EYE ON THE SKY

National Weather Service
Louisville, Kentucky

Winter 2002/2003
Volume 3, Issue 4

A Newsletter for Emergency Managers, Core Storm Spotters, Media, and Public Officials in Central Kentucky and South-Central Indiana

Comments and suggestions are always welcome. Your feedback is very important to us!

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A Message From the Top

Welcome to this edition of Eye on the Sky! This public service publication began in Spring 2000 as a partnership and communication conduit between spotters, emergency managers, media, and the National Weather Service (NWS).

It is an honor to take over the role of Meteorologist-In-Charge (MIC) of NWS Louisville. I have a varied background in weather but few of my experiences will compare to the challenge of forecasting for the Ohio Valley. My most recent weather experience was as the MIC in Missoula, Montana where winter weather and fire weather were the main concerns. Prior to this, I was the Warning and Coordination Meteorologist (WCM) in Glasgow, Montana and a forecaster in Duluth, Minnesota. I also spent some time doing radio and television weather in the Chicago area where I am originally from. It is great to be back to a part of the country that experiences a wide variety of significant weather.

The severe weather outbreak on November 10 and recent snowstorm on December 4-5 are reminders of how important the teamwork between the National Weather Service and our partners is to public safety. I am eager to continue the tradition of providing top quality weather services to the people of central Kentucky and south-central Indiana. Our NWS staff, storm spotters, emergency mangers, and the media have a tremendous reputation in providing top notch warning services. Working together as a dedicated team, with you as our partners, ensures the safety of those we serve. I thank you all for your tireless efforts in our common goal.

If you are ever in the neighborhood, I invite you to come by and visit “your" National Weather Service office. We’d like to meet you, show you our operations, and answer any questions you may have. Let me know if you’re interested by calling me at 1-502-968-8842 X 642. Have a safe winter and happy holidays.

Regards,
Kim Pye
Meteorologist-In-Charge, Louisville, KY

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Seasons Greetings and Warm Holiday Wishes from our family to yours!

Weather Office With a Heart

by Pam Lozier, Administrative Support Assistant

Please let me introduce myself. My name is Pam Lozier, the administrative support assistant at NWS Louisville. I joined the NWS staff in June 1995. Since then, my job has been to assist with the effective administration of office operations. Details of my position will be covered in another newsletter issue.

I am writing now to tell you about the "Weather Office With a Heart." First, you must know about the Combined Federal Campaign (CFC). The CFC is an opportunity through the selfless efforts of federal employees to give generously to literally hundreds of worthy causes and charities, such as the United Way, American Red Cross, American Cancer Society, and many other local and national organizations. For 35 years, CFC's mission has been "to promote and support philanthropy through a program that is employee-focused, cost-efficient, and effective in providing all federal employees the opportunity to improve the quality of life for all."

The staff of 25 federal employees at NWS Louisville recently completed this year's campaign. It was a huge success. The employees donated over $8000 to numerous charities and continued our annual tradition of 100 percent employee participation. I feel blessed to be associated with such a generous group of people. How fortunate we are to have a weather office that not only helps "protect life and property" and "enhance the national economy," but also a weather office with a big heart. With this in mind, my selection of “Caring For Communities” as the Louisville area campaign theme was chosen by campaign officials.

May we celebrate all the wondrous ways in which we have been blessed. During the holiday season, I enjoy reflecting on all I have to be thankful for. I am very honored and proud to be a part of the National Weather Service team in Louisville. Happy Holidays!

Longtime Cooperative Observer Passes Away

by Larry Dattilo, Data Acquisition Program Manager

Mr. Noble Allen of Scottsville, Kentucky in Allen County passed away on November 6, 2002. Mr. Allen was 84 years young and provided the NWS with 55 years of quality service as a cooperative weather observer. Mr. Allen began taking official observations in Scottsville on August 1, 1947 after the previous observer, Williard Cockrell, moved to Bowling Green.

Noble was responsible for recording high and low temperatures, and daily and hourly precipitation amounts. Noble had the last operational Universal rain gage in the Louisville county warning and forecast area. This type of gage measures precipitation and records it continuously. In his earlier days when his children were young, the neighborhood kids referred to his temperature system as the "little house on stilts."

Noble was extremely proud of his weather station. He always took the time to show the children what he was doing, and carried observations in his pocket in case anyone would stop him and ask for previous weather readings. Noble furnished his data to the local newspaper weekly and a summary to the radio station at the end of each month.

Mr. Allen gave the NWS 55 years of quality service.

Noble took his responsibilities very seriously. In the late 1960's, 9 inches of rain caused major flooding that washed away numerous homes. Many people contacted Noble requesting precipitation amounts. During an ice storm in 1994, Noble used household items to measure ice that caused significant damage from downed trees and power lines.

Mr. David Calvert, also of Scottsville, will take over the duties that Mr. Allen performed for so many years. We will miss Noble as both a person and weather observer.

Hazardous Weather Outlook for Winter Phenomena

by Ted Funk, Science Officer

NWS Louisville began disseminating a Hazardous Weather Outlook (HWO) on October 1. These daily outlooks are issued around 6 am local time, then updated as needed for possible significant weather hazards. The HWO discussion extends out to 7 days, with the main focus on the first 24 hours. During the winter, the HWO will highlight the potential for snow, sleet, freezing rain, or even heavy rain in the “extended” part of the HWO (Days 2-7). If a significant threat becomes better defined, a Winter Storm Watch may be issued as necessary. As hazards become imminent, a Winter Storm Warning, Snow Advisory, or Winter Weather Advisory may be issued, with information highlighted in the “short-term” part of the HWO (Day 1). The HWO is broadcast on NOAA Weather Radio and can be accessed from our website at www.crh.noaa.gov/lmk.

The Science Corner

By Chris Smallcomb, Forecaster

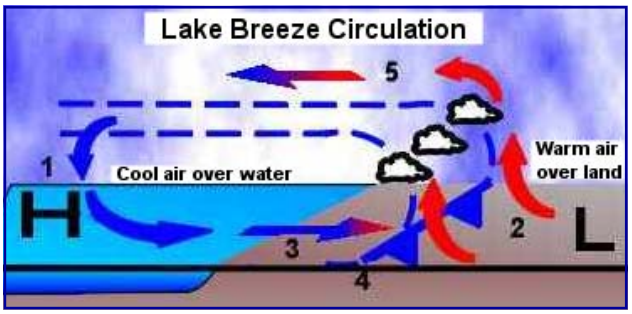
Unusual Winds Across the United States

My mother, who resides just outside of Los Angeles, recently mentioned that one of the largest trees on her property fell onto her greenhouse during a strong windstorm. These winds known as the "Santa Ana Winds" are one of the most unusual across the continental United States, and occur when strong surface high pressure over the Great Basin pushes air towards relative low pressure in the eastern Pacific Ocean. This airflow then is accelerated as it funnels through narrow mountain passes within the high coastal mountain ranges. Northeasterly speeds of 70 to 90 mph are recorded regularly within and just below these mountain passes during a significant Santa Ana. In addition, air is compressed as it descends through the passes, which induces rapid warming of the air. The rate of warming approximates the dry adiabatic lapse rate, or 9.8 degrees C per vertical kilometer. I remember as a child walking in the hills that when these winds began, the temperature would rise by 10 or 20 degrees F within a matter of minutes. Due to the compressional effect, Santa Ana's also are a dry wind which can lead to extreme fire danger. However, one benefit of these winds is that they push air pollution well out to sea and Los Angeles enjoys crystal clear blue skies. The Santa Ana Wind "season" generally is from November through April.

- Santa Ana Wind
- Chinook Wind
- Lake Breeze

A similar wind phenomenon is the "Chinook Wind" along the eastern slopes of the Rocky Mountains. This potent wind comes about when a mid-level (about 700 mb) jet streak (higher speed winds) rushes over the tops of the Rockies. As the air hits the peaks, a vertically-oriented wave is generated just downstream of the ridges. If the vertical temperature profile is just right, the wave eventually can "break" just like a wave crashing onto the beach. The downward rushing air then slams into the ground just east of the mountains. Wind speeds can reach 100 mph in places like Boulder and Ft. Collins, Colorado; Rapid City, South Dakota; and Livingston, Montana during these events. Chinook windstorms are most frequent in the winter months where the eastern slopes of the Rockies are particularly steep.

Another interesting, but far less powerful wind is the "lake breeze" along the shores of the Great Lakes and other large lakes. During the peak heating of the afternoon in spring and summer, relatively lower surface pressure develops across land with higher pressure over the cooler lake waters. Due to the established pressure gradient, a lake breeze ensues with winds blowing off the lakes into nearby land areas. Lake temperatures can still be quite chilly in the spring; thus, a lake breeze can cool temperatures over adjacent land areas from comfortable 60s and 70s to much cooler values in a matter of minutes. Usually the influence of these cooling breezes stretches only 5 to 15 miles inland, but given the appropriate atmospheric conditions can reach 50 or more miles in from the lakeshore. Relatively large cities such as Duluth, Milwaukee, and Chicago can experience this phenomenon frequently. If the air is unstable in the spring or summer, low-level convergence along the lake breeze front can help initiate convection.

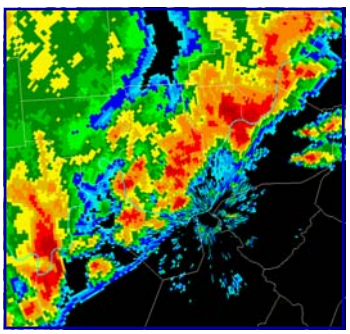


Cool air over the lake (1) has higher pressure "H" than warm air (2) over land where the pressure is relatively low "L." This pressure gradient causes air to flow inland forming the lake breeze (3) and lake breeze front (4). Warm air forced to ascend the front can form cumulus clouds above it. Above the lake breeze (5), a return breeze blows toward the lake, closing the circulation loop.

On a smaller scale, a lake breeze can develop on hot late spring and summer days next to larger lakes in Kentucky, such as Lake Cumberland in Russell, Clinton, and Wayne counties, assuming nearly calm initial surface winds. The breeze can bring light afternoon cooling, although the magnitude and effect of the breeze are less than those associated with the larger, cooler Great Lakes.

In the next issue of "The Science Corner"

A line of severe thunderstorms raced across central Kentucky and south-central Indiana on November 10, 2002. Strong tornadoes occurred in parts of Ohio and Tennessee.



Skywarn Recognition Day

by Van DeWald, Forecaster

On December 7, National Weather Service (NWS) Louisville participated in the fourth annual Skywarn Recognition Day (SRD) co-sponsored by the Amateur Radio Relay League and the NWS. A total of 12 amateur radio operators, including several members from the Bullitt County Amateur Radio Society, volunteered their services and set up 3 amateur radio stations at our office. It was another very successful year with 307 total contacts made, including 39 of 109 participating NWS offices, 41 of 50 states, and 8 countries, including Asiatic Russia, Barbados, Brazil, Canada, Dominican Republic, Puerto Rico, Sweden, and Trinidad and Tobago.

Amateur radio operators play a key role in the warning process and make vital public service contributions to the NWS mission during severe weather. Skywarn Recognition Day is a fun way to celebrate these efforts and to strengthen the cooperative bonds between the NWS and amateur radio community.

Thanks to everyone who participated and we look forward to working with you in the coming year! For a complete review of Skywarn Recognition Day, including photographs, statistics, and QSL card information, visit the SRD webpage at hamradio.noaa.gov.

Wintertime Astronomy

by Chris Smallcomb, Forecaster

Winter in central Kentucky and south-central Indiana can offer some of the best star and planet viewing of the year. Assuming a clear sky, the winter atmosphere contains relatively little amounts of water vapor and small airborne particles compared to summer, mainly due to colder temperatures. This means that there is much less "stuff" in the atmosphere that can distort stars, planets, nebulae, and other night-sky objects. So, if astronomy interests you, go outside and enjoy the night winter sky. Some phenomena that will occur during the winter season include:

- The Geminid Meteor Shower peak occurs during the early morning of December 14. These meteors appear to come from the constellation Gemini, which will be nearly overhead around 3 am est. In an average year, about 80 Geminid meteors per hour can be observed from dark, rural, and clear locations.

- Winter Solstice occurs at 8:14 pm est on December 21, which also is the shortest day of the year. Approximately 9 hours and 31 minutes of direct sunlight can be expected on this day in central Kentucky. This compares with about 14 hours and 50 minutes of sunlight on the Summer Solstice in June.

- Perihelion occurs around midnight on January 4, and is when the earth is at its closest point to the sun in its orbit. Aphelion, the farthest point in earth's orbit around the sun, occurs in early July.

- The planet Venus is at "greatest elongation" on January 11. Since Venus is between the sun and earth, the planet generally stays near the sun as viewed in our sky. During certain times in a year, Venus will be farther from the sun in our sky making it easier to see. On January 11 and the week or two surrounding this date, Venus will be very easy to see before sunrise in the eastern sky. It will be the brightest object in the sky at the time making it hard to miss.

- On January 27, the moon and Mars will be close together in the nighttime sky. On February 4, observers should be able to experience good viewing of the planet Mercury low in the eastern sky just before sunrise. Then on March 12, Venus and Neptune will be close together in the nighttime sky.

- A number of winter star constellations grace the sky from December through February. Among the most famous is Orion, the hunter, which is located high in the southern sky during the late evening hours in winter. Orion contains one of the more colorful stars in the sky, Betelgeuse, which exhibits a distinct orange color almost resembling the planet Mars. Though a star and not a constellation, Sirius, the Dog Star, also moves across the southern winter sky at night. This "bluish" star is only 8.6 light-years away, making it one of the closest stars to our solar system. It also is the brightest star in the sky (except our sun of course).

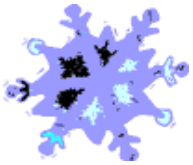
- Three full moons occur during the winter months:
  - Full "Cold" Moon on December 19 at 2:10 pm est
  - Full "Wolf" Moon on January 18 at 5:48 am est
  - Full "Snow" Moon on February 16 at 6:51 pm est

A Snowy Start to the Season

by James Brotherton, Forecaster, and Ted Funk, Science Officer

Although winter will not officially begin until December 21, winter weather forgot to check the calendar. Our area already has experienced a few rounds of cold and winter weather late this fall season.

On the morning of November 17, much of north-central Kentucky and south-central Indiana experienced the first snowflakes of the season as cold north winds brought clouds and moisture from the Great Lakes region southward. The snow was light with only flurries and scattered light snow showers, although a few brief, heavier snow showers occurred over south-central Indiana.



A fast moving storm brought light snow to north-central and east-central Kentucky and south-central Indiana on November 26. A warm ground precluded much accumulation although amounts up to around one inch occurred in some locations.

Then on December 4-5, a winter storm warning was issued for all of central Kentucky and south-central Indiana as a major winter storm brought a hazardous combination of snow, sleet, and freezing rain. Snow was predominant over north-central and east-central Kentucky and southern Indiana where 3 to 7 inches were common. Louisville received 5.4 inches while Lexington reported 3.5 to 4.0 inches. Over south-central Kentucky, the snow changed to freezing rain and sleet resulting in 2 to 5 inch snow amounts (Bowling Green reported 3.5 inches) and a coating of ice. The storm exited the region early on the 5th, followed by the coldest night of the season that night as low temperatures dipped to 10 to 15 degrees in many areas.

Climatologically, snow has occurred from October through May in central Kentucky and south-central Indiana. Normal seasonal snowfall for Louisville and Lexington is around 17 inches. Below is a table of climatological snowfall facts for these two cities.

Event	Louisville	Lexington
Earliest Snowfall	Oct 3, 1980 (trace)	Oct 6, 1952 (trace)
Latest Snowfall	May 20, 1894 (trace)	May 24, 1925 (trace)
Maximum snowfall in 24 hours	Jan 16-17, 1994 (15.9 inches)*	Jan 26, 1943 (13.4 inches)
Maximum snowfall in one month	Jan 1978 (28.4 inches)	Jan 1978 (21.9 inches)
Maximum snowfall for Christmas	1890 (5.0 inches)	1935 (6.5 inches)

* Note that the maximum snowfall from one storm in Louisville was 22.4 inches from February 4-6, 1998.

This year, a moderate El Nino pattern continues in the equatorial Pacific Ocean. During most El Nino years, its effects on weather patterns across the Ohio Valley are such that seasonal snowfall and total precipitation are below normal. However, there have been a few recent studies correlating a cold autumn season during a moderate El Nino with a subsequent cold winter, as seems to be the case this fall. Nevertheless, the jury is still out on this winter. And remember also that averages can be deceiving. One large snowstorm or one bitterly cold arctic outbreak in an otherwise mild, relatively dry winter can result in what appears to be an average winter, when in fact the majority of the winter was relatively tame. We shall see.

Severe Weather Statements Changing to County Codes

by Van DeWald, Forecaster

As follow-up messages to all severe thunderstorm and tornado warnings, NWS Louisville issues “Severe Weather Statements” (SVSs) as needed. These statements update the location and movement of the severe storms, specify towns in their path, and provide any severe weather reports that have been received.

Effective December 18, 2002, the NWS changed the Universal Geographic Code (UGC) in Severe Weather Statements from the Zone (Z) form of the UGC to the County (C) form. County UGCs follow the federal information processing standards (FIPS) for its numbering system. County/FIPS UGCs also are used in tornado, severe thunderstorm, and flash flood warnings, and in tornado and severe thunderstorm watches.

Thus, you may need to contact your weather provider vender to change from Zone to County codes if necessary in order to continue receiving our SVSs. For a complete listing of both Zone and County codes, check our website at www.crh.noaa.gov/lmk/cwa.htm or www.crh.noaa.gov/lmk/news/2002/111402.htm.

Rain, Snow, Freezing Rain, and Sleet...YUCK!

by Tony Sturey, Lead Forecaster

During the course of this winter, you may hear forecasts from NWS Louisville having many, if not all of the winter weather elements mentioned above. Is this type of forecast issued because we're unsure of the precipitation type? Probably not, and let me explain why!

Central Kentucky and south-central Indiana reside at a latitude where cold air can penetrate during the winter, but normally these cold snaps do not last that long. The coldest and most frigid temperatures are associated with a large snow pack over the northern tier of the United States extending into the Midwest and Upper Ohio Valley. Without the snow pack, cold air has a chance to modify somewhat on its journey southward. Meanwhile, low pressure storm systems normally have preferred tracks across the country in the winter. These tracks include from the southern Plains to the Great Lakes (to our west), and from the southeastern states up the East Coast (to our south and east).

When a storm tracks to our west, our area commonly becomes located within the "warm sector" of the storm. However, cold dense air occasionally may be established across the Ohio Valley and has to be "scoured out." As a result, when a storm passes to our west, frozen (snow) and/or freezing (sleet or freezing rain) precipitation usually falls at the onset until enough warm air arrives to scour out the cold resulting in a changeover to rain.

Of course, this is a very simple explanation of how the atmosphere operates, and many small scale features play important roles in determining the type, duration, evolution, and timing of frozen, freezing, and liquid precipitation. Such features are not normally displayed on TV weather maps, but these atmospheric phenomena can interact in a complex fashion over our area to result in a variety of precipitation types.

A storm traveling across the Southeast and up the East Coast can be tricky as well. The track (location) of the low can mean the difference between a complete miss to a substantial precipitation event around our region. For a low pressure system located far enough east along the Atlantic seaboard, the westward movement of significant moisture usually is blocked by the Appalachian mountains. Conversely, a storm that tracks near the spine of the Appalachians can wrap significant moisture back into central Kentucky and south-central Indiana. Forecasters still must assess the temperature structure in the lower and mid levels of the atmosphere. With this storm track, precipitation type in our area often is snow, but sleet, freezing rain, or rain also could occur if atmospheric temperatures are not sufficiently cold, especially across south-central Kentucky. Thus, knowledge of cloud physics and dynamic vertical temperature profiles are crucial variables that must be considered in forecasting winter precipitation type.

These are some of the "weather forecast obstacles" we face during the course of a winter season. Challenging, you bet, but this helps explain the potpourri of weather that often occurs in winter across our region of the country.

Flash Flood Hot Spots...We Need Your Help

by Don Kirkpatrick, Lead Forecaster

NWS Louisville is coordinating with each county Emergency Manager (EM) in our county warning area across central Kentucky and south-central Indiana to research flash flood history and current flood vulnerability. In an effort to provide better future service, we are asking each county EM the following questions:

1) Are you a flash flood prone county?
2) Where have you had road closures or building evacuations in the past?
3) Is your flash flooding due to terrain/soil type, the rapid rise of nearby streams or creeks, and/or poor urban drainage?
4) Where are the most dangerous parts of the county for flooding (hot spots)?

Our goal is to make better warning decisions based on county flash flood potential and provide detailed information for the area involved. We will zoom in on the highest radar rainfall estimates and with the help of our spotters, determine the need for a warning or statement predicated on our knowledge of individual county terrain, stream, and drainage features.

We have been in contact with several south-central Kentucky counties and discovered that most are not flash flood prone, but all counties have certain hot spots. The exceptions are Warren and Barren counties, which have numerous vulnerable areas. For example, the city of Bowling Green is quite flash flood prone with at least 20 locations within city limits highly susceptible to heavy rains. Several state and county roads throughout Warren and Barren counties are flash flood prone as well.

We appreciate the information received to this point from the EM's. This data will greatly enhance our ability to provide property and life saving warning information to the people of central Kentucky and south-central Indiana.

Climatological Calendar

Observed Temperatures and Precipitation: Fall 2002

Location	Month	Average Temperature	Departure From Normal	Total Precipitation	Departure From Normal	Highest Temp (Date)	Lowest Temp (Date)
Louisville	Sep	72.8	+2.7	7.88	+4.83	96 (9th/10th)	47 (23rd)
	Oct	56.2	-2.3	5.83	+3.04	86 (3rd)	38 (14th)
	Nov	43.4	-4.2	2.70	-1.11	78 (10th)	21 (28th)
Lexington	Sep	72.1	+4.1	5.44	+2.33	97 (8th/9th)	47 (24th)
	Oct	56.0	-0.6	6.52	+3.82	85 (3rd)	37 (14th)
	Nov	42.6	-3.3	4.99	+1.55	76 (10th)	19 (28th)
Bowling Green	Sep	74.6	+5.0	9.47	+5.34	97 (10th)	47 (24th)
	Oct	61.7	+3.8	5.26	+2.09	88 (2nd/3rd)	40 (18th)
	Nov	47.1	-0.3	5.08	+0.62	82 (10th)	26 (23rd)

Normal High/Low Temperatures					Record Monthly High/Low Temperatures			
Location	Dec 1	Jan 1	Feb 1	Mar 1	Dec	Jan	Feb	Mar
Louisville	50/34	42/26	43/26	51/32	76 (1982) -15 (1989)	79 (1943) -22 (1994)	78 (1992) -19 (1951)	88 (1929) -1 (1960)
Lexington	49/33	41/25	41/25	50/32	75 (1982) -19 (1989)	80 (1943) -21 (1963)	80 (1996) -20 (1899)	86 (1929) -4 (1873)
Bowling Green	52/33	44/26	45/26	53/32	78 (1982) -14 (1989)	78 (1943) -26 (1886)	83 (1918) -20 (1951)	92 (1929) -6 (1960)

Astronomical Calendar

Sunrise and Sunset

	Louisville		Lexington		Bowling Green		
Date	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	
Dec 1	7:41 am est	5:23 pm est	7:35 am est	5:19 pm est	6:40 am cst	4:29 pm cst	Times are given in est (Eastern Standard Time) and cst (Central Standard Time), as appropriate.
Jan 1	8:00 am est	5:33 pm est	7:54 am est	5:29 pm est	6:59 am cst	4:40 pm cst	
Feb 1	7:48 am est	6:05 pm est	7:43 am est	6:01 pm est	6:49 am cst	5:11 pm cst	
Mar 1	7:15 am est	6:36 pm est	7:10 am est	6:31 pm est	6:17 am cst	5:40 pm cst	

Moon Phases

New Moon	First Quarter	Full Moon	Last Quarter
Dec 4	Dec 11	Dec 19	Dec 27
Jan 2	Jan 10	Jan 18	Jan 25
Feb 1	Feb 9	Feb 16	Feb 23
Mar 3	Mar 11	Mar 18	Mar 25

Rainfall was above normal this fall, thanks in part to the remnants of Tropical Storm Isidore which brought heavy rain and minor flooding to our area in late September. The rainfall alleviated drought conditions from this past summer.

Winter Solstice (Start of Winter):
December 21 at 8:14 pm est (7:14 pm cst)