Metro Skywarn

Editor: Dave Johnson, NØKBD **Fall 1997**

Mid-Year Report Overview, Vision, Facts And Safety Concerns

by Lynn E. DeLong, Chair
Board of Directors
Metro Skywarn, Inc.
Highlights of June 5, 1997
Report to the Board

Like most of the readers of this report, the author has mixed feelings concerning the start of 1997 in terms of weather. We can be pleased that we have been to date spared severe thunderstorms and tornadoes in the Metro Area. On the other hand, the severe storms, blizzards and floods effecting most of Minnesota and the surrounding states this year have been demanding upon our state, our region, our volunteers and our systems.

I would like to thank each of you for your services in support of the 1997 Metro Skywarn Training and Operating Programs. Though not all the statistics are available, I want you to know that your efforts aided in the following:

- recruitment and training of 17 instructors, the largest number ever.
- development of a sponsoring relationship with the largest number of clubs and agencies ever.
- scheduling and presentation of 14 sponsored classes.
- new, high quality content of our training pro gram.
- increased use of technology in our training pro grams.
- acquisition by Metro Skywarn of Doppler radar.
- continuation of the 1-800 MCI communication bridge.
- installation and operation of the on-line, real-time outlook and forecast relay system.
- installation and operation of the WAN/Packet Node at the NWS.
- design of the 67-85 linking hub system.

An important note of thanks. It is old news, but lest we forget why the quality of what we do is important, thank you for your

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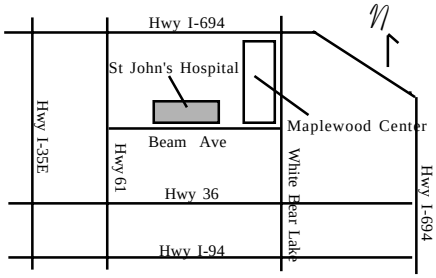
METRO SKYWARN ANNUAL FALL CONFERENCE

Saturday, November 15th, 1997
9:00 AM to Noon
At the Auditorium of HealthEast St. John's Hospital
Directions: SW of MapleWood Center (MWC) on Beam Av
1575 Beam Avenue Maplewood 55109

PROGRAM Highlights
1. MN 1997 Severe Weather Analysis - NWS
2. Review 1997 SKYWARN
3. Preview 1998 SKYWARN
4. FEATURE PRESENTATION AND DISCUSSION:

AUTOMATIC PACKET/POSITION REPORTING SYSTEM (APRS)
by Donn Baker, WA2VOI

Amateur Radio operators nationwide are beginning to use APRS for reporting and tracking severe weather conditions. Any Ham with a home weather station can connect a APRS station and automatically transmit his weather conditions. Hear about the existing networks in the midwest and what we can do in Wisconsin and Minnesota.



HealthEast St. John's Hospital
1575 Beam Avenue
Maplewood 55109
Direstions: SW of MapleWood Center (MWC) on Beam Av

MINN COMM PAGING LOST GROUP LIST

The Group Call List for activating MINN-COMM Pagers when the National Weather Service issues "watches" and "warnings" has been wiped out when the Ramsey County pager accounts were closed. The closing of the accounts automatically purged the list that was linked to it.

MINN-COMM is willing to assign an account to METRO SKYWARN and establish a new list linked the MSW account. Spotters with MINN-COMM pagers need to notify Lynn DeLong of their pager number. Please E-Mail your name, call, MSW Id#, and pager number to lynn.delong@hamlink.mn.org or call 566-1299.

This does not effect pagers on the Page-Net System.

VARIATIONS ON A THEME

By Scott Woelm, AJØWX

In the Fall 1995 Skywarn newsletter, I talked about some unusual ways in which the atmosphere can produce severe weather. Well, with this article I would like to touch base on that again, and give you some other things to chew on as well!

A refresher on the basic severe weather theme

Before I get started I would like to review some basic severe weather parameters and concepts with you. I know that many of you have heard all this basic stuff before, but I think it's a good idea to review this, so please bear with me!

The energy found in the atmosphere is measured and calculated by the NWS using information from the morning balloon launch and other weather data that comes in during the day. The term used for this energy is CAPE (**C**onvective **A**vailable **P**otential **E**nergy), and it is measured in **J**oules per **K**ilogram. The greater the number, the more energy you have. Although looking at *just number*s can be deceiving, figure if you have CAPE values of 1500 J/Kg or more, you have sufficient amounts of energy to generate strong to severe storms. Often times we will have CAPE values of 3000 J/Kg and higher during the summer months, and that's a lot of energy!

Next, you need some sort of "lift" in the atmosphere to get the parcels of air accelerating upwards. Often times, that source of lift can be found in the form of a prefrontal trough ahead of a cold front, the cold front itself, a warm front, a stationary front, an old thunderstorm "outflow boundary", or perhaps some features in the upper levels of the atmosphere.

Remember what I just said about numbers being deceiving? I have seen CAPE values of well over 8000 J/Kg (!) but there was no lifting mechanism present to release it, so thus a severe weather forecast based on CAPE alone would have been unsuccessful.

A key factor for organized severe storms is found in the winds aloft. For the more intense severe storms, it's best to have the upper level winds *increase* with speed (*speed shear*) and *turn* (from the east, to the south, to the southwest etc.) as they go up with height (*directional shear*). Simply put, severe storms need assistance from the winds above the surface to maintain their life, by keeping the downdrafts of cool air and precipitation away from the storms updraft area. That keeps its supply of warm moist inflow air intact. In addition, days that have good speed and directional shear can increase the updraft strength of the stronger storms.

Another key for organized severe storms is the temperature of the air above the surface. If it's too warm, it "caps" off the ability for strong to severe storms. On the other hand, if it's not warm enough, and there is good instability hanging around, all kinds of activity fires. No one storm can take over and become dominant because of the intense competition for energy amongst the cells.

So, if you have large CAPE values, good speed and directional shear, the right amount of warm air above the surface and a lifting mechanism, you have a good chance at seeing severe weather. Obviously, there are other factors that come into play, but these are the primary ingredients.

Sources

So, how do you find out about what is happening in the atmosphere? The best place is through the Internet. Most of the NWS text products (such as discussions from the *SPC - **S**torm **P**rediction **C**enter* and SFD/AFDs **S**tate/**A**rea **F**orecast **D**iscussions from the local NWS offices) are available through different Internet sites. These text products are written in meteorological shorthand, but it's fairly easy to pick out the parameters I have mentioned here.

Those of you with more advanced weather

knowledge can take advantage of the many Internet sites that provide the "raw" data and look at these parameters for yourselves.

Now let's look at some ways to get severe storms when all of the factors I discussed earlier are *not* in synch.

"Pulse severe"

There are times when a thunderstorm can produce brief severe weather events and then quickly die out. The term that is used for such an event is "pulse severe". In many cases, pulse severe occurs when you have a lot of energy, little or no cap and poor wind shear. These storms fire up quickly and produce a brief severe event, but with no wind shear to help keep the downdrafts from cutting off their inflow of warm moist air, and with no cap in place to hold off other development, these storms "pulse" and then quickly fizzle out.

Opposites attract

Now it's time to throw you a curve! Some days you can have really strong winds in the upper atmosphere but you still get "pulse" severe. Sound puzzling?

On July 11 of 1996, we had some tremendous upper level winds in excess of 53 m s-1 (meters per second, or in other words, around 120 m.p.h.) around 34,000 feet AGL (Above Ground Level) or so. However, the result was still a pulse severe storm. The problem was that there was a lack of heating due to some cloud cover that took place during the day. A shortwave (an upper air feature found around 18,000 feet AGL in this case) came through and provided the lift, and there was enough energy to generate a severe storm. Due to low CAPE values, the storm only had enough energy to be severe for a short time, and it was literally sheared apart by the strong winds aloft. Thus the storm "pulsed", and it was over. In other words, it simply ran out of gas!

That's not to say it wasn't a potent storm! It dropped 3/4" hail that covered the ground in the town of Glenwood, which is located in Pope County in west central MN.

Strong downburst winds and hail are the most common threat to pulse severe storms, however, short lived tornadoes are also possible. That's rare, but they do occur. In fact, a "pulse" severe storm dropped a brief tornado near Eureka, SD on July 20 of 1996. However, the long-tracked strong to violent tornadoes will most likely occur from persistent and well developed supercell storms, and they usually require decent amounts of energy.

By the way, the basic definition of a supercell is a severe storm that contains a rotating updraft (these updrafts are called mesocyclones). These storms may or may not be tornadic.

Tornadoes? With low CAPE? No way!

Now that I just said that tornadoes usually form when you have decent amounts of energy, it's time for me to go back on my word! On October 26 of 1996, a spectacular event occurred. 14 tornadoes touched down across MN that day, the third largest tornado outbreak of all time! Several of these tornadoes were considered to be in the "strong" category to boot. This occurred with very little energy. However, there was tremendous speed and directional shear, and that compensated for the lack of energy and produced tornadic storms.

The NWS had a good handle on the situation on this day, and the threat was mentioned in the late morning SFD. The SPC had a Tornado Watch out well before the tornadoes occurred. However, even then many were taken by surprise by the scope of this event, and it is currently being studied by various researchers.

In conclusion

The bottom line is that during the severe convective season, we all have to keep our minds open to all types of variations of the typical severe weather theme. Good luck!

Scott Woelm AJØWX

Forecasters Defend Effort to Warn Jarrell of Twister

Editor's Note: *How unfortunate NWS staff have to defend themselves from an uninformed news media. Contrary to the tone of the article, the average warning time for tornadoes is 7 to 8 minutes. Congratulations to NWSFO Austin-San Antonio office for a job well done.*

From the Houston Chronicle 9:30 PM 5/30/1997

By JOHN W. GONZALEZ
Copyright 1997 Houston Chronicle Austin Bureau

JARRELL -- The tornado that obliterated a subdivision and killed 27 people was one of only four storms in the United States to be rated an "F5" in the past decade, according to weather experts who on Friday defended their efforts to warn the public.

People in Jarrell had no more than 15 minutes to find shelter after the initial warnings were issued about 3:30 p.m. on Tuesday, said Al Dreumont, a National Weather Service meteorologist in charge of the Austin-San Antonio forecast office at New Braunfels.

"I've been in the weather service 34 years and this is the first time I've seen an F5. Indeed, it's something awesome to behold," Dreumont said after touring the devastation.

Jim Henderson of Kansas City, Mo., the weather service's assessment team leader who visits major storm sites, also attested to the tornado's might.

"In this particular case, there has been asphalt stripped right off the roadways. The houses have been cleaned down to the slab. Trees have been snatched out of the ground. This is every indication of an F5," he said. "Those are very rare. We've only had three nationwide in the last 10 years. It's certainly very rare in the central part of Texas.

"Tornadoes are rare events to start with and this is rarer than rare," he added.

The most recent F5 was the 1995 twister that hit near Pampa, he said.

Based on examination of the Jarrell area, the weather service experts theorized that the tornado took from five to 10 minutes to lay waste to the area.

The funnel cloud developed in southern Bell County and entered Williamson County on a path from north-northwest to south-southeast, Dreumont said. But soon after crossing the county line, the twister veered south-southwest and plowed into the Double Creek Estates subdivision after raking farms, crops and a few scattered structures.

"It looks like there was an F2-F3 variety in Bell County. The tornado weakened somewhat and then the tornado began to grow again once it got into Williamson County and then became an F5 once it got into this area here," Dreumont said.

Surface markings indicate the tornado, whose funnel was sprawled about half-mile wide and wobbled as it careened through the area, was on the ground from 6 to 6.5 miles, the experts said.

Some of the debris, and perhaps victims, were carried a mile or two by the ferocious winds, which pushed objects both upward and horizontally.

The Jarrell tornado was one of eight separate twisters verified that day, prompting a total of 49 official warnings, Dreumont said. The first warning, which involved the Jarrell tornado, was prompted by sightings near Belton.

"With the new Doppler radar that we have, we were able to do as good a job as we did," said Dreumont. But if the weather service had been relying on equipment it used until five years ago, "no way," he said.

Henderson agreed that "the equipment worked real well. The warnings were out. It's unfortunate that there were lives lost and one of the things we'll have to look at is, in terms of the safety, what are some changes we might suggest."

But Henderson added that experts aren't sure much can be done to hold off the forces of an F5, with winds from 261-318 mph. The Tornado Project based in St. Johnsbury, Vt., describes F5s as capable of "incredible" damage: "Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile-sized missiles fly through the air in excess of 100 meters; trees debarked; steel-reinforced concrete structures badly damaged."

All those phenomena were recorded in Jarrell.

"It's very similar to Hurricane Andrew, where they had 200-mph winds. It took everything down to the slab in that area, too," Henderson said.

Because storms can move swiftly and erratically, even the most modern devices can't prevent all casualties, the officials said. Old-fashioned spotters who eyeball the skies continue to play a key role in Texas, they said.

"We have not advanced that much in our science that we can do away with the spotters. As a matter of fact, we had a spotter training exercise in this county in April to teach people what to look for, to save their own lives," Dreumont said.

"We still need the human eye ... but the radar is doing a fantastic job. Fifteen minutes' lead time, 20 minutes' lead time -- that's become quite the average," he said.

"But this is like watching a pot of water boil. Where is that first boil going to occur?" he said. "We know it's going to boil, but we don't know where."

Report continued from page 1

1996 activities. Our bottom line: Zero tornado deaths in our service area.

Vision and the challenge for the rest of 1997.
MSInc's vision for the future is a significantly improved set of training products and operational services and systems that enhance public and spotter safety of the Metro Area. These will enhance the volunteers' abilities to safely observe, understand, and report severe weather and effectively and efficiently disseminate information to and from the NWS.

CHALLENGE
Weather has profound effects on human welfare, health and economic well being. Each year, hundreds of lives and billions of dollars are lost due to severe storms, floods and other natural events that could be predicted minutes to months in advance. NOAA's and the NWS's current ability to predict short-term change is restricted by observations that are incomplete in time and space. This limits the ability to improve basic understanding and predictive modeling of weather and other natural phenomena. Although most natural disturbances can not be prevented, everything possible must be done to minimize the human impact. Along with efforts of NOAA & NWS, MSInc must improve its spotters' safety, its observing systems, develop a better understanding of natural processes, and enhance its methodology and information dissemination systems.

IMPLEMENTATION STRATEGY
The objectives of MSInc are to:

1. Complete the modernization and re-engineering of its communication systems to ensure the continuation of effective services in all situations, a "Fail-Safe" System.
2. Establish and maintain continuous real-time radar feeds operationally linked to the EOCs.
3. Establish and maintain continuous real-time satellite imagery *and Automatic Weather Reporting Packet Network. (Italic portion added 8/7/97)*
4. Strengthen observation training by offering advanced training classes covering forecasting and prediction systems through scientific, technological and programmatic advances in meteorology.
5. Strengthen safety emphasis in all training, activities and communications through programmatic requirements.
6. Improve awareness of the public, emergency managers, the media, and private forecast planners through effective communication and utilization of the Metro Skywarn newsletter and Web Page.

Benefits
Increasing spotters' understanding of the environment, improving training and communication systems, and investing in new technologies will provide more accurate and timely warnings. Hence, improving the ability of the public to move to a place of safety thus reducing injuries and avoiding deaths from severe weather. Years from now, improvements in long-term forecasting of future conditions will provide better information for planning weather sensitive activities. Today, it is accurate and timely warnings that save lives.

How to Reach Us

* By phone: Call evenings Board Chair: Lynn Delong, NØCVI at 566-1299.
* By snail mail: Metro Skywarn, Inc. PO Box 211, Braham, MN 55006-0211
* By email: Lynn Delong: lynn.delong@hamlink.mn.org
* On the World Wide Web: The Metro Skywarn Homepage, URL= http://www.winternet.com/~daveej
* The Board always needs more help. Anyone wishing to participate in Board activities is invited to attend the meetings held the first Monday of each month. Call Lynn Delong, NØCVI at 566-1299 for directions.

Minnesota Severe Weather Report

by Jim Richardson, WMØX, Forecaster, National Weather Service

Not all of the statistics for the season have been compiled, but a review of a couple of the events are in order. Initially, the severe weather season was slow to start, at least for the Chanhassen NWS county warning area. No tornado or severe thunderstorm warnings were issued in April or May by Chanhassen. There were a scattering of warnings issued in early June. However, things really got rolling on June 28!

A marathon severe weather day started around 6 am on June 28th with numerous warnings issued for large hail. Areas around St. Cloud..to the north and east suburbs of the Twin Cities..to western Wisconsin were affected. These thunderstorms formed along a warm front across central Minnesota. After a 2 or 3 hour break, a new cluster of storms moved into western Minnesota and formed into a bow echo. This system tracked across central and eastern Minnesota during the afternoon and early evening hours producing a scattering of minor wind damage and hail. Storms continued into Wisconsin during the evening with more reports of hail. Around 70 warnings were issued by the Chanhassen NWS and a couple of staff members worked 22 hours!

Only 3 days later, on July 1, severe weather erupted once again over central and eastern Minnesota. This was a very strong system for the time of year. An incredibly strong jet stream for July, with winds speeds of 120 knots was curving through the central plains to the south of Minnesota. The associated low pressure over South Dakota was likewise very strong. Most local NWS offices were mentioning severe weather in the forecast the day before the outbreak. The Storm Prediction Center placed Minnesota in a "HIGH RISK" for severe weather during the early morning hours of July 1.

Central Minnesota was hardest hit in terms of wind damage and hail in a corridor from Willmar..through Litchfield..to Monticello and the northern suburbs of the Twin Cities. A storm survey team led by Warning and Coordination Meteorologist, Todd Krause, confirmed 15 tornadoes. The strongest tornado found was an F3 in Wright county. The path extended from near Howard Lake to Buffalo Lake. The Monticello area was affected by 3 tornadoes followed by severe downburst winds. Straight line wind speeds were estimated to be near 120 mph. In addition, flashflooding occurred in parts of the Twin Cities as the complex of thunderstorms slowed down. Extremely high rainfall rates were observed. 3.1 inches of rain fell in 55 minutes at the St. Paul campus of the U of M! More thunderstorms with straight line winds and hail tore through parts of the western suburbs around mid July including a measured 83 mph wind gust in Mound. An finally some breaking news at the time of this newsletter:

TORNADOES RIP CENTRAL MINNESOTA

Not all of the statistics are in yet, but it appears that at least 5 tornadoes affected parts or Morrison, Mille Lacs, and Kanabec counties on the evening of Sep 18, causing at least 2 injuries, damaging many homes and trees. This would bring the Minnesota tornado total to over 40 for the season!

Metro Skywarn, Inc.
PO Box 211
Braham, MN 55006-0211

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