Thursday Morning Session

1.1

Historical Perspective on the Dust Bowl Drought in the Central United States

Dr. Dorian J. Burnette

Department of Geosciences, University of Arkansas, Fayetteville, AR

Three new 159-year long reconstructions of spring, summer, and growing season precipitation totals were developed for northeastern Kansas and northwestern Missouri from five station clusters (Lawrence, Leavenworth, and Manhattan, Kansas; Miami and Oregon, Missouri). Nonstandard observation practices are inherent in the early meteorological data, which can induce an undercount in precipitation measurements, particularly during the cool season. Threshold analyses of these five station clusters indicated undercount can be lessened for daily precipitation totals of 0.50 inches and greater during the warm season ("half-inch threshold"). Therefore, "adjusted reconstructions" of total precipitation for the spring (AMJ), summer (JA), and growing season (AMJJA) were derived using the "half-inch threshold" totals and an estimate of the missing amount between 0.00 and 0.50 inches based on an average of the modern observations at each station (or the nearest available station). The new precipitation reconstructions suggest that the most severe spring drought may have occurred during the mid-19th century, although the potential for undercount is likely highest during the spring season. The most severe summer precipitation deficit is estimated during the 1930s Dust Bowl drought, followed by the summer drought of the 1910s. When precipitation is totaled for the entire growing season, the mid-19th century and Dust Bowl droughts were of approximately equal magnitude and duration in this reconstruction. However, the integration of precipitation and temperature into seasonal measures of effective moisture, using a new 19th century temperature reconstruction for northeastern Kansas, indicates that the 1930s growing season moisture deficit was the most severe and sustained since 1855, highlighting the extraordinarily high temperatures recorded during the 1930s Dust Bowl drought.

1.2

Improving Probabilistic Ensemble Forecasts of Convection through the Application of QPF-POP Relationships

Christopher J. Schaffer
National Weather Service, Goodland Kansas

William A. Gallus Jr.
Iowa State University, Ames, Iowa

Moti Segal
Iowa State University, Ames, Iowa

New approaches of post-processing quantitative precipitation forecasts (QPFs) from an ensemble were used to generate probability of precipitation (POP) tables in order to develop a forecasting method that could outperform a traditional method that relies upon calibration of POP forecasts derived using equal-weighting of ensemble members. Early warm season 10-member ensemble output from the NOAA Hazardous Weather Testbed Spring Experiments was used, with 29 cases serving as a training set to create the POP tables and 20 cases used as a test set. The new approaches use QPF-POP relationships based on two properties termed characteristic precipitation amount and agreement. In the first approach, POPs were based on a binned precipitation amount and the number of ensemble members with 6-hour precipitation accumulations greater than given thresholds. In a second approach, a neighborhood method was used to find the number of points in a given neighborhood area around each of the domain grid points with precipitation greater than a threshold, while also considering the binned amount representative of the neighborhood. This approach, although considering only a *single* ensemble member, yielded forecasts of only marginally lower skill compared to those obtained by *10-member ensembles* in the first approach. After application of a correction for forecast overestimation, a third approach using a combination of methods produced forecasts that were improved statistically significantly compared to the calibrated traditional method's forecasts. The second approach on its own showed skill comparable to that obtained by a traditional calibrated 10-member ensemble, so adopting this approach alone could potentially save computer resources which could then be used for model refinements, only sacrificing a small amount of increased skill that could have been obtained by including the other approaches used in the third approach.

1.3

Assessment of Hourly Ceiling and Visibility During Thunderstorms Across Central, South-central, and Southeast Kansas

Kenneth R. Cook, Mary-Beth Schreck, L. David Williams

National Weather Service, Wichita Kansas

Thunderstorms cause significant challenges to pilots and the airline industry. These challenges include operation costs, safety, and customer service just to name a few. In a study conducted by the National Transportation Safety Board (NTSB) from 1995-2000, weather was cited as being a factor in three (3) out of every ten (10) fatal aircraft accidents (Pearson, 2002). The same study also indicated that 63% of all weather-related aircraft disasters happen in low ceilings and fog (Pearson, 2002).

This study examines 30 years of observation data at the five (5) Terminal Aerodrome Forecast (TAF) sites that are served by Weather Forecast Office, Wichita, Kansas. A presentation of the results will be made showing the affects thunderstorms have on ceilings and visibilities during the most convectively active months (April through August). Further illustrations will be made to depict MVFR probability of occurrence during the season, comparing each site studied.

1.4

Examination of 700-mb Temperatures and Wind Anomaly Data Relationship to Significant Severe Wind/Hail Weather Reports across Nebraska, Kansas, and Oklahoma

Chris Jakub

National Weather Service, Wichita Kansas

The relationship of 700-mb temperatures and Wind Anomalies are examined and compared to significant wind/hail severe storm reports data from 1996 to 2009 across Nebraska, Kansas, and Oklahoma. The peak significant severe weather frequency months of May, June, and July were studied using 700-mb temperatures and wind anomaly data compared to locations of significant severe wind/hail storm reports. The inspiration for this study is to improve forecaster confidence in recognizing favorable environments for significant severe wind/hail events using simple methods.

1.5

The Future of Severe Storms On-Line Publication

Jim Johnson

Chair EJSSM/Retired NWS

Now coming up on 5 years in existence, the Electronic Journal of Severe Storms Meteorology offers meteorologists a low cost, quick turn-around, open peer reviewed on-line journal aimed at severe storms. This talk will describe the EJSSM's system, process, quality and utility to the meteorology community and serve as an introduction to those who are not aware of its existence and purpose.

1.6

Tornadic Supercells in Wyoming on June 20, 2010

Jonathan Finch
National Weather Service, Dodge City, Kansas

Dan Bikos
Cooperative Institute for Research in the Atmosphere, Colorado State University, Fort Collins, Colorado

On June 20, 2010, easterly to southeasterly low-level upslope flow north of a stalled out frontal boundary resulted in unusually high mixing ratios across eastern and southeastern Wyoming. At mid to high-levels, moderately strong west-southwesterly flow was present ahead of an upper-level trough along the west coast, leading to a favorable vertical wind shear profile for supercells over eastern Wyoming. Additionally, elevated heating along with cool mid to high-level temperatures resulted in steep, surface to 400mb lapse rates. The steep lapse rates combined with the very rich low-level moisture to yield unusually high surface based CAPE values. The key synoptic and mesoscale features, as well as shear and instability parameters are presented and the role of topography in storm initiation is explored.

1.7

Long-lived Supercell in Wyoming and Nebraska on June 9, 2010

Dan Bikos
Cooperative Institute for Research in the Atmosphere, Colorado State University, Fort Collins, Colorado

Jonathan Finch
National Weather Service, Dodge City, Kansas

On June 9, 2010 a supercell tracked approximately 300 miles across southern Wyoming and the Nebraska panhandle. The storm initiated at an elevation around 6600 feet, went through a region up to 7600 feet and finally weakened at an elevation of 3800 feet, about 8 hours after initiation. The storm had reports of hail up to 2.75" in diameter, however, since the storm was over a sparsely populated region the authors obtained (via phone calls) additional reports of hail up to 2.00" in diameter. We will discuss the synoptic and mesoscale environment that contributed to this event, including the important localized effects caused by the terrain. This event is rare in that the climatology of severe weather reports west of the Laramie mountains is significantly less than that east of the mountains. In this case, we have a supercell that produced very large hail west of the mountains as well as over the High Plains east of the mountains.

Thursday Afternoon Session

2.1

Early Morning Significant Hail Events: 31 May 2008 Analysis and Other Comparisons for Central and Southeast Kansas

Kenneth R. Cook and Andy D. Kleinsasser

National Weather Service, Wichita Kansas

Over the past few years, thunderstorms containing very large hail have struck the National Weather Service Wichita's forecast area. These have occurred during what would be termed the "morning rush hour". Storms from 2006 and 2008 produced hail two inches in diameter and larger, causing over $200 million in damage combined. Though thunderstorms were predicted, the significance of the hail was grossly underestimated.

Cases where this phenomenon occurred were studied and will be presented. This includes the recurrence intervals of such events as well as some conceptual modeling where forecasters can identify traits as precursors to these events. The goal is to aid forecasters in not only situational awareness for the pre-storm environment, but also improve staff preparedness for significant storms when severe weather staffing is likely the most challenging

2.2

Non-Mesocyclone Tornadogenesis in the October 26, 2006 Closed Mid Level Low Severe Convective Event

Aaron W. Johnson

National Weather Service, Dodge City Kansas

On the afternoon of October 26 2006, multiple weak tornadoes developed over portions of southwest Kansas in association with a strong closed 500 hPA low near the Oklahoma Panhandle. Photographic evidence of these tornadoes was provided by Mike Umscheid with several of these vortices occurring well ahead of more mature convection resembling conditions generally associated with non-mesocyclone tornadoes (NMT). Although most tornado related literature detailing misoscale to very small mesoscale vortices involve the more traditional NMT such as a landspout, the process of tornadogenesis in this case appears to mimic rapid vortex ascent/stretching processes seen with a landspout rather than the more widely accepted mini Supercell mode for tornado development. Whether this type of tornadogenesis for closed 500 hPA low severe weather events is the dominate mode or is more multi mode for tornado development, requires additional research.

2.3

Assessment of Thirty Year Fog Climatology in Wichita Forecast Area

Matthew Harding
Butler Community College, El Dorado, Kansas

Attempting to correctly predict the development of fog and subsequent cloud ceilings are the biggest challenges in aviation forecasting. This challenge affects customer service, warning decisions, and public safety. In a study conducted by the National Transportation Safety Board (NTSB) from 1995-2000, weather is cited as being a factor in three (3) out of every ten (10) fatal aircraft accidents (Pearson, 2002). The same study also indicated that 63% of all weather-related aircraft disasters happen in low ceilings and fog (Pearson, 2002).

In June of 2007, the Weather Forecast Office in Wichita began an examination of the fog climatology at the five (5) Terminal Aerodrome Forecast (TAF) sites that are served by Weather Forecast Office Wichita. The results of this assessment were presented to the forecast and operations team at Weather Forecast Office Wichita in November of 2009. Since the presentation of this assessment, the predictability of fog and subsequent cloud ceilings has dramatically improved.

2.4

Visualization of Key Ingredients for Forecasting Winter Storms

Kenneth R. Cook
National Weather Service, Wichita Kansas

Winter storm forecasting is very challenging, especially with such a significant amount of data, models, and science fields to examine. The National Weather Service in Wichita has made a significant effort to distill these down into the most pertinent meteorological science fields for winter storm forecasting while at the same time, creating greater visualization for forecasters to use on AWIPS.

Presented will be a summary of these meteorological fields as well as examples of the visualization associated with these. Results from the start of this project have show a persistent increase in GPRA measures over the last 4 winter seasons.

2.5

Climatology of Wind Chill Warning Events In and Surrounding the Cheyenne WFO

Jesse Lundquist
National Weather Service, Cheyenne Wyoming

Wind chill forecasting presents a unique challenge to meteorologists due to the varying nature of this wintertime event. What may seem to be subtle changes in wind speed and or temperature can have a significant impact on the duration and severity of the wind chill event. In addition to the effects of temperature and wind speed, terrain and the lack of available sensors in rough terrain adds another level of complexity to the forecast process. Challenges like these are common for regions of the intermountain west, such as southeast Wyoming, when forecasting wind chill warnings. To aid in the forecasting of these events this study will develop a local climatology by collecting the hourly weather observations from stations in southeast Wyoming, southwest South Dakota, and the Nebraska Panhandle for the previous 40 to 70 years. The climatology will be composed of the wind chill, duration, and wind speed during wind chill warning events according to the local Cheyenne Weather Forecast Office criteria. This presentation will cover the methodology for retrieving and analyzing the data, the current results of the project, and future work.

2.6

June 7th, 2010 Ellis County KS Severe Convective Wind Event

Marc Russell

National Weather Service, Dodge City Kansas

During the mid morning hours of 7 June 2010, a particularly strong convectively induced downburst wind episode occurred over portions of Ellis and Rush Counties in the Smoky Hills region of central Kansas. A storm damage survey conducted later that day by the National Weather Service Office in Dodge City determined thunderstorm wind speeds may have approached or exceeded 100 mph in and around the eastern portion of the town of Ellis. A case study including a detailed radar analysis is performed in effort to foster better understanding and increased situation awareness for exceptionally strong severe thunderstorm wind environments like this one. The meteorological environmental conditions and radar observations will be compared to severe wind environment and radar signatures for severe wind cases from the literature.

2.7

A Tornado of Hellish Fury: The May 17, 1896 Kansas Tornado Outbreak

Bruce Jones

Meteorologist/Spokesperson for Midland Radio Corporation

On May 17, 1896 a historic tornado outbreak occurred in northeast KS, southeast NE, and northwest MO. Over a period of six hours, numerous large, violent, and slow-moving tornadoes struck several towns in the area. An examination of old newspapers, plat maps, coop observer reports, and Weather Bureau records reveals the likelihood that a single cycling supercell may have been responsible for the outbreak. My research also uncovered what may be the earliest documented storm chase.

The combination of local and state historical society data, National Archive records, and in situ research reveals a complex and harrowing picture of a devastating and wide-ranging tornado event, a few scars of which are still evident today.

2.8

World's Best Warnings: The NOAA Weather Radio Network

Bruce Thomas

Meteorologist/National Spokesperson for Midland Radio Corporation

For more than fifty years the NOAA Weather Radio Network has distinguished itself as the most successful public alert system in world history. Now comprising more than 1,000 transmitters serving 98% of the US population, NOAA Weather Radio is poised for a significant upgrade. The ongoing Weather Radio Improvement Program (WRIP) promises to further expand the capabilities of this robust warning service. What's coming, what is the current state of the system, and how successful is NWR in an era of smart phones and Tweets?

Friday Morning Session

3.1

Interactive Effects of Solar Radiation, the Earth's Magnetic Field and Surface Temperatures of Central North America

Dr. Cliff L. House,

Faculty Emeritus, Missouri State University, Springfield, MO

There were comments from the December 2009, Copenhagen conference and NOAA that mid-North America has experienced cooler temperatures in the last five years. Mid-North America has recorded record lows, but until December 2009, it appears that the average temperatures have shown some increase since the solar peak of 2000-2001, through 2007. This does not fit a loose profile of solar inactivity relating to cooler temperatures on a five year basis. The following work is limited to the middle U.S. The author lives in the state of Missouri and has studied the solar cycles and the earth's magnetic field interaction since obtaining an amateur radio license in 1955.

How much, if any, do solar storms correlate with temperatures here in mid America? Three areas are considered: Grand Forks, North Dakota; Springfield, Missouri; Austin Texas; and when data is available Mexico City, Mexico.

When Galileo discovered solar storms, they disappeared for nearly a century. In literature of that era there is evidence that the earth was very cold, or cooler than normal. In contrast to modern times, this does not necessarily show a parallel. In 2005, the low point of the last solar cycle with maximum activity in 2000-2001, the temperatures seemed to elevated rather than decease on some graphs. An unusual event has occurred during the years of 2005, 2006, 2007, 2008, and 2009, in that the low part of the eleven year cycle has stayed low or relatively inactive for four years. It has been interesting to note that the winter of 2009 and 2010 has been

abnormally cold. Does the earth's atmosphere relate to a three year or more delay? Is a result of this possible delay related to a colder than average winter for 2010-2011? Is there any evidence that this has occurred in the past 100 years or so? Even though there has not been a four year low in the last 100 years or more, new data may hint at a four or more year delay, resulting in colder temperatures. Using simple statistical methods Austin, Texas shows a peak of 0.18, and Springfield, Missouri shows a peak of 0.21, but Grand Forks, shows no correlation at all when related to years of delays. The focus of the study is the correlation of solar energy and days of delays allowing for resultant effects of solar-earth atmospheric interactions. Observing days of delays rather than years, correlations are higher. The highest correlation of daily delays, within this study, shows a 0.5011, with the traditional 1.0 being a perfect correlation, 0 representing no correlation and a -1.0 being a perfect negative correlation. Most of the correlations are centering close to 0.25. However, this is taking a month of correlations at a time. ***Correlating 10 days at a time has shown a correlation as high as R = 0.93. This demonstrates that there is some evidence that temperatures are cooler during the solar minimum of solar cycle 24. The temperatures for Grand Forks, ND, and Springfield, MO has shown a gradual decline in annual temperatures.*** (This data was taken from NOAA temperature tables.) ***Is this because the earth's magnetic field is 10 percent less than it was 300 years ago?***

This study shows a correlation of surface maximum, average, and minimum temperatures with solar flux, planetary A index, and sunspots. Correlations are made one day, two days, and up to 30 days of delays for each location. There is a definite pattern for these observations, but the patterns change with respect to time and location. The patterns follow a rough sine wave form, with results in a cycle covering a period, on the average, of 25 days. Patterns are presented graphically, in addition with tabled data. The study relates to random time periods of interest for months, years, and seasons of a year.

The daily section of the study contains 270 correlations embedded in the body of the study or in the appendix. The study offers data and ideas for other scientist to study. Several areas of interest are included in hopes of identifying more important areas of scientific study. The paper is not designed to interfere with the debate of global warming. The purpose is not to convince or sway others for or against the global warming issue, but to learn more of what we are experiencing on earth and add to the knowledge of how the weather system of the earth works.

3.2

Examination of a Collapsing HP Supercell

Widespread Wind and Crop Damage across Eastern Lincoln and Western Dawson Counties July 11th, 2010

Steve Carmel
National Weather Service, North Platte, Nebraska

Severe thunderstorms developed across the eastern Nebraska Panhandle on Sunday afternoon, July 11th 2010. A stationary frontal boundary and upper level disturbance provided the impetus for a long-lived supercell thunderstorm. This storm moved southeast along the stationary frontal boundary, and produced large hail and damaging winds, across eastern Lincoln and western Dawson counties.

The HP supercell thunderstorm had a well-defined rear inflow notch, and began to collapse across eastern Lincoln into northwestern Dawson County. Peak wind gusts to 67 MPH occurred at Lee Bird Field in North Platte, while an anemometer located 7 miles north northwest of Gothenburg, recorded 94 MPH winds, as the supercell began collapsing after moving away from the stationary frontal boundary. Due to the strong winds and hail, crop damage over parts of eastern Lincoln and western Dawson counties was estimated to be around $10 million dollars.

During this presentation, the supercell evolution will be shown, including the collapse and subsequent strong downdraft winds, which caused havoc across far eastern Lincoln and northwestern Dawson Counties. Close examination of various radar and satellite loops, surface and upper air data, witness reports and other information will be provided in support of this case study.

3.3

Collaboration between Storm Chasers and Local National Weather Service Offices: A Warning Coordination Meteorologist's Perspective

Tom Magnuson
National Weather Service, Pueblo, Colorado

In the past, a challenge for National Weather Service WFOs was to have trained weather spotters positioned near tornadic storms in rural areas of the high plains and western US to help in the warning decision making process. In addition, another greater challenge was to obtain very detailed post-episode information on tornado tracks and timing in rural areas. This information is important for the preparation of Storm Data, the official National Weather Service storm events database. Storm Data users include researchers, insurance companies, emergency services, and other entities that are weather sensitive.

With the increased popularity of storm chasing, the number of trained people observing tornadic storms has dramatically increased. A few excellent tools for collaboration between NWS warning forecasters and storm chasers are Spotternetwork, Severestudios, Tornadovideos, and NWSChat.

During the 2010 tornado season, over 30 tornadoes have occurred over southeast Colorado. Trained SKYWARN spotters and storm chasers have provided real-time information to WFO Pueblo, being aware of the valuable input they can provide during the warning decision making process. However, after the dust has settled, storm chasers can provide additional information with regard to the details of tornado tracks and timing, but often do not, because their chief goal while out in the field is to view, photograph, and video storms and tornadoes.

One task of Warning Coordination Meteorologists is to foster relationships with partners and weather enthusiasts, so as to enhance their understanding of the needs of local WFOs. Therefore, WFO Pueblo began a more concerted effort to identify those storm chasers, and then to contact them during and after the episode. Some chasers were identified using Spotternetwork, Severestudios, or Tornadovideos. But, there were many others who were not available through those venues, which were later identified by conducting internet searches of personal storm chaser web sites and YouTube videos.

Once the storm chasers were contacted by WFO Pueblo, the vast majority were willing to share very detailed information about their chase experience. Many were mildly surprised that WFO Pueblo needed this information, given that there were other chasers on the scene. Many assumed that the chaser down the road was supplying the needed information.

A brief, simple methodology for apprising storm chasers of the need of local National Weather Service WFOs will be discussed.

3.4

A Case Study of the May 5, 1987, Satanta Kansas Tornado

Michael J. Scott

National Weather Service Dodge City, KS

On May 3, 1987 at 1613 CDT, a tornado developed on the east side of Satanta, Kansas and moved directly through the center of town moving west southwest. The tornado was only on the ground for a length of 3 miles, but caused over 3 million dollars worth of damage to trailers and homes as it moved straight through town.

This case study will attempt to describe in detail of the upper level dynamic pattern and the complex surface features which will lead up to the event. As an intensifying upper level trough moves into the central plains and closes off, a surface warm front intersected an occluded front in Southwestern Kansas. This case study will also show how robust moisture funneled into Haskell County, KS between the warm front and occluded front.

3.5

A Climate Study of Daily Temperature Change from the Previous Day

Matthew Masek
National Weather Service, North Platte, Nebraska

This climate study will provide statistics based on the past 111 years of recorded high temperatures and low temperatures from one day compared to the previous day at North Platte, KLBF. It will be shown how a warmer maximum temperature on the second day can be expected to occur more frequently than a cooler maximum temperature; however the opposite is true for minimum temperatures. In addition, the effects of precipitation, depending on which day it was recorded, can have a positive or negative correlation to the temperatures. Finally, the frequency of strong cold and warm frontal passages will be examined presenting how their occurrence varies through the year and how more common the frontal passage was associated with precipitation.

3.6

Radar and Environmental Conditions Associated with Golf Ball Size Hail Occurrence in the NWS Topeka County Warning Area

William Gargan
National Weather Service, Topeka, Kansas

Techniques for determining golf ball size hail from archived radar reflectivity and storm relative velocity data were examined using both the height of the melting level and the -20 degree C. These heights were obtained from archived radiosonde data from the KTOP upper air observing site. Golf ball size hail reports from Storm Data were retrieved for an 11 year period from 1998 through 2008 for the NWS Topeka County Warning Area. This study showed that the best correlation, for a severe thunderstorm to produce golf ball size hail, occurred with the height of the 50 dBz reflectivity and the height of the melting level. The second best correlation in this study was that between storm top divergence and the height of the melting level. Over 90 percent of the golf ball size hail reports occurred with the 50 dBz height above 30,000 feet and storm top divergence greater than 80 KTS.

3.7

Mobile, X-band Doppler radar data collected in the 4 May 2007 Greensburg, Kansas Tornadic Storm

Robin L. Tanamachi

Ph.D. Candidate, School of Meteorology, University of Oklahoma, Norman, Oklahoma

After producing four relatively weak (EF-0 and EF-1) tornadoes, a supercell in southwest Kansas ("the Greensburg storm") on 4 May 2007 (local time) produced an EF-5 tornado ("the Greensburg tornado") that severely damaged the town of Greensburg, Kansas. Volumetric Doppler reflectivity and velocity data were collected in the Greensburg storm by a dual-polarimetric, mobile, X-band Doppler radar (UMass X-Pol) throughout this period (0126 – 0236 UTC on 5 May 2007). UMass X-Pol had a radial resolution of 150 m, and captured the genesis of the Greensburg tornado as well as the entire life cycles of the four preceding tornadoes and at least two satellite tornadoes. The field deployment of the UMass X-Pol on 5 May 2007 will be described, and examples of the data collected will be shown.

The relatively high spatial and temporal resolution of the UMass X-Pol data permit detailed analysis of each tornado's structure and evolution. It will be shown that (1) the Greensburg tornado originated from a remnant circulation associated with an earlier tornado, (2) the Greensburg tornado contained both a weak-echo hole and a low-Z_{DR} hole, features consistent with previous X-band radar tornado observations, and (3) the horizontal motion of the Greensburg tornado more closely matched the motion of its parent updraft than any of the previous tornadoes. Comparison of the mobile radar observations to the surveyed tornado damage tracks will also be shown.

If time permits, I will also describe a set of experiments in which I assimilated the UMass X-Pol data into a numerical weather prediction model to test the sensitivity of a simulated Greensburg storm to initial environmental velocity profiles. In particular, the inclusion of a strong low-level jet in the initial environment results in tornado-strength vortices in the model that are stronger, longer-lived, and span a greater depth than when this feature is omitted.

3.8

Ensemble Numerical Prediction of the 4-5 May 2007 Greensburg, Kansas Tornadic Supercell and associated Mesocyclones using EnKF Radar Data Assimilation

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University of Oklahoma, Norman Oklahoma

A set of storm-scale (2 km and smaller grid-spacing) EnKF data assimilation experiments are performed in which NEXRAD level-II radar data from KDDC are assimilated into the Collaborative Model for Multiscale Atmospheric Simulation (COMMAS) during the developing and early tornadic phase of the Greensburg, Kansas supercell on the evening of 4 May 2007. The environments of various experiments were horizontally-homogeneous, each initialized from one of a series of reconstructed soundings valid at three separate times during the early to mid stages of the storm life cycle. These soundings had identical thermodynamic profiles, but had progressively larger low-level hodographs, in keeping with the observed rapid increase of low-level shear during the early tornadic phase of the Greensburg storm. Soundings were based on several sources of data, including nearby surface observations, VAD wind profiles, and KDDC

RAOB data. In addition, a sophisticated double-moment bulk ice microphysics scheme was used.

The 75-min EnKF assimilation period (using KDDC level-II radar reflectivity and velocity data) was terminated at 0145 UTC, 15 min prior to the touchdown of the long-track tornado that struck Greensburg at EF-5 intensity. The resulting end state of each of the 30 ensemble members was then used as the initial conditions for a free forecast period, in order to predict the envelope of possible evolutions, and enabling a probabilistic forecast of the mesocyclone-scale circulations. Preliminary results indicate that the overall tracks of the surface circulation in the various ensemble members are predicted quite well, with several of the members' tracks overlapping the observed track for a significant length. This will be demonstrated by a series of ensemble probability plots, and of individual ensemble member circulation swaths. Significant sensitivity to the initial sounding was also seen, with the best results obtained when a hodograph representing the low-level shear environment at 0230 UTC (about halfway through the life cycle of the Greensburg tornado) was used. This result is consistent with recent research in storm-scale numerical prediction that has demonstrated the importance of an accurate larger-scale environment for skillful prediction of short-term storm evolution. Overall, these results are encouraging for the "Warn-on-Forecast" paradigm for probabilistic numerical prediction of severe thunderstorms and tornadoes.