NOAA's National Weather Service

Eastern North Dakota/Grand Forks

Minnkota Cyclone Spring 2007

FACT SHEET

NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION

Grand Forks: Rebuilt, Renewed, Reborn and StormReady!

NOAA's National Weather Service has implemented several new flood forecasting tools and practices since the record-setting 1997 flood on the Red River of the North.

The National Weather Service has increased communication and coordination with Federal, state and local government agencies to keep water managers more aware of conditions on the Red River of the North. These efforts have led to an increase in the number of stage gauges that provide the latest information about flow and water levels in the Red River of the North Basin.

- NOAA satellites and aircraft provide more detailed and more frequent snow surveys and soil moisture analyses
- Expanded and improved river and flood data are more accessible to cooperating agencies in weather forecasting, disaster mitigation and water management
- Government agencies at all levels meet more frequently before and after spring snowmelt, ensuring increased awareness of river and weather outlooks

Deployed on the Red River of the North in 2001, NOAA's Advanced Hydrologic Prediction Service (AHPS) provides more flood forecast details and uncertainty information which enables emergency and water managers to make more informed decisions. Graphical flood forecast information available on the internet provides National Weather Service users with at-a-glance river conditions.

- User friendly, web based AHPS graphics, including uncertainty information, was well received during the moderate to major flooding threat across the entire Red River Basin in 2001
- Web access means virtually everyone – government officials, media and residents - has direct access to the latest weather and hydrologic information and to the forecasts produced from this information
- Forecasts are updated more quickly and frequently than in the past, providing decision makers and the public more time to consider the best options

In January 2004, the National Weather Service recognized Grand Forks as a StormReady community. Communities earn the StormReady designation by implementing emergency warning plans for schools, businesses, civic and government organizations and employing NOAA Weather Radio All Hazards to receive warnings from the National Weather Service. Community leaders adopt procedures to ensure everyone is adequately prepared and sheltered.

On the Web:

NOAA *http://www.noaa.gov*

Weather Forecast Office Grand Forks: *http://weather.gov/fgf*

North Central River Forecast Center Chanhassan: *http://weather.gov/ncrfc*

For more information, contact David McShane or Gregory Gust 701-772-0720

50th Anniversary of the Fargo Tornado of June 20, 1957

By Dave Kellenbenz

On the evening of June 20, 1957 around 640 pm CST, an F5 tornado moved through Fargo, North Dakota. This devastating tornado killed 13, injured over 100, and badly damaged or destroyed over 1,300 homes. There were many heroes on the day the tornado struck, and the days and weeks following the disaster. There were also miracles on the evening of June 20, 1957, as a baby was lifted from the arms of his mother, and thrown several hundred yards. The baby was later found and that person is living today.

This tornado goes down in history as the farthest north documented F5 tornado in United States history, with 51 F5 tornadoes officially reported since 1950. The last F5 tornado to strike the U.S. was on May 3, 1999, when an F5 tornado struck Moore, Oklahoma.

The Fargo tornado traveled 9 miles and was 700 feet wide. This F5 tornado was one in a family of 5 tornadoes, with an intermittent damage track of nearly 70 miles long from Buffalo ND to Dale, MN. Meteorologists today would call this a long lived cyclic supercell thunderstorm, and this supercell lived for at least 6 hours and produced tornadoes for at least 4 hours.

Debris from Fargo was found north of Detroit Lakes around Rochert, MN (about 54 miles from Fargo) and surrounding areas. The tornado was photographed more than any other during that era, with detailed film footage as well. Many people evacuated Fargo before the tornado struck, since they knew the tornado was moving in from the west. Warnings were issued by the U.S. Weather Bureau in Fargo, (now NOAA's National Weather Service) and broadcast by local television and radio stations.

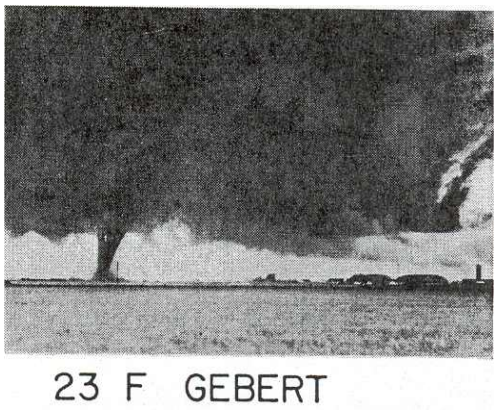


Figure 1. Image of Fargo tornado on June 20, 1957 looking southwest towards Hector International Airport. Photograph #23F taken by Gebert (Fujita 1960).

Figure 2. Damage done near the Shanley High School in Fargo.

The Red Cross was tasked with disaster relief during the aftermath of the tornado. They performed exemplary and provided needed services for the residents of Fargo after the devastating tornado. Volunteers were staffed around the clock, and ran feeding operations

serving about 40,000 hot meals and 57,000 cold lunches during the days and weeks following the tornado. Thirty three Red Cross disaster specialists from all over the country were dispatched to the Fargo area for recovery operations. The costs of all resources expended by the Red Cross to 188 families were significant, and totaled $286,777. This corresponds to approximately $2,058,939 present day dollars with inflation figured in. Shelter for 656 homeless persons was arranged by the Red Cross in private homes, hotels, and in college dormitories. They estimated that 100 tons of clothing and bedding were distributed to families in need.

The tornado was studied by T. Theodore Fujita from the University of Chicago. Much of his ground breaking tornado research and damage analysis was performed on the Fargo tornado. He would later quantify tornado damage onto the F Scale, which he developed in 1971.

A large study and examination of the meteorological conditions leading up to this historic tornado is being performed by the National Weather Service in Grand Forks. This study is being conducted to commemorate the 50th anniversary of the tornado, which will occur June 20, 2007. This information can be found on the Grand Forks NWS webpage dedicated to the event at http://www.crh.noaa.gov/fgf/?n=fargojune1957f5 . If you are a survivor or know of any survivors from the Fargo tornado, contact David.Kellenbenz@noaa.gov.

REFERENCE

Fujita, T., 1960: A Detailed Analysis of the Fargo Tornadoes of June 20, 1957. Research Paper No.42, U.S. Weather Bureau, Washington, D.C., 1-67.

Are you in the path of a severe thunderstorm?

by Dan Riddle

The answer to the above is extremely important to everyone. NOAA's National Weather Service issues severe thunderstorm, tornado, and flash flood warnings for 17 counties in eastern North Dakota and 18 counties in northwestern and west central Minnesota. Because severe thunderstorms often impact only a small part of each county, the text of the warning statement often includes only a portion of the county along with cities in the path as being under the warning. For example, southeastern Otter Tail county, including the city of Parkers Prairie.

The difficulty is each county has a certain code (called the **F**ederal **I**nformation **P**rocessing **S**tandards or **FIPS** code), which goes out with the warning. These codes are read by software used by the media to transmit the warnings to the public. Many TV stations have automatic scrolls at the bottom of the screen which will display the county under the warning and our NWS Grand Forks web page highlights the county too. The entire county is highlighted based on the FIP code sent with the warning.

For, example, if you live in Fargo and you see or hear about a severe thunderstorm warning for Cass county, you might be shaking your head and wondering what's going on. The sun is out and no hint of rain. However there is a small, but dangerous thunderstorm tracking through the northwestern part of Cass county. So, in the long run, if this happens often you might get complacent

and not act on the next warning until it is too late.

Having a NOAA Weather Radio All-Hazards is one solution to this problem. Weather radios can be programmed to alert you when a warning is issued for your county or area. Or when you see a warning scroll at the bottom of the TV screen or hear it on the radio, you can turn on your weather radio to hear the entire warning text as issued by NOAA's National Weather Service. Thus, you find out what part of the county is under the warning and what cities are in the path.

There are many ways to be weather informed in today's society, and the best way is by using a combination of traditional media (TV and radio) along with the internet and NOAA's Weather Radio All-Hazards.

Forecaster Uncertainty

By Dan Riddle

As weather forecasters, we deal with uncertainty all the time. In a world where people want yes or no answers, uncertainty in our forecasts can be tough to project to the public. In our day to day job, we issue forecasts out to 7 days. Computer models help to show the meteorologist possible solutions to how fronts and low and high pressure areas will move. Two of the main models that are used by NOAA's National Weather Service are the GFS (**G**lobal **F**orecast **S**ystems) and NAM (**N**orth **A**merican **M**esoscale). These models are run every 6 hours and send data to NWS offices throughout the country. They often change solutions every run, especially the farther you go out in time.

Forecasters look over the data, and using this, in conjunction with many other sources of information, come up with her/his best educated opinion of what will happen over the next 7 days. Can two people looking at the same data come up with two different answers? You bet! That is why the National Weather Service in Grand Forks talks over forecast ideas with neighboring offices to come up with a collaborative forecast opinion. However, after all of this, sometimes there is much uncertainty in what is finally issued to the public. I often hear that meteorologists have the only job that you can be "wrong" sometimes and still get paid. Well, that is true to a point.

The atmosphere is a fluid and in that fluid, storms spin up and dissipate. There are still some unknowns about a variety of weather processes. The fact is, we don't have complete data regarding all that occurs in our very complex environment. Meteorology is an evolving science that we continually learn more about each day. In this regard, the term most often used by forecasters is not yes or no, but "maybe" because of the many complexities of our job as forecasters.

Can a corn field influence a thunderstorm?

By Thomas Grafenauer

Thunderstorms form when warm, moist air near the surface of the earth is allowed to rise through the entire depth of the atmospheric layer that produces weather. The rate of the rising air will generally determine the intensity of the thunderstorm, with faster rising air making stronger storms. The rate of rising air is determined by the instability of the atmosphere, or the ability for an air parcel to rise freely within the environment. A more unstable atmosphere causes air to rise faster,

leading to potentially severe thunderstorms. Atmospheric stability is determined by comparing the temperature and moisture of the rising air to the surrounding atmosphere.

Hot/moist air is less dense then cold/dry air, and rises "easier" than the colder more dense air around it. When comparing two objects, the object with greater density will always want to be under the object with less density. Thus, hot/moist air wants to rise while the cold/dry air wants to sink, and produce a stable atmosphere. Warm/moist air will continue to rise as it remains warmer/moister (less dense) than the air surrounding it.

The above can be visualized by holding a wooden board at the bottom of a pond of water, with the board representing a parcel of air and the water representing the weather producing layer of the atmosphere. The wood is less dense than the surrounding water, thus conditions are unstable when the wood is at the bottom. As the wood is released, it rises to the top of the pond. The instability is then released and the atmosphere returns to its original stabile state.

So how does all of this relate to a corn field's influence on thunderstorms? Corn and other crop fields add moisture to the air near the surface through a process called evapotranspiration. Evaporation accounts for the movement of water to the air from sources such as the soil and water bodies. Transpiration accounts for the movement of water within a plant and the subsequent loss of water to the air through its leaves. This added moisture may assist in creating a more unstable environment. Thus, thunderstorms are more likely to form. The added moisture will also create stronger thunderstorms by making the air less dense, causing the air to rise faster.

Recent research suggests that thunderstorms may breed thunderstorms. During a wet summer the soil, and thus crops, have more moisture available to add to the air, thus creating more thunderstorms. On the other hand, a dry summer has less moisture available to add to the air, with not as many thunderstorms able to develop. In addition, wet summers have been shown to generate severe thunderstorms more frequently than dry summers.

The summer of 2006 was notably dry. During that summer, staff members from NOAA's National Weather Service in Grand Forks noted multiple times where thunderstorms would begin to develop, but quickly dissipate. These storms would initiate in a similar environment from the previous few summers where the storms would continue to grow, become severe and produce heavier rainfall. The one main difference between the summer of 2006 and the previous few summers were the lighter amounts of rainfall received. What will the summer of 2007 bring? Stay tuned to find out.

Educating Tomorrow's Meteorologists

By Chauncy Schultz

The move of NOAA's NWS Eastern North Dakota office from Fargo to Grand Forks in 1995 created a recipe for success. Its staff of professionals is now down the street from the students at the University of North Dakota. Any meteorologist will tell you that they had to spend countless hours staring at mathematical equations in order to get their degree. However, that's only half the story. In order to apply this education to the real world, students

need to follow the old saying "practice, practice, practice." That's where the NWS steps in. The office hosts several students throughout the year under its student volunteer program. There have been 22 participants since the program took off under the wings of Senior Meteorologist Nancy Godon in 2004.

Students selected are exposed to all facets of forecasting, climate, and hydrologic programs at the NWS office. This gives them a chance to see how meteorologists really put together their forecasts, to gain experience in collecting weather observations. It even lets them break out the colored pencils and practice their skills analyzing weather maps the "old fashioned way." This happens to be one of the best methods to develop an understanding of the atmosphere. Godon said, "We've geared the program toward operational meteorology, but we've also worked to provide students with a consistent view of all aspects of an NWS office."

For some students, the volunteer program is a chance to determine if they would like a career in operational meteorology. For others, it's an opportunity to begin developing skills that will help them in future careers with the NWS or other entities. Godon said, "I had my own experience with a similar program when I went through school, and I found out myself what I really wanted to do – operational meteorology, not research. The experience helped me focus the last few years of school, and helped me get a job. We're providing students with the same opportunity."

The office also has three undergraduate students participating in NOAA's **S**tudent **C**areer **E**xperience **P**rogram (SCEP). These aspiring meteorologists are paid employees of the NWS and gain experience working side-by-side the operational staff at the forecast office, along with formal meteorological training. The SCEP participants at NWS Eastern North Dakota are charting a path toward becoming forecasters with the agency. In fact, the students remain employees through their graduation, when they are automatically eligible for conversion to full-time, entry-level meteorologist positions.

"Our student volunteer program is still evolving, but the main goal is finding the best way for students to apply what they've learned academically, and help them develop their potential as meteorologists," said Godon.

If you want more information on student programs with the NWS, visit: http://www.weather.gov/eeo/studentresearchopportunities.htm.

Seasonal Climate Outlooks

By Mark Ewens

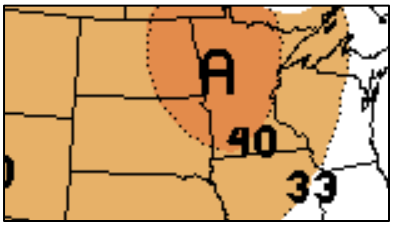
The science of climate forecasting, while still in its infancy, has come a long way in the past several decades. New technologies including satellites, buoys and advances in climate computer models have broadened the depth of knowledge we have on climate and its many interactions. For example, the **T**ropical **A**tmosphere **O**cean (TAO) Project has greatly enhanced our ability to detect subtle changes in the phase of the **E**l **N**ino**S**outhern **O**scillation (ENSO) signal. This, in turn, has lead to a greater ability to predict the start of an El Niño or La Niña.

Advances in computer modeling, such as the **C**limate **F**orecast **S**ystem (CFS) have enhanced the predictability of large scale, long- term climate events.

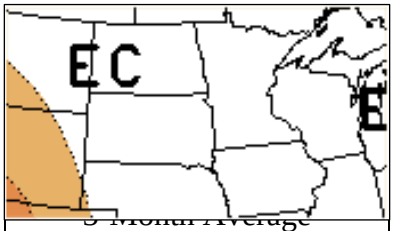
Statistical models have improved to the point where the **C**limate **P**rediction **C**enter (CPC) now issues 13, three-month seasonal outlooks for more than a year in advance. These outlooks are a combination of historical events, comparison and human intervention. The human intervention is still a critical part of the process, with climate experts at the CPC using their experience and knowledge of climate forcing interactions to make the best outlooks possible.

The seasonal statewide outlooks for March, April and May show a trend toward warmer than normal. For the 3-month period from March through May, there is a greater than 40% chance for Eastern North Dakota to have above normal temperatures while the rest of the state has a slightly better chance than climatological expectation of 1/3. The precipitation outlook for the next 3-month period, however, calls for equal chances of wetter-than-normal, drier-than-normal and near-normal conditions.

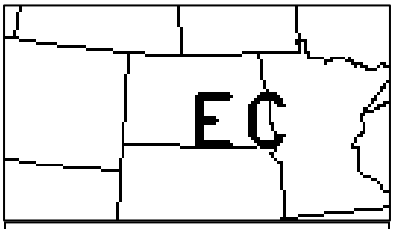
These outlooks are updated on the third Thursday of each month, with a final monthly outlook issued at the end of each month. They are posted at the following link:
http://www.cpc.ncep.noaa.gov/products/predictions/long_range/lead01/off_index.html



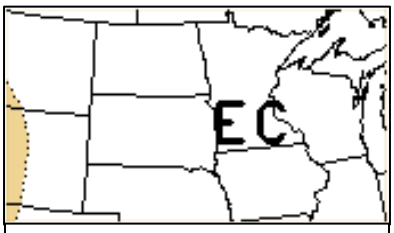
3-Month Average
Precipitation Outlook
March-April May



Temperature Outlook
March-April May



3-Month Average
Precipitation Outlook
June-July-August



3-Month Average
Temperature Outlook
June-July-August