2024 STAKEHOLDERS REPORT

NATIONAL WEATHER SERVICE

TOPEKA, KS

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WELCOME

BY KRIS CRAVEN, METEOROLOGIST IN CHARGE

Welcome to the 2024 edition of our stakeholders report! Looking back is a big part of moving forward, and this report is just one piece of how we do that here at the National Weather Service forecast office in Topeka - by reporting back to you, the public we serve. Inside you will find our 'year in review', highlighting everything from weather events, to outreach, and much, much more.

We had quite a year in northeast Kansas, with the most documented tornadoes in northeast Kansas (22) since 2008, and the most severe thunderstorm warnings (346) we have issued in a single season since 1984! We will take you through our top weather events of the year, including several strong and impactful windstorms that brought widespread damage to communities like Silver Lake and Topeka. Our local climate focal point will review the literal highs and lows of the year, and our Cooperative Observer Program Leader shares updates for our dedicated citizen observers that have been critical in maintaining the weather record across northeast Kansas for decades.

You will also read about the outreach opportunities we had this year, and the ways in which some of our staff were able to participate in groundbreaking research that advances the science of weather warnings and decision making by working with the Operations Proving Ground in Kansas City. We also continue to share our enthusiasm for science with the next generation, participating in school talks, STEM outreach, and safety talks across the area and throughout the year.

Our support to our core partners is built into the fabric of our commitment to public safety, as we participate in activities such as table top exercises, as well as provide real-time support to our emergency managers as they work to protect you from dangerous and impactful weather events.

First established as a First Order Station in the U.S. Army Signal Service on the Washburn Campus in 1887, we have proudly served the residents of northeast, east central, and north central Kansas for over 135 years. We are here 24 hours a day, 7 days a week, 365 days a year. As public servants, we are proud to serve our mission of, "providing weather, water and climate data, forecasts, warnings, and impact-based decision support services for the protection of life and property and enhancement of the national economy."

Special thanks to our editor Chelsea Picha, and to all our staff for sharing stories about what we do.

Happy reading!

Kris Craven
Meteorologist in Charge

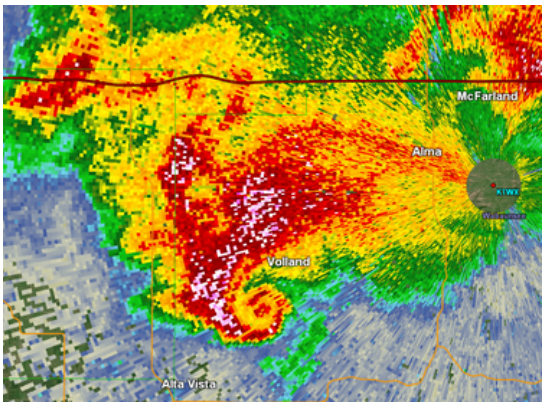
TOPEKA AREA TOP WEATHER EVENTS OF 2024

BY DANIEL REESE, METEOROLOGIST

In 2024 we saw a number of impactful weather events across northeast Kansas. This is a subjective list of our top 5 most memorable events. What weather events do you most remember from 2024?

1. **April 30 Westmoreland tornado**
A narrow but strong tornado developed just west of Westmoreland and caused significant EF-3 damage as it moved through the town. Unfortunately one fatality occurred from this tornado, the first tornado fatality in Kansas since 2012. The parent storm produced additional wind damage and a few brief tornadoes as it moved along Highway 24 north of Topeka and Lawrence. Another supercell north of the Westmoreland supercell produced an EF-1 tornado that caused damage to a home in Nemaha County.

Westmoreland tornado on April 30
(Photo by Daniel Reese)



Radar from March 13 Alta Vista tornado
(Photo courtesy of GR2Analyst)

2. **March 13 Alta Vista and Rossville tornadoes**
The first severe weather event of the season was a significant one. Two supercells developed over portions of the Flint Hills and moved northeast, each producing an EF-2 tornado. The first of these tornadoes took a path from just east of Alta Vista to a few miles southwest of Alma. While some damage occurred to homes and farms in the area, fortunately the storm stayed over open fields when it was at its strongest. The second tornado developed just west of Rossville in Shawnee County and did significant damage to several homes north of town.

TOPEKA AREA TOP WEATHER EVENTS OF 2024

BY DANIEL REESE, METEOROLOGIST

3. **Early/Mid January cold and snow**
While much of 2024 was on the warmer side, the most impactful heat or cold came with a two week stretch in early to mid January. Across most of the area low temperatures were below 10° for ten straight days, with five or six days falling below 0°. From January 13-15, even the high temperature stayed below 10°. Along with the cold, this stretch saw several days with snow, totaling between six and ten inches for most places.

4. **April 16 morning tornadoes**
A supercell produced two EF-1 tornadoes that moved northeast through Osage and Shawnee Counties. These tornadoes thankfully weren't as impactful as those further up this list, though some damage did occur to several homes in the area. What made these so remarkable was the time of day - around 6:00 in the morning. Looking back at the record books, there have been over 800 tornadoes since 1950 in the Topeka area. Until this day, only four had occurred between 5 and 9 AM CDT, and none between 5:30 and 6:30 AM.

5. **Summer Interstate 70 Damaging Wind Events**
Lumping a few events together here, but the second half of summer saw four significant severe thunderstorms move along Interstate 70 in eastern Kansas, producing widespread damaging winds of 70-90 mph. The first of these events occurred on June 28, when a supercell produced flash flooding and damaging winds over Junction City before dropping several brief tornadoes northeast of Emporia. The second occurred the morning of July 16, when a cluster of storms developed in central Kansas near Hays and moved east all the way through Topeka and Lawrence. The third event happened about two weeks later on July 31. Again a line of storms developed in north-central Kansas and moved east through the Topeka forecast area. Lawrence was hit particularly hard with wind damage. The last event occurred another two weeks later on August 14. A supercell north of Manhattan grew into more of a line as it moved east, then produced a microburst as it moved through northeast Topeka. Significant tree damage occurred in the Oakland neighborhood where our office is located.

Snow and cold in Lawrence on January 15 (Photo by Daniel Reese)

2024 BY THE NUMBERS

BY KYLE POAGE, LEAD METEOROLOGIST

	Topeka	Concordia	Manhattan	Emporia	Lawrence
Hottest Temperature	102° Jun 26, Jul 17, & Aug 26	107° Jul 15	106° Aug 25	104° Jul 15	101° Jun 26 & Jul 15
Highest Heat Index	113° Jul 31	109° Jul 15, Jul 30, & Jul 31	116° Jul 15	110° Jul 31	119° Jul 15
100°+ Days	4	11	9	7	5
Coldest Temperature	-8° Jan 15	-10° Jan 13	-15° Jan 16	-9° Jan 16	-13° Jan 16
Lowest Wind Chill	-28° Jan 14	-28° Jan 13 & 14	-33° Jan 16	-31° Jan 14	-32° Jan 13
Days with High Temperature of 32° or Lower	10	16	11	8	12
Annual Precipitation (Departure from Normal)	34.27" (-2.26")	26.56" (-1.82")	35.59" (+3.42)	32.33" (-2.48)	32.44" (-3.14")
Highest Calendar Day Precipitation	1.92" Jul 4	2.50" Apr 25	2.56" Apr 25	2.72" Nov 2	2.48" Jul 1
Annual Snowfall (Departure from Normal)	12.6" (-4.5")	N/A	10.8" (KSU campus) (-6.8")	N/A	N/A
Highest Calendar Day Snowfall	3.3" Nov 30	N/A	N/A	N/A	N/A

TOPEKA OFFICE OUTREACH & MUTUAL AID - A LOOK BACK AT 2024

BY SARAH TEEFEY, METEOROLOGIST

For meteorologists at the National Weather Service (NWS), communication with partners and public outreach participation are high on the priority list. Looking back at 2024, NWS Topeka office staff participated in a vast variety of outreach events, table top exercises, and mutual aid to support partners and connect with the public.

Outreach events last year started with numerous local SKYWARN storm spotter shows. During the late winter and early spring months, our staff traveled to the counties we serve to present spotter shows. The presentations included information regarding severe weather awareness and preparedness, thunderstorm types and associated cloud features, general safety information, and how to communicate weather reports with our office. Another round of these shows will occur this spring.

Outside of spotter shows, meteorologists were involved in several school talks, some of which took place virtually all across the country and even Canada. Talking to students about weather and safety is always a rewarding experience for our staff. In similar fashion, members of our staff participated in events ranging from Girls in Aviation Day, Farm to You, which teaches elementary aged children about agriculture, and a Women in STEM event at the University of Kansas.

Photos from the Women in STEM event at KU

TOPEKA OFFICE OUTREACH & MUTUAL AID - A LOOK BACK AT 2024

BY SARAH TEEFEY, METEOROLOGIST

In addition to public outreach, there were a few opportunities to provide unique partner support last year in the form of tabletop exercises and mutual aid of on-site impact-based decision support services (IDSS). Topeka staff were involved in two separate emergency management tabletop exercises. One was for a hypothetical tornado scenario at Fort Riley, and the other was an exercise at the Wolf Creek Nuclear Powerplant. Tabletop exercises are an important planning and practicing tool that brings together varying emergency response and emergency aid agencies, such as local and state emergency management, the Red Cross and the Department of Homeland Security. NWS Topeka encourages weather-related exercises and is always happy to participate. Also, while we often perform on-site decision support services to partners within our coverage area, we sometimes also provide the same service outside of our area as mutual aid to neighboring NWS offices. One such event was NASCAR at the Kansas Speedway last summer. Staff from Topeka were able to provide weather briefings to emergency personnel at the Speedway while NASCAR events were underway.

Finally, as a bit of a celebration, staff in Topeka hosted a combined retiree and COOP observer award picnic in the spring of last year. Many of our past employees enjoyed seeing how the building and our operations have evolved with time. Current senior staff enjoyed catching up with former colleagues, and newer staff found interest in hearing stories of how operations used to be. The picnic presented a great opportunity to also celebrate two loyal and dedicated COOP observers who have assisted the Topeka office for over 40 years – Alan Winkler and Melba Bruce were honored in the presence of current employees, past employees, a regional headquarters employee, and local media who joined to cover the ceremony.

It was another busy, but successful year of outreach and partner support in Topeka!

Photos from COOP award ceremony and retiree picnic

RESEARCH TO OPERATIONS

BY CHELSEA PICHA, SARAH TEEFEY, & MATT FLANAGAN, METEOROLOGISTS

Testbeds are a crucial part of research-to-operations initiatives, whereby experiments are conducted using the latest advancements in science and technology to learn how useful and effective they could be for operations, as well as what kind of improvements may be needed before integrating those new methods into operations. In any given year, several opportunities are available for NWS staff to participate in various testbeds in different formats. A few of our meteorologists were able to take part in research opportunities such as this in 2024.

CONVECTIVE WARNING MUTUAL AID EVALUATION

One of these testbeds was an evaluation of convective warning mutual aid. The idea behind this is that a meteorologist at one forecast office experiencing quiet weather could examine radar and provide input to a meteorologist at another office impacted by severe weather. This would be supplemental to what offices already do, but it would help out the impacted office by giving them another set of eyes to monitor storm-scale trends and evolutions during a severe weather event. The goal is that this additional perspective would provide added confidence on warning decisions, and the Operations Proving Ground (OPG) in Kansas City facilitated a two-phase evaluation to test that hypothesis.

Both phases of the experiment consisted of forecasters going through simulations of past severe weather events in different parts of the country and analyzing specific storm hazards at pre-determined decision points. In phase 1 (conducted in June), all forecasters worked individually. In phase 2 (conducted in November), different cases were chosen and many of the forecasters from phase 1 returned, but were then paired with each other via video call. Additional forecasters who did not participate in phase 1 worked individually, similar to those who had taken part in the first phase. These additional forecasters functioned as the control group to see how their performance compared to those who were paired. Facilitators at the OPG were able to keep track of everyone's submissions at their decision points. They will compile the data from both phases to determine how much decision making improved between forecasters who were paired and worked individually in phase 2, as well as individual forecasters between phase 1 and phase 2.

RESEARCH TO OPERATIONS

BY CHELSEA PICHA, SARAH TEEFEY, & MATT FLANAGAN, METEOROLOGISTS

Our office was fortunate enough to have two meteorologists participate in phase 1 and three participate in phase 2, including one who participated in both phases. In addition to contributing to this test to determine the feasibility of implementing convective warning mutual aid on a more frequent and widespread basis, it was also useful for getting more practice with radar and analyzing hazards, and becoming more exposed to different severe weather situations. We look forward to seeing the results and how they may be used to improve operations!

AVIATION WEATHER TESTBED

As another part of research-to-operations initiatives within NWS, one of our staff was able to participate in an Aviation Weather Testbed experiment last year at the Aviation Weather Center in Kansas City, MO. The purpose of the three day experiment was twofold. First, the focus was to evaluate the usefulness of the National Severe Storms Laboratory's Warn-on-Forecast System (WoFS) research project for aviation forecasting purposes. WoFS data includes high-resolution ensemble models that update every hour, intended to increase lead time on impending weather hazards. Thunderstorms and Instrument Flight Rule (IFR) conditions were evaluated closely using WoFS model data. Next day verification was conducted to determine how well the model performed. The second focus of the experiment was on the creation of outlook graphics for aviation hazards beyond day 1, specifically intended to assist the general aviation community and low altitude fliers. Results of the experiment and participant feedback may eventually create changes to what type of data aviation forecasters use, and how they communicate hazards beyond the first day timeframe.

RESEARCH TO OPERATIONS

BY CHELSEA PICHA, SARAH TEEFEY, & MATT FLANAGAN, METEOROLOGISTS

WINTER WEATHER & SPRING FORECASTING TESTBEDS

Another of our meteorologists had the opportunity to participate in two different testbeds last year: the Weather Prediction Center's (WPC) Winter Weather Experiment and the Spring Forecasting Experiment facilitated by the Storm Prediction Center (SPC). During the Winter Weather Experiment, NWS meteorologists analyzed the usefulness and accuracy of the newest group of models being developed by the National Weather Service called the Rapid Refresh Forecast System (RRFS). This new ensemble of high-resolution models aims to provide a range of potential outcomes for different weather phenomena and generate probabilistic information about the likelihood of a specific phenomenon occurring, such as the probability of greater than 4 inches of snow at a location. Through testing of four different winter cases varying from heavy snow across the Plains to snow squalls and lake effect snow across the northeast US, forecasters in the experiment found the output from the RRFS to be comparable to what actually occurred and would be very useful in messaging the potential for impactful winter precipitation to partners and the public.

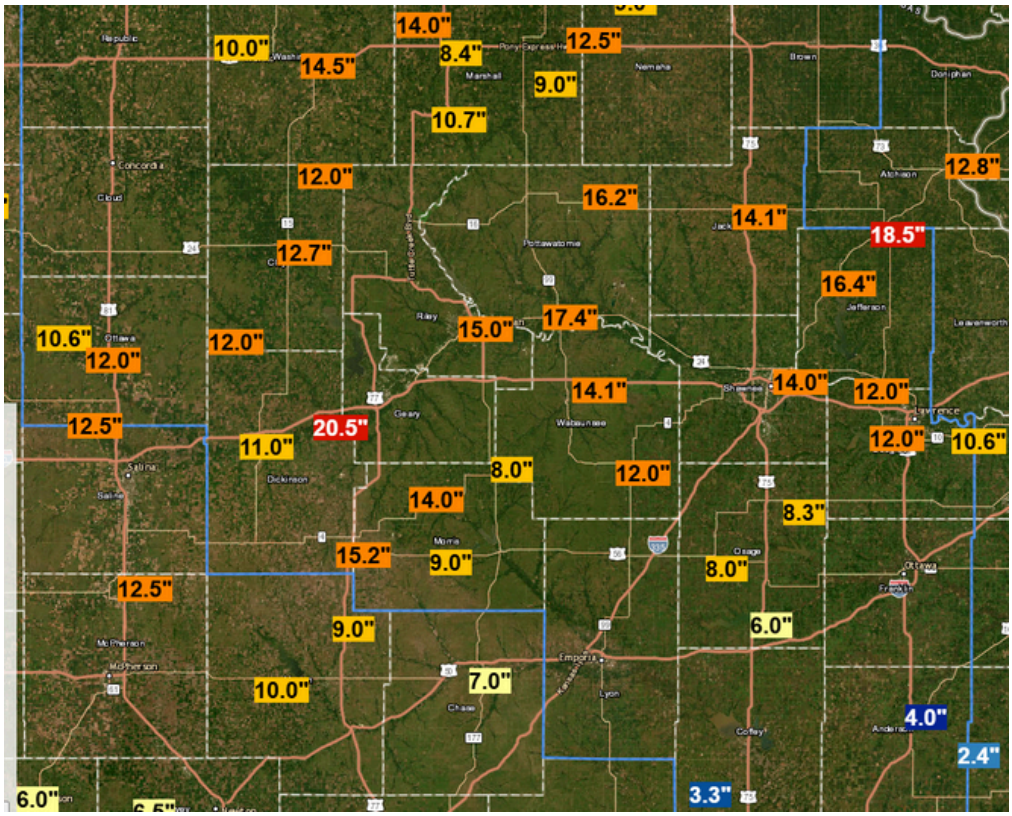
During the Spring Forecasting Experiment, a group of NWS forecasters analyzed a new feature within the Warn-on-Forecast System (WoFS) that utilizes artificial intelligence and machine learning to provide probabilities of severe weather occurring. WoFS is a rapidly-updating, high-resolution ensemble model system designed to increase lead time for tornado, severe thunderstorm, and flash flood warnings. WoFS runs every 30 minutes, allowing for rapid updates, but only forecasts 6 hours into the future due to the computing power needed to run this system. During the experiment, NWS forecasters were able to utilize WoFS and the new AI-generated probabilities of severe weather during real-time severe weather events. Participants generated 0-1 and 1-2 hour probability forecasts for each severe weather hazard (tornadoes, large hail, and damaging wind gusts) based on WoFS guidance and findings showed that forecasters not only preferred to have the AI probabilities at their disposal, but also that having the AI information improved their probabilistic forecasts. While WoFS has been utilized during severe weather events at NWS Topeka for the past few years to aid in forecasting storm initiation and morphology, the addition of AI-generated probabilities for severe weather occurrence could further enhance our forecasting capabilities and allow us to better serve our partners and the public before and during severe weather.

COOP CORNER

BY SHAWN BYRNE, OBSERVING PROGRAM LEADER

It has been a cold, snowy winter to start out 2025 so far! December started out rather mild with days reaching into the 70's! However, that quickly changed to arctic air after the New Year, and a near record breaking blizzard impacted the area beginning with ice January 4th and ending with a significant snowfall January 5th. All of your snowfall amounts as evidenced by the chart below were received in an accurate and timely manner and we greatly appreciate it!

2 Day Snowfall Totals (January 4-5, 2025)



As we eventually emerge out of winter and transition into spring, please place your inner rain gauge tubes and collection funnels back onto your rain gauges.

There will be a new version of Weather Coder (WXCODER) becoming available soon. This will be called WXCODER 4. I will be sending out an email when that becomes available along with any relevant details. Stay tuned!

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