Summer 2006

The Rising Barometer

Bringing you a fair look at weather in southeast Wyoming and the western Nebraska panhandle

Issue number 4

Welcome to the fourth edition of The Rising Barometer. Inside you'll find various articles written by employees of the National Weather Service office in Cheyenne. If you have an idea for subject material you would be interested in hearing about, please e-mail the editor at ken.pomeroy@noaa.gov. If you need to submit a change of address or other contact information, please contact Mike Weiland at 307-772-2468, or by e-mail at michael.weiland@noaa.gov. I hope you enjoy this edition of The Rising Barometer, and all of the employees of NWS Cheyenne look forward to working with our indispensable spotters and observers during the upcoming severe weather season.

- Ken Pomeroy, editor

The NWS office in Cheyenne, Wyoming

My First Day on the Job

Jim Hatten

Although there certainly is some excitement in changing to a new job, many people end up finding out that their first day at work is either slightly boring or at least uninspiring. Mine, however, will forever live in infamy as it was July 16, 1979.

The tornado that struck Cheyenne on July 16, 1979 (courtesy Southeast Wyoming Skywarn.)

I had just arrived in Cheyenne a little over a week earlier, fresh from the University of Oklahoma to start my position as a Meteorological Intern with the National Weather Service. Ironically enough, one of the items in my welcoming packet from the Meteorologist In Charge then, Robert Beebe, was a climatological summary of the weather in Wyoming which began with the words..."A tornado is a rare event in Wyoming." While that statement is (still) true for the state as a whole, it would not hold up in the Cheyenne area that afternoon.

When I got to work the morning of July 16th, I was given a brief tour of the facilities and then sent to the area of the building where all of the teletype machines were, as that was where I would be working for a few months. Since training on the teletype machines was fairly simple, and knowing that thunderstorms developed nearly every afternoon along the Front Range, I decided to keep an eye on the sky as much as possible that afternoon as the air mass was rather moist and unstable.

Another image of the Cheyenne tornado

To my surprise, one of the first thunderstorms to form that afternoon soon appeared to be rotating slightly on its southwest flank. I immediately went outside to get a better view of things, and couldn't help but notice a very dark swirl on and just above the ground (almost like smoke from a fire) west of the office. It should be noted here that the observer on duty had told me on my way out the door that someone from the Cheyenne Airport Tower had called, saying that a dust devil was about to move over the air field.

A quick glance up to the base of the thunderstorm revealed that this was no dust devil as a funnel was hanging down. Indeed, this was a tornado that was not quite totally connected yet! Upon hearing my excitement (and maybe an expletive or two), most of my new co-workers came outside, and shortly thereafter one of them issued a tornado warning.

Over the next 20 minutes or so, I was able to watch this tornado in its entire cycle from as

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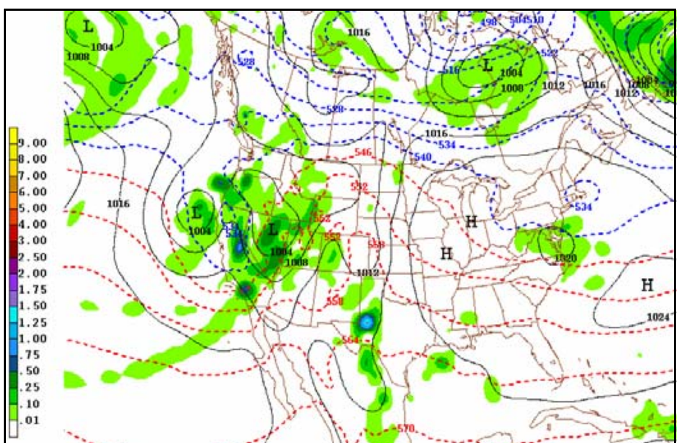
Models, Inc.

Mike Weiland

Every day, meteorologists use computer models of the atmosphere to help them make their forecast. You may have heard of models before as they are currently used widely in many professions. Models help develop aerodynamic aircraft and other machines, predict sales of products, help plan warfare strategies and even help predict college basketball outcomes. Models have become much more common over the last 10 or 20 years as computer power has increased.

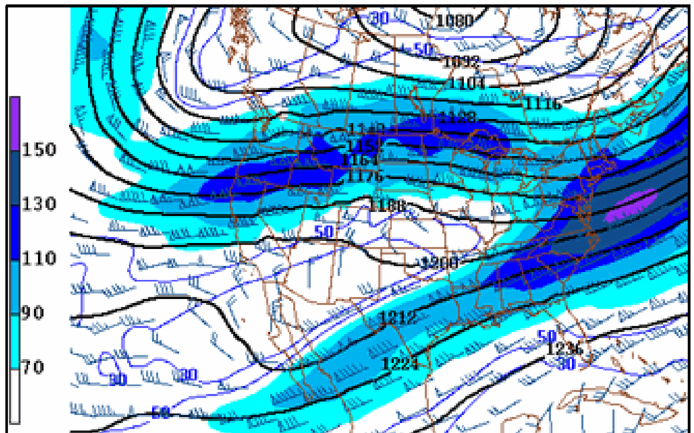
Using mathematical equations, the computer can come up with an outcome. It has proven to be a tremendous help as the user can look at outcomes in a safe environment. With changes to the input, such as soil moisture (in the case of weather) a scientist can see how changes in one variable can alter the outcome. For example, in the summer, by altering something like soil moisture in the equations, different amounts and locations of thunderstorms will develop in the outcome of the computer model. It is not only an excellent way to help in the understanding of a topic, a model is also very useful for a meteorologist to help see what might take place in the future.



Model output indicating forecast precipitation and surface pressure

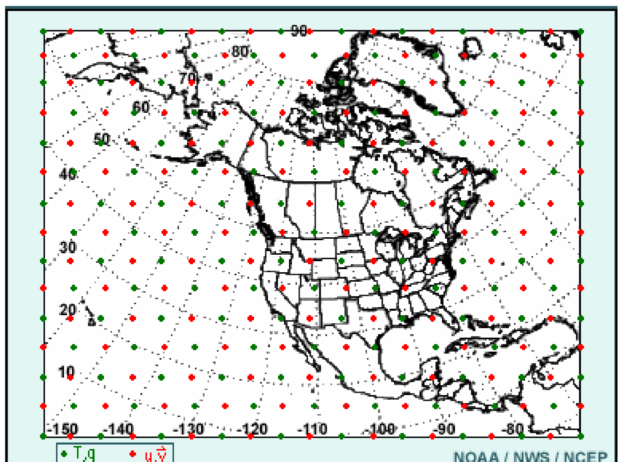
Models for weather forecasting were originally developed in the 1940s and were one of the first uses of computers. Equations that govern air motion were used by the early models to create a basic forecast using some actual current information. The early computer models were simple, but because of the primitive computers at that time, took many hours to run.

Weather models have come a long way since then, and now some of the world's fastest computers are used to run them. The speedy computers are needed to perform the billions of calculations to come up with a model's picture of the upcoming weather.



This is the model output showing the wind speed in the upper atmosphere. This allows a forecaster to see where the all-important jet stream is forecast to be.

Just how does the computer simulate the atmosphere? Well, the earth is divided up into grid points at a certain distance apart. Each point also has a number of points above it at certain levels of the atmosphere. Observed data is applied to each point and is then ingested into the computer model. The computer then grinds out the calculations to come up with the forecast.



Dots represent the grid points in the "Eta" model.

Models are run at least twice a day using the latest information gathered from each grid point. Some models can make a forecast of the atmosphere for out to 2 weeks (generally for the entire globe) and others for only 12 hours (a much smaller area). There are even climate models that are run out for hundreds of years. In general,

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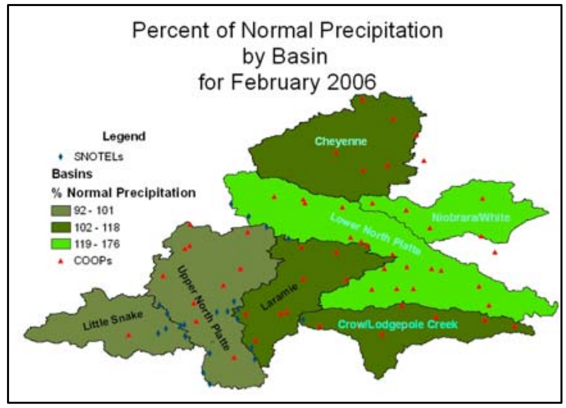
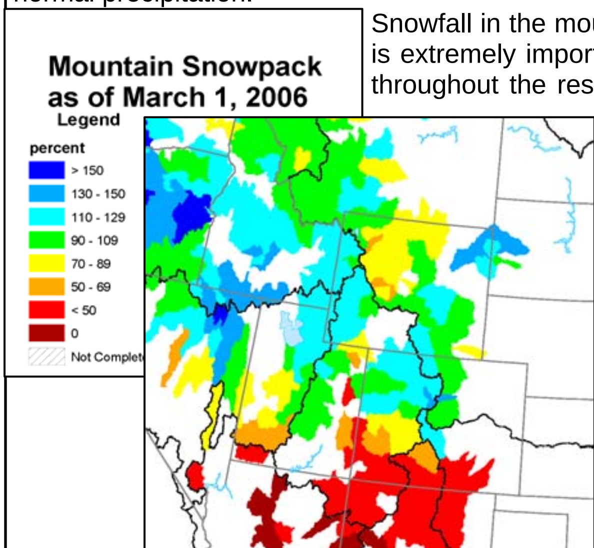
HYDRO REPORT

Melissa Goering

Although January precipitation for the Little Snake, Upper North Platte and Lower Platte River basins was near to just above normal, all other major watersheds within southeast Wyoming received well below normal precipitation totals (39 to 79% of normal). However, February precipitation (right) indicated all river basins received near normal to much above normal precipitation during February. The Niobrara/White drainage received 176% of normal precipitation during the month. The total water year for 2006 shows the Little Snake to be 121%, the Lower North Platte to be 114%, and the Upper North Platte to be 123% of normal precipitation.





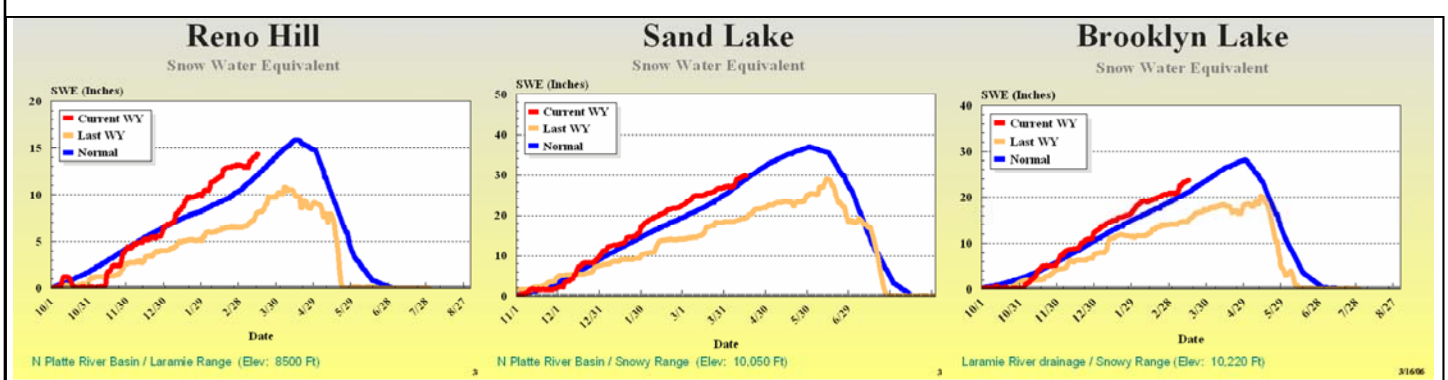
Snowfall in the mountains during the winter is extremely important as it provides water throughout the rest of the year. Thus, it is also important to know how much snow, or snow water equivalent (SWE), there is to prepare for the spring flood season. The USDA Natural Resources Conservation Service shows the mountain snowpack as of March 1st (left) as a percent of normal SWE. For southeast Wyoming, the SWE's mainly ranged from 90 to 120% or near normal to slightly above normal snowpack.

The Colorado and Missouri River Basin Forecast Centers run a model in February and March to get a forecasted volume for spring runoff. The March values are summarized below for the major rivers and streams. These values represent an average to above average spring runoff volume for southeast Wyoming. Thus, there may be minor spring snowmelt flooding expected along the Upper North Platte, Laramie, and the Little Snake River basins.

Forecasted Stream Flows

Stream and Station	*Period*	*Volume 1000 AF*	*Forecast % of Avg*
North Platte River			
Northgate	Apr-Sep	310	115
Seminoe Reservoir	Apr-Sep	1000	116
Glendo	Apr-Sep	1160	117
Guernsey Reservoir	Apr-Sep	1350	134
Alcova to Orin	Apr-Sep		
Rock Creek			
Arlington	Apr-Sep	66	116
La Prele Creek			
La Prele Reservoir	Apr-Sep	18.6	78

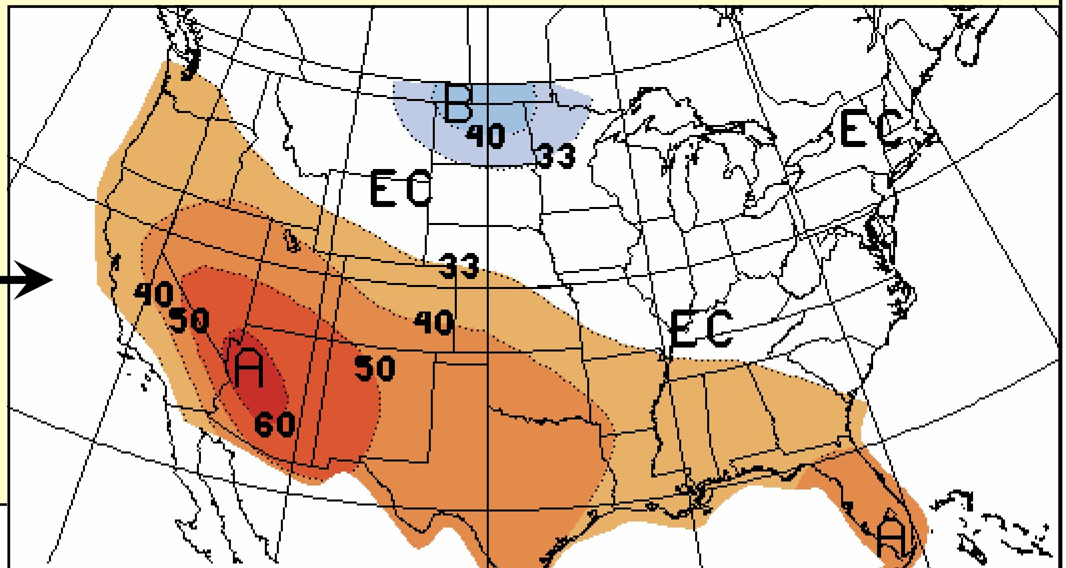
Stream and Station	*Period*	*Volume 1000 AF*	*Forecast % of Avg*
Encampment River			
Encampment	Apr-Sep	220	133
Laramie River			
Woods Landing	Apr-Sep	155	115
Little Laramie River			
Filamore	Apr-Sep	72	113
Little Snake River			
Slater	Apr-Jul	185	116
Dixon	Apr-Jul	380	115

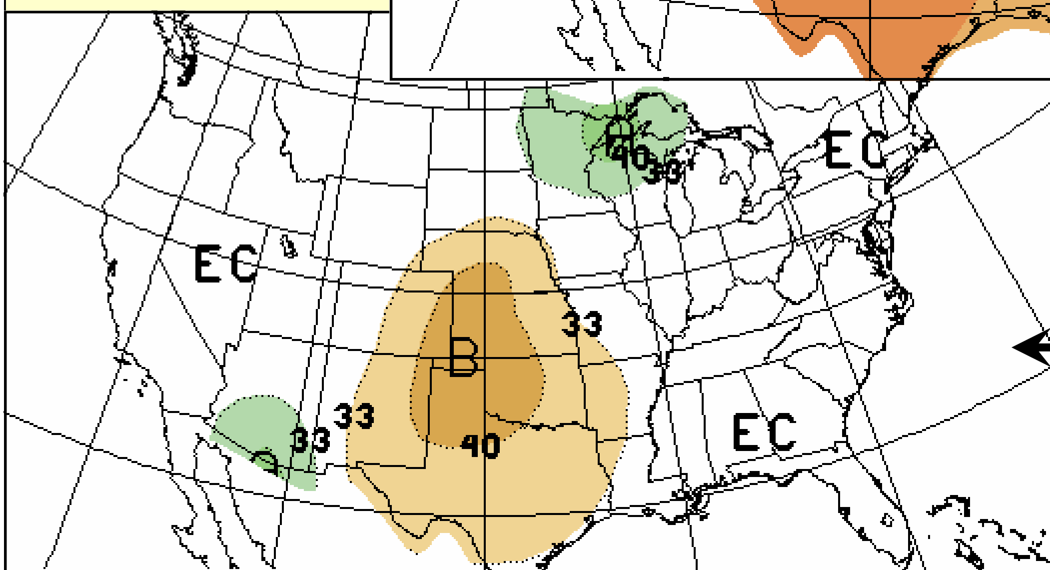


Snow Water Equivalent for the current water year in the Snowy and Laramie Ranges

THE LONG-RANGE FORECAST

The temperature outlook for May through July calls for a high likelihood of warmer than normal temperatures across the southern U.S. but equal chances of above and below normal temperatures across most of Wyoming and Nebraska





The precipitation outlook for May through July calls for a high likelihood of drier than normal temperatures across the south central plains, including Nebraska, but equal chances of above and below normal precipitation across most of Wyoming.

Meteorological Calendar

May 10 - Average date of last freeze at Scottsbluff.
May 11 - Average date of last freeze at Chadron.
May 18 - Average date of last freeze at Cheyenne.
June 14 - Latest freeze on record in Scottsbluff and Chadron (1969)
June 19 - Latest freeze on record in Cheyenne (1876)
June 21 - The summer solstice, start of astronomical summer. (6:26 AM)
July 23-July 27 - The warmest normal high temperatures across the area (Cheyenne, 83 F; Scottsbluff 90 F; Chadron 90 F)
September 22 - The autumnal equinox, start of astronomical fall. (10:03 AM)
September 24 - Average date of first freeze in Cheyenne.
September 25 - Average date of first freeze in Scottsbluff.
September 28 - Average date of first freeze in Chadron.

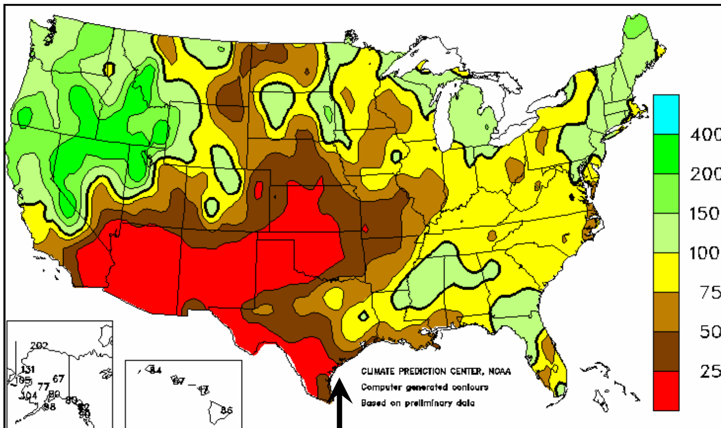
NOAA Weather Radio Frequencies

Cheyenne/Laramie..................162.550 MHz
Rawlins....................................162.425 MHz
Douglas/Torrington..................162.450 MHz
Scottsbluff................................162.475 MHz
Chadron....................................162.525 MHz
Sidney.......................................162.500 MHz

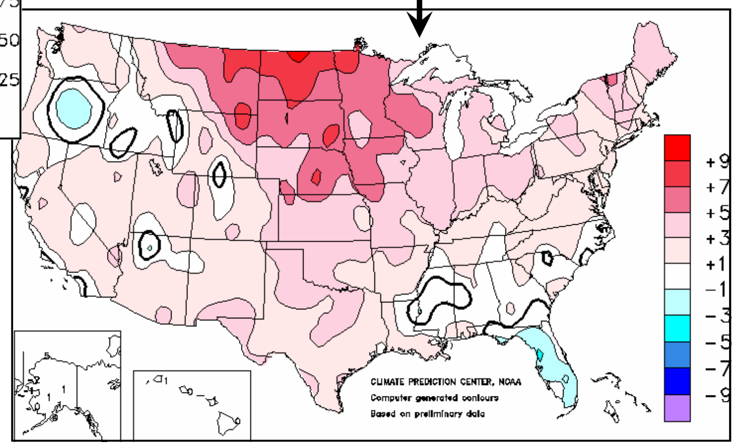
Rank these cities by how much possible sunshine they see annually: Scottsbluff, Nebraska; Yuma, Arizona; Boston Mass; Seattle, Washington.
[See page 6 for the answer!]

Visit our website:

http://weather.gov/cheyenne

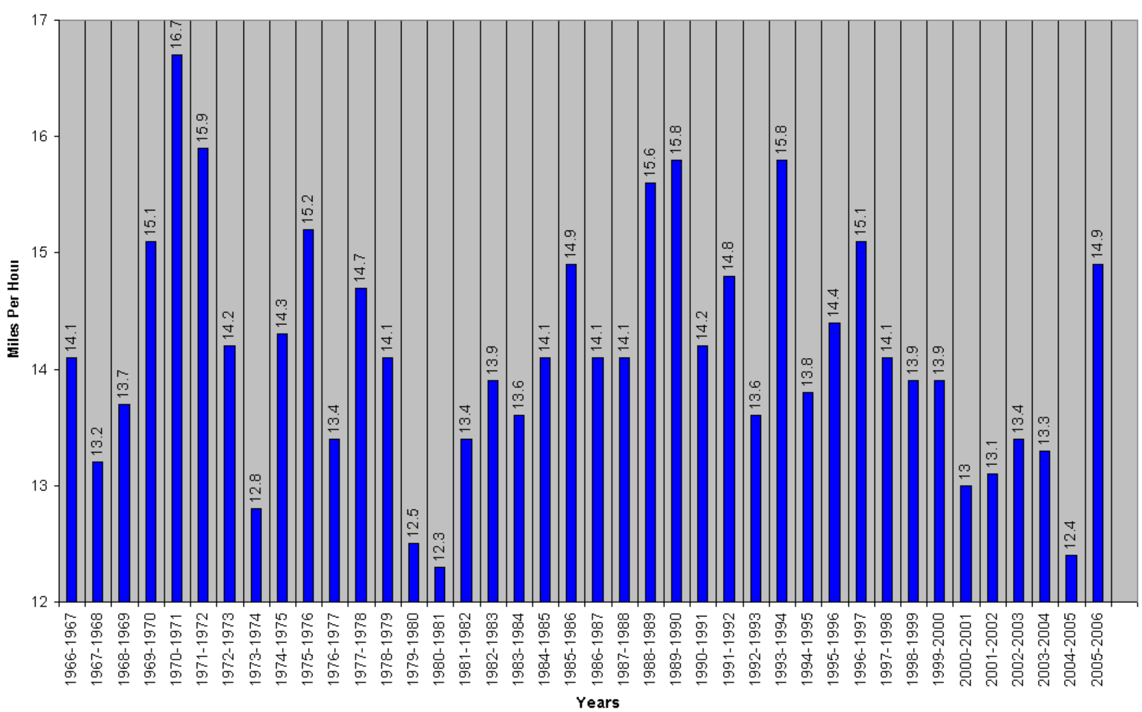


Average temperature departure from December through January. Southeast Wyoming and western Nebraska was warmer than normal.



Total precipitation departure from December through February. Southeast Wyoming and western Nebraska were drier than normal, but the mountains of southeast Wyoming were wetter than normal.

Climate Corner



It was definitely a windy winter across southeast Wyoming and western Nebraska. As you can see from the graph to the left, this past November through January was the windiest November through January period in Cheyenne since 1996-1997. It was the tenth windiest such period in the past 40 years. The stronger than usual winds led to a warmer than average winter with below normal precipitation. The prevailing flow was from the northwest during the period.

Steve Rubin
Meteorologist
NWS Cheyenne

Want more climate info? Check the NWS Cheyenne home page http://weather.gov/cheyenne and click on 'Local' under 'Climate'. There you can find daily climate data dating back to the beginning of 2002 for the major cities in our forecast area (Alliance, Chadron, Sidney, Scottsbluff, Laramie, Rawlins, Douglas and Cheyenne). You can also access the archives of daily climate data from our cooperative observers that is normally published each evening by our office. These date back one year.

(Continued from page 1)

close as across the runway only a few hundred feet away to its dissipation stage just northeast of Cheyenne. I heard its roar (like a jet plane taking off) and saw it damage a couple of C-130 transport planes before it went across (then) open areas north of Dell Range Boulevard and into the Buffalo Ridge residential area where we had several NWS employees who were directly impacted.

The final numbers: an F3 tornado that caused one death, 57 injuries, and $25 million in property damage.

Growing up in central Kansas and attending Oklahoma University, I was jokingly accused of bringing this particular tornado with me to Wyoming. Truth be told, I have seen but never been so close to a tornado before or since that day…July 16, 1979. Oddly enough though, I and others at my office did see two more tornadoes briefly touch down west of Cheyenne just two weeks later on July 30, 1979.

Parker Retires

Ken Pomeroy

This past winter, NWS Cheyenne said good-bye to its long-time Meteorologist in Charge, Bill Parker. We honored Bill with a retirement dinner at the Plains Hotel in downtown Cheyenne on January 14th. Many distinguished guests from around the Weather Service were present.

One of our more experienced forecasters, Jim Hatten, emceed the event. Bill was presented with many gifts, including the bucking horse clock pictured. A good time was had by all, but Bill's leadership will be missed. We know Bill will be happy in retirement as he pursues his hobby of painting.

(Continued from page 2)

the closer the forecast time is to when the model was started, the more accurate the forecast.

Meanwhile, the more distant the forecast is, the less accurate the forecast becomes. Computer models over the past 15 years have become more accurate due to increasing computer speeds. The number of grid points have increased, are closer together and simulate more levels in the atmosphere. In the future, as computer speeds continue to increase, computer models and the forecasts that you rely on will become even more accurate.

Answer to trivia question on page 4:

Yuma

Scottsbluff

Boston

Seattle

For Your Eise Only

Ken Pomeroy

John Eise reports for work in Cheyenne in early April as NWS Cheyenne's next Meteorologist In Charge. Eise has been the Science and Operations Officer in Milwaukee for 12 years but has also worked in offices in Amarillo, Texas; St. Louis, Missouri; and Anchorage, Alaska during his 20+ years in the National Weather Service.

Eise originally became interested in meteorology while growing up in Missouri. He appreciated the power of the meteorologist to cancel school by putting out a forecast calling for snow. During his career, Eise has had to use that power. One the most memorable moments in his career was when he worked during a historic blizzard in Amarillo during the early '90s. He also recounts seeing his first tornado from the Amarillo office during his time there.

Why Cheyenne? "It seemed like a natural fit for me to move to Cheyenne," Eise said. "I miss the wide open spaces." John's wife is a graduate of Colorado State University and has family in the area, so the Eises could not pass up the opportunity when NWS Cheyenne came calling.

John looks forward to the challenges of directing an office that has to forecast severe weather, winter storms, and fire weather across southeast Wyoming and the western Nebraska Panhandle. John looks forward to meeting as many people as possible in southeast Wyoming and the Nebraska panhandle.

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

Enhanced Fujita Scale

John Griffith

Rating	Original F-Scale	Enhanced F-Scale
0	45-78 mph	65-85 mph
1	79-117	86-110
2	118-161	111-135
3	162-209	136-165
4	210-261	166-200
5	262-317	>200

Since the early 1970s, meteorologists have used a system developed by Dr. Tetsuya Theodore Fujita of Chicago University to estimate tornado wind speeds based on damage left behind by a tornado. The scale is called the Fujita scale or simply the F-scale.

Wind speeds in a tornado vary along its path. The F-scale rating of a tornado event represents the highest wind speed that occurred during the life of the tornado. The National Weather Service is the only federal agency with authority to provide official tornado F-scale ratings.

Beginning in February 2007, the NWS will implement an enhanced F-scale to rate tornadoes in a more consistent and accurate manner. The new scale was developed by a forum of nationally renowned meteorologists and wind engineers from across the county as well as the Texas Tech Wind Science and Engineering Center. The new scale will attempt to overcome some of the limitations of the original scale such as a lack of damage indicators, no account for construction quality and variability, and a lack of definitive correlation between damage and wind speed. These limitations may have led to some tornadoes being rated in an inconsistent manner and an overestimation of wind speeds in some cases.

The enhanced F-scale will still rate tornado categories from F0 to F5, but the ranges of wind speed in each category should be more accurate. The enhanced F-scale takes into account more variables than the original scale did when assigning a wind speed rating to a tornado. The new scale will incorporate 28 damage indicators such as building type, structures, and trees. For each damage indicator, there are eight degrees of damage ranging from the beginning of visible damage to complete destruction of the damage indicator.

For an example, with the enhanced F-scale, an F3 tornado will have estimated wind speeds between 136 and 165 mph, with the original F-scale, an F3 tornado has winds estimated between 162 and 209 mph. The wind speeds necessary to cause F3 damage are not as high as once thought and this may have led to an overestimation of some tornado wind speeds.

One final point to remember is that the historical tornado rating database will not be affected by the enhanced F-scale ratings.

Calling All Rain Gauges

Mike Weiland

If you have a rain gauge and a interest in weather, CoCoRahs is looking for you. CoCoRahs (Community Collaborative Rain and Hail Study) originated in the fall of 1996, after the July Fort Collins, Colorado flood. It was the idea of researchers at Colorado State University who realized the need for more densely located reports of rain and snow. Since 1996, the program has expanded to cover more than ten states, including Wyoming and Nebraska. In Nebraska, the program is called NERain.

You may be asking, how does CoCoRahs work? Well, once a day at about 7 AM, CoCoRahs observers look at their rain gauges to see how much rain or snow has fallen. Then, they send their reports in using the internet. The interesting thing is, once the reports are entered, the information is quickly placed on the website on a map of the particular county. At that time, you are able to see your report as well as the reports of your neighbors. The information is also used by weather, climate and water researchers around the country. In Colorado, it has greatly increased information on water availability. The data also goes to the National Weather Service and helps in flood forecasting.

If you are interested in joining the growing list of volunteers, you may signup for CoCoRahs or NERain (in Nebraska) on the website. The website address is cocorahs.org and on the left side of the screen is a link to join us. All you need to enter is your address and latitude and longitude. A rain gauge will be provided to you as well as any training, if needed. For more information, you may go to the website (cocorahs.org) or call Mike Weiland at the NWS in Cheyenne at 307-772-2468, ext. 516.

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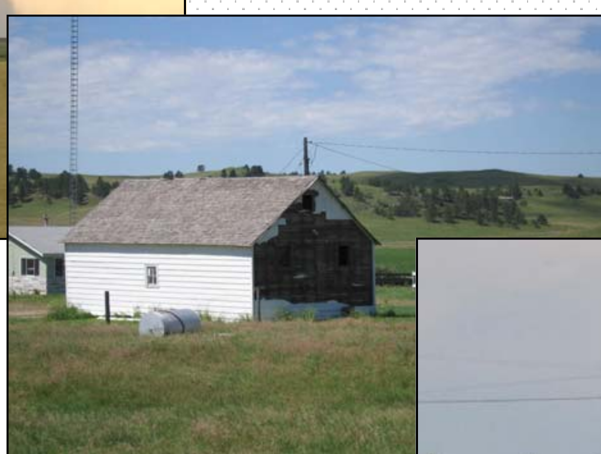
http://weather.gov/cheyenne

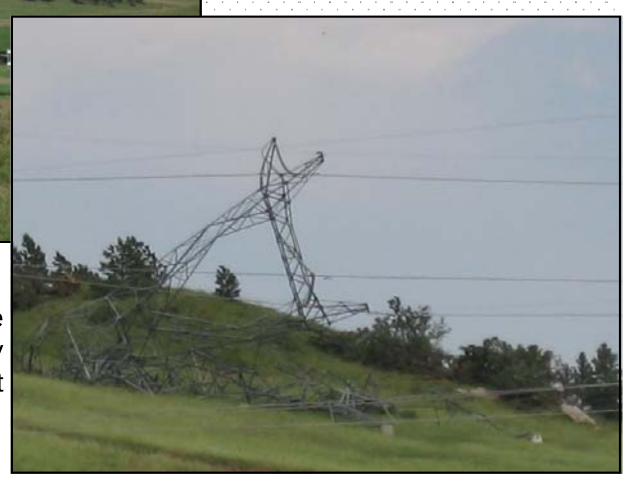
The Rising Barometer is a semi-annual production of the National Weather Service office in Cheyenne.

Thanks for reading!

Storm Spotlight: Tornado in Banner County, Nebraska

June 27, 2005





The most notable severe weather event last year was the tornado that moved through the Nebraska panhandle. The tornado formed over the Wildcat Hills shortly after 4 pm and tracked south-southeast, an unusual direction as tornadic storms typically move to the northeast.

It's just another example of how rules of thumb in meteorology are just that, and the weather can take an unpredictable turn at any moment. This storm remained strong as it moved into northeast Colorado and produced tornados all the way into northwest Kansas.