Central Illinois Lincoln Logs

Volume 4 Issue 2 Summer 2001

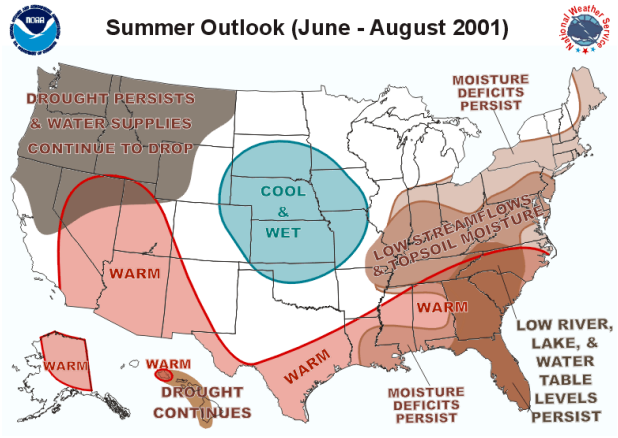
Summer is on Central Illinois's Doorstep...maybe?

Summer in Central Illinois

by Melissa Byrd, Meteorologist

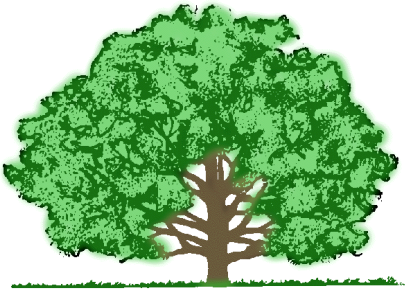
It may be hard to believe...especially after the cooler than normal weather that we have had over the past week and a half...but summer is on its way for Central Illinois.

In this issue...



During a typical summer our high temperatures top out in the middle 80s from late June through early August. As for low temperatures...middle 60s are the rule.

The Climate Prediction Center has come out with its summer outlook for the United States. For Illinois we should see normal temperatures and normal precipitation...though the eastern half of the state will continue to experience low streamflow and low topsoil moisture.



Bow Echoes: What are they and why should I be worried about them.

By Brad Ketcham, Meteorologist

During the summer months of June, July and August. Thunderstorms start to take on a different shape as depicted by radar. Although the spring time squall line thunderstorms and supercell thunderstorms still occur, the thunderstorms start to transition into the Bow Echo type radar signature (Figure 1) . Central Illinois is typically affected by at least 3 to 5 bow echo storms a year. Bow echo storms are typically associated with damaging downburst winds, and sometimes weak tornadoes.

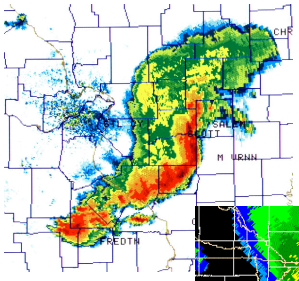


Figure 1

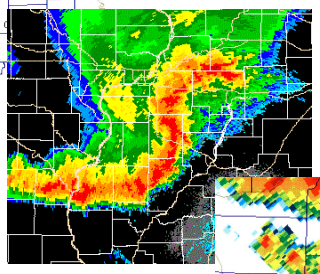


Figure 2

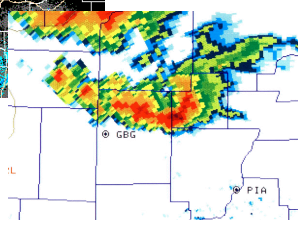


Figure 3

Radar Characteristics

The Bow Echo storm can take on many different sizes (fig 1-3) but a few things are common with each. Bow echoes exhibit a **bulging/bowing of the reflectivity gradient** along the leading edge of the line (Figure 4). This tight reflectivity gradient can sometimes look like a "wall" of rain

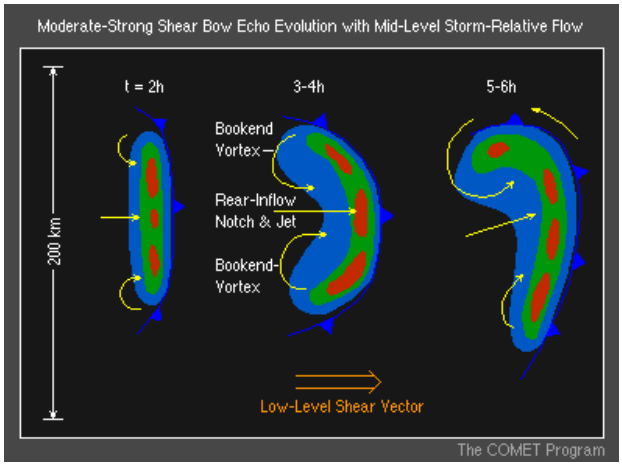


Figure 4

hitting someone as the line moves across them. **Weak echo notches** are also noticeable behind the leading edge, indicative of strong to severe downburst winds descending to the ground (Figure 4) just after the tight reflectivity passes. WSR-88d Doppler radar can pick up these downburst winds using velocity products available to the forecaster (Figure 5). So these storms have a higher degree of detection with the latest technology.

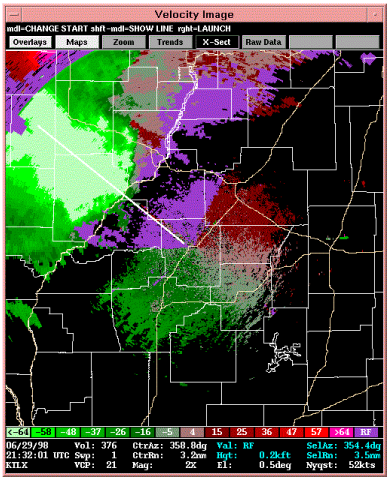


Figure 5

Severe Weather Associated with Bow Echoes

Most of the severe weather associated with Bow Echoes is **damaging downburst winds** that can have a more widespread impact on communities

than a tornado. The June 29th,1998 Bow echo knocked out power to over 40,000 people. Some of this power wasn't restored for almost a week. Also associated with this type of storms is the possibility of weak tornadoes. Studies and damage surveys have shown that **weak tornadoes** can and do develop along the leading edge of the Bow Echo given sufficient forcing, instability and wind shear.

Damage associated with this type of storm includes trees blown over, structural damage to lightly constructed buildings, and downed power lines/poles.

Warnings issued by the NWS Central Illinois for Bow Echoes

Because of studies and damage surveys that have shown a high incidence of weak tornadoes associated with bow echoes. The NWS Central Illinois will typically issue a tornado warning for this type of storm. But the tornado warning that is issued will be worded differently than the normal tornado warning to alert the people to the possibility of damaging winds and short lived tornadoes.

Warning example:

BULLETIN - EAS ACTIVATION REQUIRED
TORNADO WARNING (TEST !!!!)
NATIONAL WEATHER SERVICE LINCOLN IL
XXX PM XXX XXX XX 2001

THE NATIONAL WEATHER SERVICE IN LINCOLN HAS ISSUED A

*TORNADO WARNING FOR...
(COUNTIES.....)

*UNTIL XXX PM CDT

*AT XXX PM CDT...NATIONAL WEATHER SERVICE DOPPLER RADAR INDICATED A LINE OF TORNADO PRODUCING STORMS FROM (CITY X TO CITY Y)...MOVING XXXX AT XX MPH.

*THE TORNADO PRODUCING STORMS ARE EXPECTED NEAR...
(CITY A)
(CITY B)

THIS IS A VERY DANGEROUS SITUATION. HIGH WINDS ARE LIKELY WITH THIS SYSTEM. TAKE COVER IMMEDIATELY IN A BASEMENT OR INTERIOR ROOM ON THE LOWEST FLOOR. LEAVE VEHICLES AND MOBILE HOMES, ACT NOW TO SAVE YOUR LIFE.

REPORT SEVERE WEATHER OR ANY STORM DAMAGE TO YOUR LOCAL ESDA...OR THE NEAREST LAW ENFORCEMENT AGENCY ...FOR RELAY TO THE NATIONAL WEATHER SERVICE. STAY TUNED TO LATER STATEMENTS.

Interpreting Radar Imagery - Late Evening Radar Explosions

By Chris Miller, NWS Lincoln
Lead Forecaster and Doppler Radar Program Leader

We are at a time, in the brief history of weather radar, when more people are being exposed to radar imagery than ever before. Local TV weather segments, The Weather Channel, and hundreds of Internet websites display updated radar images as often as every 5 minutes, around the clock. However, do the users of radar data really understand what they are looking at? The ability to interpret the imagery is critical to properly utilizing radar information. At the National Weather Service, we sometimes receive questions or letters from people wanting an interpretation of an interesting or puzzling feature they viewed on radar.

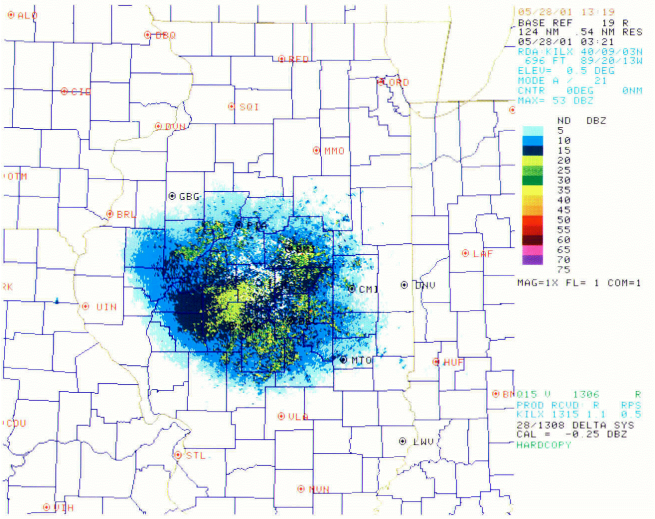
One such letter we received recently, asked us about the rapid "explosion" of radar returns (called radar reflectivity) that are often experienced from the evening through the overnight hours. The author of the letter was afraid there might be a problem, or some kind of interference with our radar. I am sure that this same question has been pondered by many people who use our radar data. The reasons for this occurrence are actually quite common, and may even surprise you!

Radar reflectivity, often times, undergoes a rapid explosion of returns during the late evening hours. This radar pattern is not ground clutter or interference, but rather is a result of an atmospheric condition known as a **temperature inversion**. A temperature inversion is defined as a condition where temperatures increase with height in the atmosphere. Typically, temperatures ***decrease*** with height in the lowest half of the earth's atmosphere. An inversion forms during the late evening when the earth's surface loses radiation to space on clear/partly cloudy evenings, which results in cooling temperatures close to the ground. Temperatures several thousand feet above the ground do not cool as rapidly, if at all. This is what produces the warmer temperatures as one goes up in the atmosphere, resulting in an inversion. Inversions do not form every night, since a cloudy sky or strong surface winds mixing the atmosphere will not allow the ground temperature to cool very much (with respect to the atmosphere above it).

How does this relate to the radar? The shape, or curvature, of the radar beam is highly dependent on the temperature and moisture profile of the lower atmosphere. If an inversion is present, then the radar beam will be bent downward, back toward the earth. The stronger the inversion, the greater the bend of the beam. The National Weather Service 88D Doppler radar can "suppress " the magnitude of the false echoes created by the inversion (known to meteorologists as Anomalous Propagation or AP). However, the radar can not completely eliminate this natural occurrence. Thus, the large pattern of circular echoes will be present on nights when the inversion is present.

When an inversion is present, several other things also occur to help create the rapid explosion of the reflectivity pattern. The inversion acts like a ceiling, which traps smoke, haze, moisture, dust, pollution or other particles in the lowest few thousand feet of the atmosphere. The NWS Doppler radar is sensitive enough to detect these very small particles trapped in the lower atmosphere. The radar is also sensitive enough to detect insects during the summer. Shortly after sunset when the insects start swarming, the radar will rapidly "light up" with returns. So the late evening radar "explosions" mean that either its getting cooler outside, or during the summer, get the insect repellent!

If you have any questions regarding the interpretation of radar imagery, you can contact me via e-mail at Chris.Miller@noaa.gov. I'll answer your radar interpretation questions, and may even use them as topics in future Lincoln Logs newsletters!



Summer's Heat: Are you prepared for it?

By Melissa Byrd, Meteorologist

Summer across Central Illinois usually means hot temperatures and high humidity. It is important to be prepared and know what to do if you or someone you know feels the effects of the heat and humidity.

During the summer months, if the Heat Index is expected to be at least 105 degrees for 3 hours or more with a minimum Heat Index of at least 80 during a 24 hour period...the National Weather Service office in Lincoln will issue a **Heat Advisory**. Now if the Heat Index is expected to be at least 115 degrees for 3 hours or more with a minimum Heat Index of at least 80 during a 24 hour period...the NWS in Lincoln will issue an **Excessive Heat Warning**.

You are probably wondering what is **"Heat Index"**. The Heat Index (HI), given in degrees F, is an accurate measure of how hot it really feels when relative humidity (RH) is added to the actual air temperature. On the left side of the chart is current air temperature and on the top is the current relative humidity. Find the current air temperature on the chart and follow it to the right...to the column that is the current relative humidity. At this intersection is the current Heat Index or how hot it really feels. Note on the HI chart the shaded zone above 105 degrees F. This corresponds to a level of HI that may cause increasingly severe heat disorders with continued exposure and/or physical activity. The "Heat Index vs. Heat Disorder" table (to the right of the HI table) relates ranges of HI with specific disorders, particularly for people in higher risk groups.

Sweating, by itself, does nothing to cool the body, unless the water is removed by evaporation and high relative humidity retards evaporation. Heat disorders generally have to do with a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating, or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise and heat-related illness may develop.

The following are ways you can prevent this from happening:

Slow down. Strenuous activities should be reduced, eliminated, or rescheduled to the coolest time of the day. Individuals at risk should stay in the coolest available place, not necessarily indoors.

Dress for summer. Lightweight light-colored clothing reflects heat and sunlight, and helps your body maintain normal temperatures.

Put less fuel on your inner fires. Foods (like proteins) that increase metabolic heat production also increase water loss.

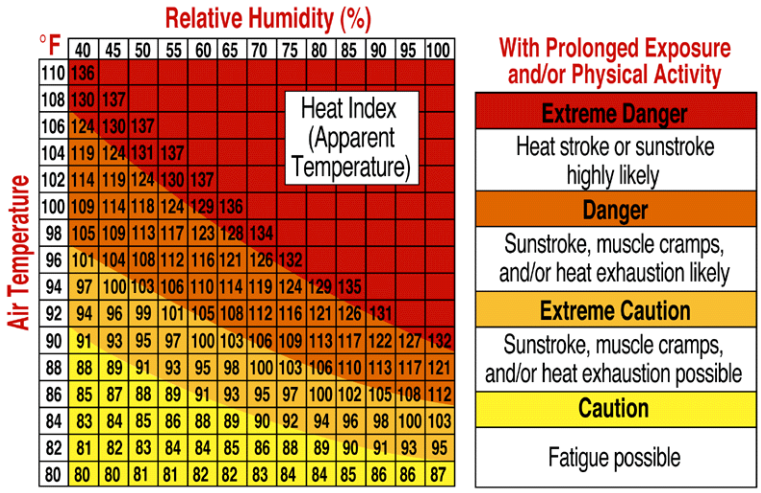
Drink plenty of water or other non-alcoholic fluids. Your body needs water to keep cool. Drink plenty of fluids even if you don't feel thirsty.

Do not take salt tablets unless specified by a physician. Persons on salt restrictive diets should consult a physician before increasing their salt intake.

Spend more time in air conditioned places. Air conditioning in homes, malls, and other buildings markedly reduces danger from the heat.

Don't get too much sun. Sunburn makes the job of heat dissipation that much more difficult.

For more information on heat wave tips try online at
http://weather.noaa.gov/weather/hwave.html
or
www.redcross.org/disaster/safety/heat.html



SWOP's 1st Anniversary -

Central Illinois SWOP Program Moving Along Nicely

by Lonnie Fisher, Meteorologist Intern

The SWOP, or Significant Weather Observation Program, established in Spring of 2000, continues to grow each month. The program recruits citizens interested in weather and providing information to the NWS through the Internet. At present, there are over 200 observers interested in the program. Of these, roughly 150 have internet access, making them part of the current network. The observers that do not have internet access will hopefully be utilized in the near future through other programs.

In an effort to make communications between observers and the NWS, Internet programs called Instant Messengers are used. These programs are free to the public at many different web sites and allow users to talk, or chat, with other users using the same program. Presently, Central Illinois uses ICQ and AOL Instant Messenger. Nearly 80 of our observers use one of these programs and in some cases both programs.

The National Weather Service's primary resource for climate data is the Cooperative Observer (COOP). However, most of these observers report every day, at the same time and occasionally, we cannot get a hold of them after their report as many are businesses or public service staff. The SWOP is geared more towards those people with no set schedule that want to help out their community, but may not be able to be tied down to any long term commitments.

Presently, we either have only a few observers or have no observers in the following counties: Cass, Scott, Macon, Christian, Clark, Crawford, Richland, Lawrence, and Cumberland. If you know of anyone who may be interested in helping the weather service provide weather information "as it happens" via the SWOP, we would like to hear from you, or them. Please pass on the name, address, phone number and email of any interested parties and we will take it from there. Just drop the information to Dan.Kelly@noaa.gov and we will get back with you as soon as possible.

Illinois Science Olympiad

by Ed Holicky, Meteorologist

The National Weather Service office at Lincoln, Illinois and the Central Illinois AMS chapter combined to create a program for the Illinois Science Olympiad. Rod Palmer (WCM, and President of AMS), Chris Miller (Lead Forecaster and AMS), Ed Holicky (Forecaster, Vice-President of AMS), and Julie Bauer (Malmberg) (Student Volunteer and AMS) were involved in creating the program. The program was designed to test the top 30 High Schools in weather sciences at the event called "Dynamic

Planet". Ed Holicky and Julie Bauer (Malmberg) supervised, assisted, and graded the youths during the event. Coaches and students gave the NWS and AMS outstanding reviews of the event. The state director also stated that because of the outstanding program, he will recommend that we attend the National Science Olympiad in future years. The National Weather Service office at Lincoln, Illinois and the Central Illinois AMS Chapter, will continue to work together to present the program in future years.

The DAPM Corner

by Billy Ousley, DAPM

The Historical Climate Network (HCN) is made of Coop Stations having at least 80 years of high quality data in a stable environment. The HCN has been identified as the data source of choice for climate change research. The HCN was compiled in response to the need for an accurate, unbiased, modern historical climate record for climate change research. The Carbon Dioxide Research Program of the U. S. Department of Energy and the National Climatic Data Center (NCDC) of the National Oceanic and Atmospheric Administration (NOAA) established a network of 1219 stations in the contiguous United States for the specific purpose of compiling a data set suitable for detecting and monitoring climate change over the past two centuries.

One of the objectives in establishing the U.S. HCN was to detect secular changes of regional rather than local climate. Therefore, only those stations that were not believed to be influenced to any substantial degree by artificial changes of local environments were included in the network. To be included in the U.S. HCN, a station had to be active and have at least 80 years of mean monthly temperature and total monthly precipitation data, and have experienced few station changes. An additional criterion that was used in selecting the 1221 U.S. HCN stations, which sometimes compromised the preceding criteria, was the desire to have a uniform distribution of stations across the United States.

The 1221 station U.S. HCN database contains station histories, monthly temperature (maximum, minimum, and mean) data, and total monthly precipitation data that were compiled by NCDC after being extracted from digital and nondigital data sets archived at NCDC. These data sets originated from a variety of sources, including climatological publications, universities, federal agencies, individuals, and data archives. All stations were quality controlled by NCDC with the use of outlier and areal edits, and each station in the network was corrected for time-of-observation differences, instrument changes, instrument moves, station relocations, and urbanization effects. A unique feature of the data set is that, within most temperature and precipitation data files, both original and adjusted estimates are given, along with confidence factors for each adjusted estimate. Another unique feature of the database is that in relation to the long periods of record, a small portion of the data are represented as missing. In order to make the U.S. HCN record as serially complete as possible, missing data have been estimated by using data from neighboring stations. The majority of the 1221 stations have had data records that are serially complete since 1900; where serially complete is defined as having original or adjusted data available for all months after the reported serially complete date for a given station.

The U.S. HCN database represents the best monthly temperature and precipitation data set available for the contiguous United States. Unlike many data sets that have been used in past climate studies, these data have been adjusted to remove biases introduced by station moves, instrument changes, time-of-observation differences, and urbanization effects. It provides an accurate, serially complete, modern historical

climate record that is suitable for detecting and monitoring long term climatic changes on a regional scale and may be used for studies attempting to determine the climatic impacts of increased concentrations of greenhouse gases. The U.S. HCN climate record may also be used by dendrochronologists and paleoclimatologists for calibrating tree ring growth, pollen, and marine plankton data or by those studying the climatic impacts of periodic events such as El Nino/Southern Oscillation or volcanic eruptions. Those studying longterm climatic changes on smaller scales, may want to review the information given in the appendices in order to identify the stations most suitable for their research needs.

The station inventory file that follows provides a list of the 15 Central Illinois stations in the HCN. The file provides essential information about each station. Each record contains the state number, station number, latitude and longitude coordinates, station elevation, station name, two letter state code, beginning year of record in the station history file, ending year of record in the station history file, beginning year of record for the minimum, mean, average, maximum temperatures, and precipitation in the HCN files, and the beginning year of record for minimum, mean, average, and maximum temperatures in the urban files.

After the State abbreviation, eleven sets of numbers (years) are listed. They correspond to what is listed below.

1 - BYRSHF is the beginning year of record in the station history file.

2 - EYRSHF is the ending year of record in the station history file (9999 indicates the station is still in operation).

3 - HCNMN is the beginning year of record for a station in the minimum temperature data file.

4 - HCNAVG is the beginning year of record for a station in the mean temperature data file.

5 - HCNAV2 is the beginning year of record for a station in which both the maximum and minimum temperature data are available.

6 - HCNMX is the beginning year of record for a station in the maximum temperature data file.

7 - HCNPCP is the beginning year of record for a station in the precipitation temperature data file.

8 - URMN is the beginning year of record for a station in the minimum temperature, urban heat island effect data file. (NCDC generated temperature files in which the biases introduced by urbanization effects were removed).

9 - URAVG is the beginning year of record for a station in the mean temperature, urban heat island effect data file.

10 - URAV2 is the beginning year of record for a station in which both the maximum and minimum urban heat island effect temperature data are available.

11 - URMX is the beginning year of record for a station in the maximum temperature, urban heat island effect data file.

HCN Stations in Central Illinois

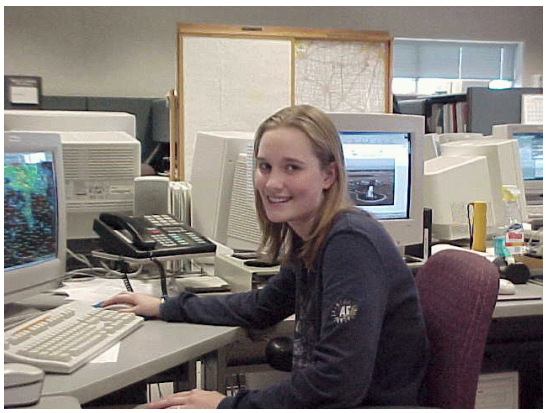
- 111436, 39.48 -88.17, 680, CHARLESTON, IL, 1896 9999 1897 1897 1899 1897 1898 1896 1896 1896 1896
- 112140, 40.13 -87.65, 558, DANVILLE, IL, 1895 9999 1898 1896 1901 1898 1895 1897 1895 1897 1897
- 112193, 39.83 -89.02, 620, DECATUR, IL, 1868 9999 1893 1876 1896 1893 1869 1893 1889 1893 1893
- 114198, 40.47 -87.67, 710, HOOPESTON 1NE, IL, 1887 9999 1887 1889 1887 1887 1888 1893 1887 1893 1893

- 114442, 39.73 -90.20, 610, JACKSONVILLE 2E, IL, 1858 9999 1895 1860 1898 1895 1862 1895 1888 1895 1895
- 115079, 40.15 -89.40, 590, LINCOLN, IL, 1906 9999 1907 1906 1908 1907 1908 1906 1906 1906 1906
- 115712, 40.90 -89.05, 750, MINONK, IL, 1886 9999 1898 1888 1897 1898 1887 1896 1892 1896 1896
- 116446, 38.70 -88.07, 480, OLNEY 2S, IL, 1887 9999 1897 1888 1896 1897 1887 1896 1887 1896 1896
- 116558, 39.00 -87.62, 520, PALESTINE, IL, 1882 9999 1894 1883 1896 1894 1882 1893 1882 1893 1893
- 116579, 39.38 -89.08, 700, PANA, IL, 1869 9999 1894 1870 1893 1894 1871 1893 1887 1893 1893
- 116610, 39.62 -87.70, 720, PARIS WATERWORKS, IL, 1886 9999 1893 1887 1893 1893 1886 1893 1886 1893 1893
- 117551, 40.12 -90.55, 660, RUSHVILLE, IL, 1889 9999 1893 1891 1893 1893 1891 1893 1889 1893 1893
- 118147, 38.17 -89.70, 520, SPARTA 3N, IL, 1887 1993 1894 1888 1897 1894 1888 1893 1887 1893 1893
- 118740, 40.10 -88.23, 743, URBANA, IL, 1888 9999 1889 1889 1889 1889 1889 1893 1888 1893 1889
- 119354, 39.43 -88.60, 685, WINDSOR, IL, 1885 9999 1888 1887 1887 1888 1886 1893 1887 1893 1893

Meet the Staff

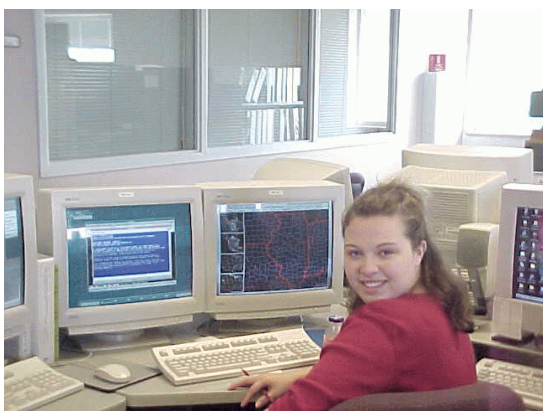
My name is Karly Hellrung and I am a student volunteer at the National Weather Service Station in Lincoln. I am here for the summer and will be answering the phones, taking weather observations, and talking with our COOP volunteers. I hope to also come out and meet some of you while I am here. I am looking forward to talking to you and meeting some of you.

I am going to be a junior at the University of Illinois and am getting my bachelors in meteorology. I plan on getting my teacher's certificate, so I can be a Teacher's Aid in graduate school. I also plan on going to graduate school at the U of I. I am not for sure exactly what I want to do with my major yet, but I do know that working at the Weather Station has been very interesting and has taught me so much already.



Hello! My name is Caroline Baumann and I am a student at Western Illinois University in Macomb. My major is Geography with a concentration in Meteorology, and my minor is Geology. I am working toward my Bachelors degree. I chose meteorology because I love storms and wanted to learn as much as I could about weather because of my strong interests in this area.

I have job shadowed at Lincoln twice, and now I am a Student Volunteer Intern. I will be here through the summer months helping out and learning as much as I can about weather. I have also interned for K100, a radio station, and the campus radio station in Macomb.



My goal is to work for a NWS, the EPA, or radio.

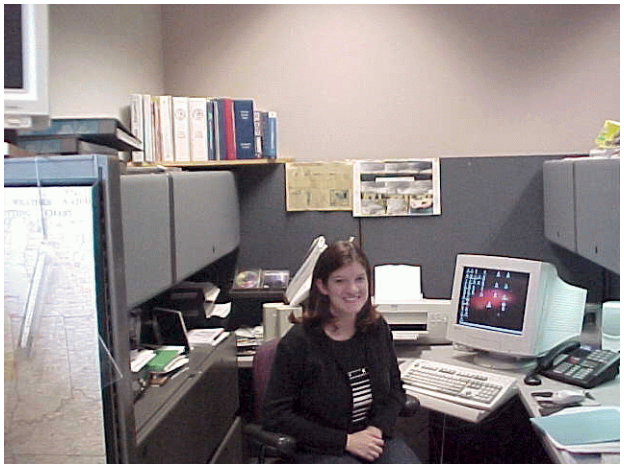
Hi! My name is Julie Malmberg and I am a SCEP (Student Career Experience Program) employee here at the National Weather Service in Lincoln, Illinois. I might have talked to some of you on the phone or on the computer while I was a student volunteer at the NWS during the summer of 2000. And now I am back as a paid employee!

I grew up in Springfield, IL, and graduated from Springfield High School in 1997. I received my Bachelor's degree in Atmospheric Sciences from the University of Illinois at Urbana-Champaign in May 2001.

Currently, I am a graduate student at the University of Illinois at Urbana-Champaign, where I am pursuing a Master's degree in Atmospheric Sciences. Along with working here and being a student, I am a teacher's assistant for Introduction to Meteorology at the U of I.

In my free time, I like spending time with my new husband, Jason (we got married on May 26, 2001), playing with my cats, Louie and Isabella, and traveling as much as possible.

After I get my Master's degree, I would like to work as a meteorologist–preferably somewhere cold.



Words of Wisdom from the WCM

by Rod Palmer, Warning Coordination Meteorologist

StormReady is a National Weather Service (NWS) program that promotes readiness by a community to receive and disseminate severe weather watches and warnings to its residents in a timely and effective manner. This means the community must have a 24-hour warning point, have several methods to receive and disseminate warnings, effectively place NOAA Weather Radios (NWR) in public buildings, schools, nursing homes, hospitals, day care centers, factories, etc., and promote its usage in individual households. The emergency manager must maintain and promote a volunteer severe weather spotter team and have a structured plan for operations during severe weather events. For more detailed information on StormReady, see the following website on the internet: www.nws.noaa.gov/stormready

So far, five communities have been certified as StormReady in central Illinois. These are **Savoy**, **Champaign, Urbana, Peoria, and Flora.**

Each StormReady community is issued two steel roadsigns designating the community as StormReady. Additional signs can be purchased if the community wants more

Remember, StormReady does not mean Storm Proof !! It means that the residents of that community have a better chance to survive the threat of severe weather.

StormReady
NATIONAL WEATHER SERVICE

NOAA Weather Radio

NOAA Weather Radio (NWR) continues to expand across all of Illinois. Two years ago, there were only **seven** NWR transmitter sites in Illinois. By the end of this summer there could be **27**!

In Central Illinois we've added transmitter sites at Jacksonville, Shelbyville, Paris, Newton, Hillsboro, Jerseyville, Macomb, Odell, and Watseka. Galesburg and Bloomington-Normal are to be added late this summer. A site is due to be added at Kankakee and realignment of NWRs at Oregon (south of Rockford) to individual sites at Dixon and at Rockford. Another realignment would place a transmitter in a western suburb of Chicago with the transmitter on top of the Sears Tower utilized for marine weather broadcasts over Lake Michigan.

A new, improved "voice" of NWR is in the not too distant future. The voice will still be a synthetic computerized voice, but will be much clearer and more "human-like!" This should happen around the first part of next year. If you would like to hear the choice of new voices and have an opportunity to comment on your favorite, check out the following website:

www.nws.noaa/nwr

MARK TRAIL NOAA WEATHER RADIO AWARDS

The Mark Trail Award is presented to individuals, state, county, and municipal governments, non-government organizations, and corporations for noteworthy community actions, gifts, and individual or group response to NOAA Weather Radio (NWR) warning broadcasts that exemplify the lifesaving benefits of NWR. Only 15 individual and organizational awards are given each year.

Syndicated by King Features and published in approximately 175 newspapers nationwide, the Mark Trail Award comic strip character has been the "official" spokesman for NWR since 1997.

This year, two of the 15 awards were presented to Illinois recipients: the **Illinois Emergency Management Agency** (IEMA) and **Jim Pitchford**, Emergency Services and Disaster Agency Coordinator for Macoupin County.

IEMA was presented with the award for their advancement of public safety through their "STAR" (Surviving Tornadoes through Awareness and Reaction) program. During the past two years, IEMA has provided grants to local entities for the distribution of NWR Alert Receivers. Nearly 8,000 receivers have been distributed throughout the state to 45 communities and counties, including 125 receivers equipped with strobe lights and tactile sensors for the hearing impaired. The National Weather Service and the Illinois Insurance Association are partners with IEMA's "STAR" program.

Jim Pitchford received the award for using a $50,000 Illinois First Grant to improve NWR and weather communications in Macoupin, Greene, and Montgomery Counties. NWR receivers were placed at all schools, day care centers, nursing homes, hospitals, colleges, government buildings, fire stations, police departments, all hotels, golf courses, school bus garages, radio stations, storm spotters, fire chief's homes, and places of business. In addition, NWR receivers have been provided to the coaches in all school districts throughout the tri-county area.

Congratulations to **Jim** and **IEMA Director**, **Mike Chamness**, **and his staff** for the advancement of NWR in the state, especially in those areas where NWR expansion is completely new.

Jim Pitchford and **Tom Zimmerman**, Policy Advisor, for IEMA attended an award luncheon in the Rayburn House Office Building in Washington, D. C. on May 23rd. The presentations were made by Scott Gudes, Acting Administrator of the National Oceanic and Atmospheric Administration and Jack Kelley, Director of the National Weather Service.

Co-op Maintenance Notes

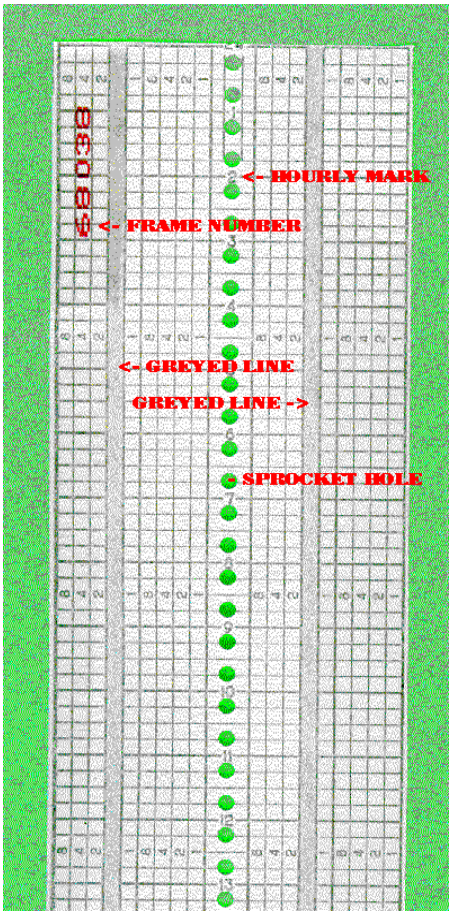
by John Parr, HMT

Fisher and Porter Rain Gauge Network

With the large amounts of rain during the past couple of months, now would be good time to check the amount of water in the bucket. To do this; open the access door on the front and check the indicator that is located above the circular wheel that is located on the right side of the gauge. If the black pointer is in the green area (10" -20" range) the bucket should be drained. If the bucket needs to be drained, it is best to wait until the end of the month and drain the bucket at the same time that you change the tape. That way, the continuity of the month's accumulation will not be lost. Do not let the amount in the bucket fall below 2", otherwise the mineral oil that is in the bucket will be drained out and evaporation could take place which will cause the paper tape to actually count backwards as the water in the bucket evaporates out of the unit. The layer of mineral oil helps to prevent this from happening.

On another note, when you change the tape each month, please do two things for me. After threading the tape through the punch block and put the tape on the take up spool, draw a line with your red pen across the top of the punch block at the correct time that you change the tape and write the day-month-year and the actual time (by your watch or clock) that you start the tape. Your station number and location should also be on the start of the tape.

At the beginning of the next month when you change the tape, please again draw a line above the punch block and put the <u>actual</u> time that you take the tape off, the date, your station number, and your station name. The reason for all this is to let me know the actual time so I can check this against the tape to make sure the tape has punched correctly all month. If not, I can figure out how much time the tape is off if a problem cropped during the month that may have to be looked at with a visit to your site.



This will also help in the quality control that I do on each tape that is sent into the office each month.

Interpreting the Tape

The interpretation of the tape must begin with an overview of its layout. The tape is divided into 24 uniquely numbered hourly time frames, each just under a foot in length. Sequential frame numbers are printed in **red** just after the beginning of each 24 hour frame. The time printed on the tape is in military format (24-hour clock) where 9 PM is

indicated as 21 for the twenty-first hour of the day.

Note the two greyed lines, approximately 3/8 inch from each edge of the tape, that run the entire length of the tape. These lines are for reference punches which occur at each and every punch cycle regardless of the amount of precipitation in the gage's collection bucket. It is important to note that punches appearing in these greyed areas indicate to the optical tape reader that the gage is operational, even if no data holes are punched, i.e., for reading of 0.0 inches of precipitation.

Decoding the Punched Values: Each of the vertical divisions paralleling the greyed lines form a reference amount for the precipitation accumulated in the collection bucket. Look at the tape with the earliest hour in the 24 hour frame at the top. Each set of four vertical columns represent a digit in the accumulated precipitation amount. Gage measurements range from 0.0 through 19.9 inches, the maximum capacity of the gage.

Four sets of columns labeled 8-4-2-1 represent 4 unique digits in the accumulated precipitation measurement. The digit value is determined from the total punches within each set. In the table below, the "o" represents a punch in the columns which are labeled, from left to right, 8, 4, 2, and 1, respectively.

8	4	2	1	Value
				0
			o	1
		o		2
		o	o	3
	o			4
	o		o	5
	o	o		6
	o	o	o	7
o				8
o			o	9

This table above shows how each digit set would be punched for the numeric values 0 through 9. To obtain the numeric values, add up the column values that are punched. For those of you familiar with binary numbers, the punched columns represent the binary number for the numeric value where a hole equals 1 and no hole equals zero.

Returning to the tape, the first digit set on the right represents the tenths value of the gage's accumulated precipitation; the second set from the right represents whole inches; and the third set from the right represents 10s of inches. The fourth digit set (the left hand set) is not used by the gage because the maximum measurement is 19.9 inches.

As an example, one row on the tape might look like the following table:

8	
4	
2	
G	o
1	
8	
4	
2	
1	o
S	o
8	o
4	
2	
G	o
1	o
8	o
4	
2	
1	o
Value	19.9

The value represented by this row of punches is 19.9 inches of accumulated precipitation. Ignoring the punches for the greyed lines (G) and the sprocket holes (S), the first digit set (on the left) is not punched, as expected. Working from left to right, the second digit set has one punch under "1"; the next digit set has two punches under "8" and "1"; and the third digit set has two punches under "8" and "1". These punches represent a value of 1,9,9 or, when decoded, 19.9 inches, the maximum gage measurement.

The code format for each row is known in the computer world as *binary coded decimal* or *BCD*.

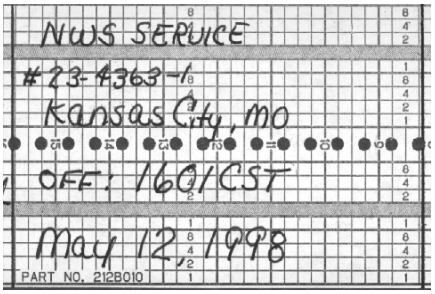
As the precipitation amount increases with time, the accumulated amounts are punched out for each 15 minute time period thereby producing a complete record of precipitation versus time for the gage site. The increase in precipitation from one hour to the next can easily be determined by subtracting the two hourly totals to find the amount of precipitation that has fallen during the period.

Encoding the Punched Values: The gage mechanisms are designed to translate the precipitation measurement into holes on the punch tape. The gage mechanically reverses the process just described for decoding punch tape codes. Each digit of the gage's accumulated amount is transferred to the code disk and punch block as individual numbers (tenths, whole inches, and tens of inches). For example, punch holes record each digit of a value using the appropriate combination from the 8-4-2-1 digit set as needed to make the required digital value. An accumulated amount of precipitation in the gage's bucket which corresponds to 15.7 inches would appear punched on the tape as follows.

- For the tenths value is a 7, the gage would show holes punched in the 4, the 2, and the 1 in the first digit set on the right which represents the tenths value. These three numbers add up to 7 which is the desired tenths value.
- For the whole inch value of 5, in the second digit set from the right, the 4 and the 1 would be punched to add up to 5.
- The 10s of inches digit set would show a punch hole in the 1 only.
- Because the maximum capacity of the gage is 19.9, no holes left of the 1 in the 10s of inches digit should be punched other than the grey reference line as discussed earlier.

Service and Annotation of the Tape

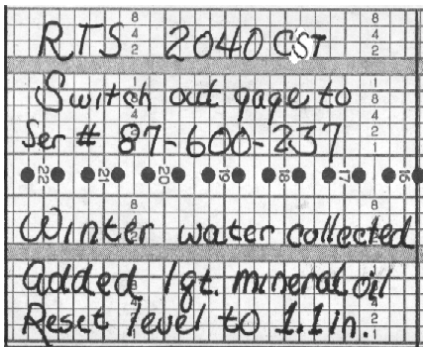
Before performing service on any operational punch tape gage at a field location, it is very important to immediately ***draw a line across the top of the punch block*** to serve as time reference for comparison between time of day shown on the tape and time being punched on the tape upon taking the gage out of service. The figure at the left shows how this annotation might appear. It is also important to manually advance the tape leaving an area where the greyed areas are not punched. This gap in punches in the greyed areas will stop the optical reader used by the National Climatic Data Center (NCDC) to decode the tape. It will require the operator of the reader to inspect the tape to determine why it stopped. This break is intentionally introduced at the time of gage service. The information listed below is the minimum information that should be annotated on the tape.



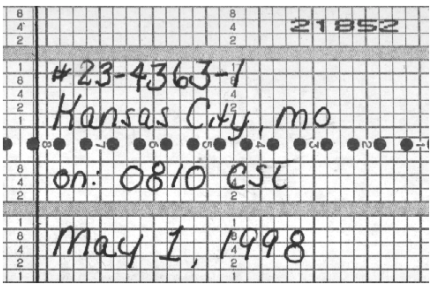
Station Number Station Name (as it appears on the B-44 for the station) *and* ***Date and Off Time***

Once the service has been completed and the gage is ready to return to service (RTS), you should annotate the ***On Time*** plus any pertinent

information regarding the service done on the gage. The figure at the left illustrates what a typical annotation might look like. This annotation should always include any ***Changes in Bucket Level*** from the level the gage was at when it was removed from service for repairs. It is also suggested that the you initial the annotation to facilitate quality control of the tape once received at the NWS office.

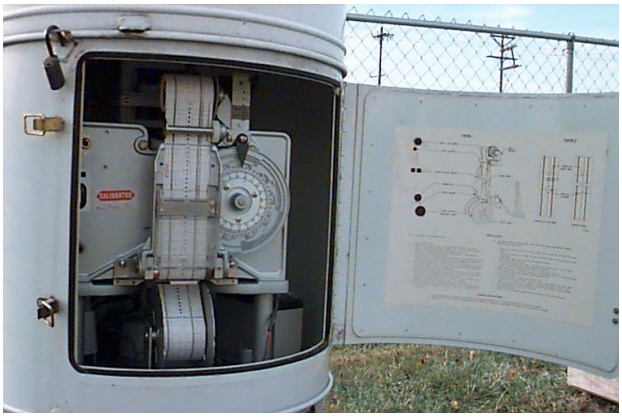


When you are ready to place the gage back in service, you must manually advance the tape to where the current local clock time and reference time on the tape at the punch can be synchronized. This advancement will usually result in the loss of at least one frame and corresponding frame number. This loss is referred to as a frame count "offset". This offset must be accounted for when quality control checks are performed for the proper number of frames contained on the tape between ***ON*** frame at the first part of the month to ***OFF*** frame when the tape is removed by the gage caretaker for mailing to the WFO.



The figure at the left shows an example of an annotation that might be made when the tape is changed. The ***ON TIME*** is shown as 0810 CST, MAY 1, 1998. A similar type of annotation would be used for the ***OFF TIME***.

It should be emphasized to the caretaker that the tape should never be removed from the gage prior to the first of the new month. This ensures that the entire month is on the tape for processing at NCDC. Also, any hourly precipitation data sent for days after the 1st of a month is stored in NCDC's computers so that subsequent data from the next tape will meld correctly to make a complete month.



The Central Illinois Lincoln Logs is a quarterly review of NWS activities in Central Illinois and is also available on our internet page at www.crh.noaa.gov/ilx.

Your comments are welcomed and can be addressed to either editor at our office. If you are currently receiving the newsletter through the mail and now obtain it through the Internet...please send us an email and we will remove your name from the mailing list. Fall Central Illinois Lincoln Logs Issue to be issued by the end of August 2001.

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