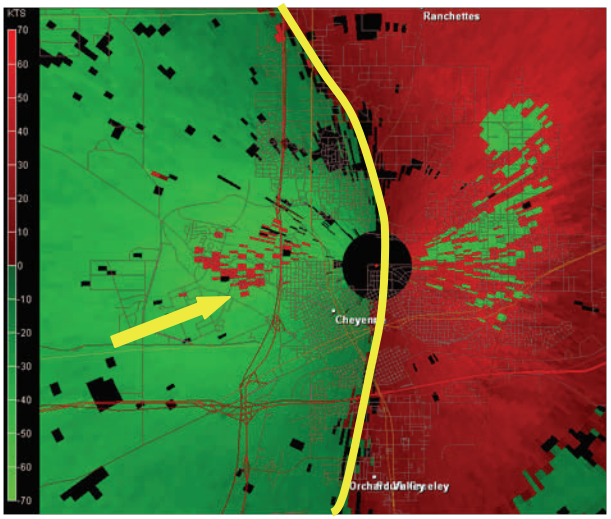
May 3rd, 2007 - Line of Severe Thunderstorms Move Through Southeast WY/Nebraska Panhandle

Severe weather season is approaching quickly and your National Weather Service in Cheyenne, WY will be utilizing new three-dimensional applications to help visualize storm structure and identify severe thunderstorm characteristics this year. Although the new technology will be very useful, our trained weather spotters (YOU) are extremely important to the NWS by providing detailed and accurate reports of severe weather occurring in your area. Here is a brief summary from a couple severe weather events from 2007 in which your spotter reports helped significantly.

On the morning of the 3rd, the Storm Prediction Center (SPC) stated that there was a slight risk of severe thunderstorms in the afternoon and early evening across western Wyoming and the Nebraska panhandle in their Day 1 Outlook product (http://www.spc.noaa.gov/) with the main threat of hail and damaging winds. The Cheyenne Weather Fore-

cast Office (WFO) updated the Hazardous Weather Outlook product in the morning (http://www.crh.noaa.gov/cys/) to also include winds in excess of 60 mph and large hail for mainly areas east of the Laramie Range due to existing severe weather parameters (ie. upper level system moving across Wyoming and 60 knot mid level jet to provide lift and ample moisture with dew point temperatures in the low to mid 40s).

Storms developed at 3 pm MDT over Converse County along the cold front and as the system moved east, a squall line developed from Platte into Laramie County by 5 pm MDT. Trained spotter reports started to pour into the Cheyenne WFO of strong winds and hail ranging from pea to penny size in diameter. By 530 pm MDT, there were several reports of hail, strong winds, and wind damage reported by law enforcement and trained spotters with the line of thunderstorms well east of Cheyenne by 6 pm MDT. Some of the damage included 12 train cars being derailed on the west side of Cheyenne, streets being closed due to debris and downed power poles on Nationway Road, and many large trees uprooted. The Cheyenne Airport recorded 62 mph winds at 531 pm MDT.



May 3rd, 2007 - Base velocity at 0.8 degree tilt at 530 pm (Green indicated inbound winds and red indicated outbound winds). Arrow points to winds in excess 55 knots (63 mph).

GR2Analyst is a new application that will allow forecasters to examine storm structure in a three-dimensional view. The three-dimensional view of reflectivity as the squall line that moved through Cheyenne at 547 pm MDT (figure 4). These thunderstorms also produced a

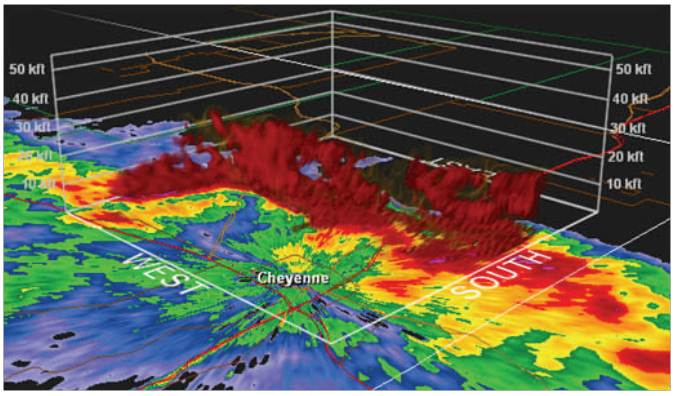


Figure 4 - GR2Analyst software shows the three-dimensional view of the line of the thunderstorms moving east of Cheyenne, WY at 547 pm. The red colors indicate greater than 50dBz reflectivity returns at nearly 25000 feet.

tornado on the southern edge of the squall line in northeast Colorado at 611 pm MDT.

On the morning of the 27th, the Storm Prediction Center (SPC) forecasted a slight risk of severe thunderstorms in the afternoon across far western portions of the Nebraska panhandle in their Day 1 Outlook product. The potential was for only isolated supercells to develop given the weak upper level disturbance moving across northern Colorado that would provide lift and moisture with dew point temperatures in the 50s.

An isolated supercell (figure 5) developed about 320 pm MDT over Cheyenne County in Nebraska. Given the limita-

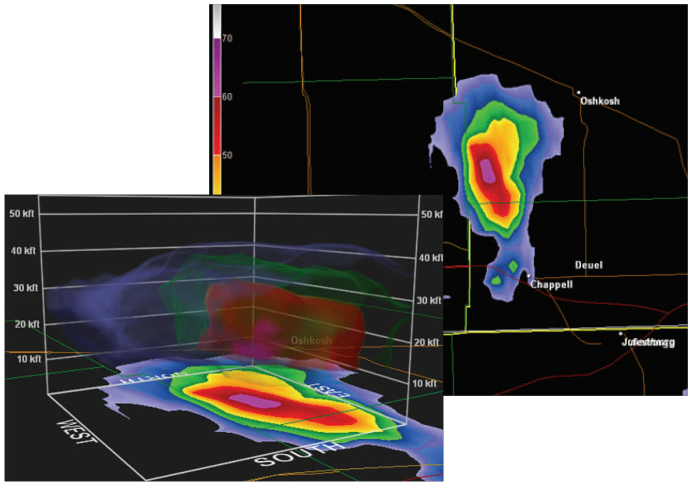


Figure 5 - GR2Analyst software shows the reflectivity at 335 pm on May 27, 2007 a) at the 0.5 degree tilt with 63dBz located at 12000 feet and b) the three-dimensional view of the storm with reflectivity values exceeding 50dBz above 25000 feet.

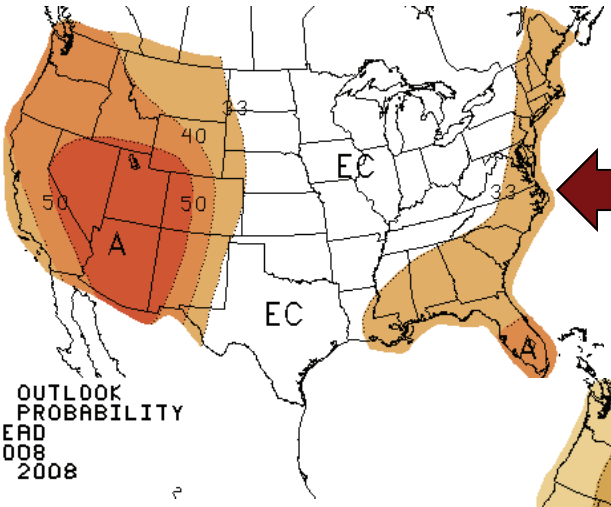
Severe Weather and You!

tion of the distance with the WSR-88D Radar, the lowest tilt (0.5 deg) beam was only showing the structure of the storm at 12 Kft and above, meaning that any structure of the storm below 12 Kft is unknown. Although it appears that the severe thunderstorm is located in Duel County, the tornado was on the ground at 335pm MDT and just inside Cheyenne County, Nebraska. A trained spotter called into the NWS that the tornado was located 5 miles north of Lodgepole and was producing dime to nickel size hail. After the survey assessment of the damage, the tornado was found to be an EF-1 category with wind values ranging from 86 to 109 mph.

An EF-1 tornado formed five miles north of Lodgepole in Cheyenne County, Nebraska on May 27, 2007 at 2131 UTC with a) the tornado located near Kristina Bond's house (photo provided by Kristina Bond) and b) damage of a barn by the tornado taken on May 28, 2007.

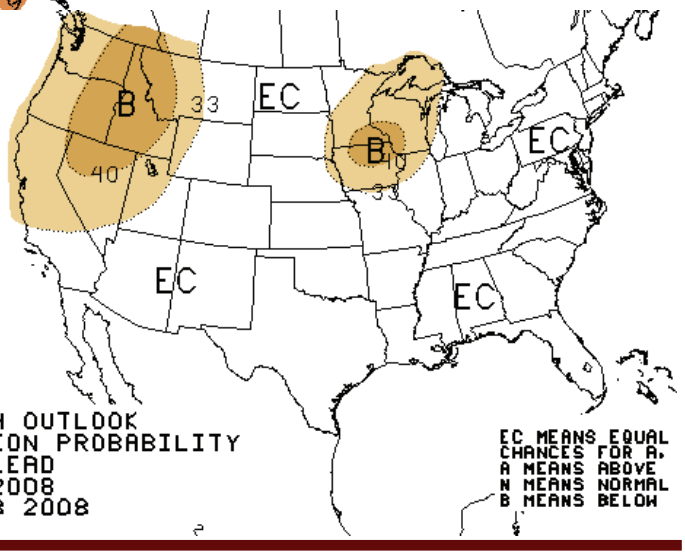
Although we welcome any severe weather pictures and reports, **YOUR safety MUST be first priority**!

Summer Outlook



The temperature outlook for Summer 2008 indicates better chances for warmer than normal temperatures across the West, including southeast Wyoming and the western Nebraska Panhandle.

The precipitation outlook for Summer 2008 calls for better chances for below normal precipitation for the Pacific Northwest & Upper Mississippi Valley. Equal chances of above , below, or near normal precipitation exist for central portions of the country.



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Thanks From All of us at National Weather Service - Cheyenne!!!

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