



Advanced Spotter Training



**National Weather Service
North Platte, NE**



NWS North Platte





Today's Topics

- Brief Review of last year's season
- Forecasting Severe Weather
- Tornadogenesis & Advanced Radar Interpretation
- A look at the Almeria Storm
- Spotting, Reporting, and Safety



2017 Nebraska Tornadoes

Total: 33 (average: 42)

EF-0:	13	Apr:	2
EF-1:	14	May:	4
EF-2:	4	Jun:	19
EF-3:	0	Jul:	0
EF-4:	0	Aug:	7
EF-5:	0	Sep:	0
Unk.	2	Oct:	1



Bellevue (EF-2), June 16
Photo: NWS Omaha damage survey



Western Nebraska Tornadoes

Total: 10

By county:

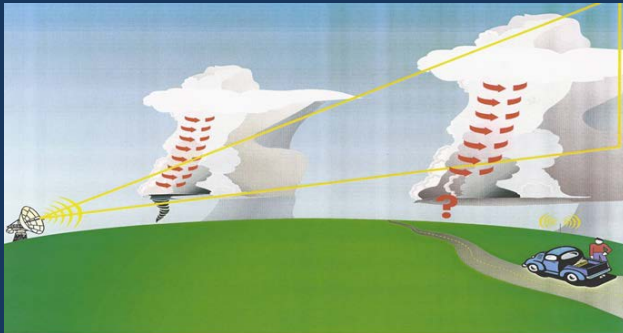
Loup	5
Sheridan	3
Chase	1
Perkins	1

Near Almeria/Taylor (EF-2), Aug. 19
Photo credit: Janet Sanders



The Role of the Spotter

- Provide “ground truth”
 - Radar has its limitations
- Reports strengthen warning credibility
 - “Radar-indicated” vs. “Observed”



Advanced Spotter Tidbit:

Recent research has shown that often tornadic circulations start at the ground and can be seen long before a condensation funnel!

There is no Radar out there that can sample the ground for this circulation – only our spotters can see it!



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Forecasting Severe Weather



Severe Weather 101

Step into
the wild world
of weather

www.nssl.noaa.gov/education/svrwx101

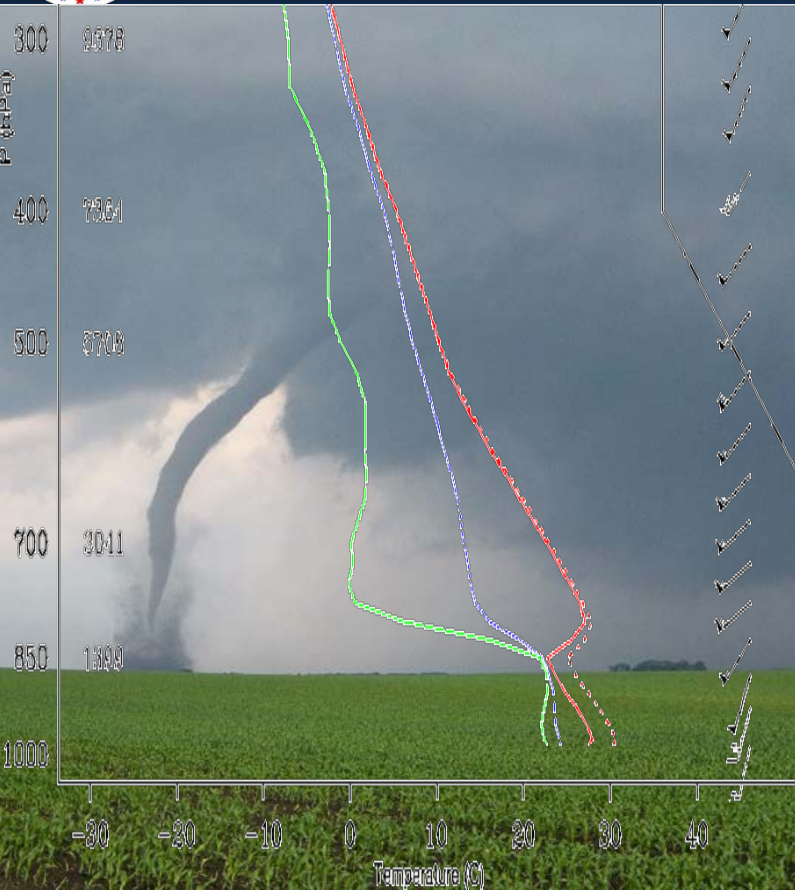


Tornado Basics

- What distinguishes a “tornado day” from a regular thunderstorm day?
 - Thunderstorms need:
 - Moisture
 - Instability
 - A Source of Lift
 - Spin in the Atmosphere (Wind Shear)



Tornado Basics



- Warm, humid air at the surface, usually a South wind
- Cooler air and strong west/southwest winds aloft
- The Temp diff and changes in wind speed and direction create instability and wind shear
- Usually a layer of warmer, dry air called a “cap” separates the two layers (the “loaded gun”). When it breaks, storms develop suddenly
- A boundary to kick things off



Forecasting Tornadoes



- Meteorologists at the Storm Prediction Center (SPC) issue daily forecasts, or convective outlooks, for organized severe thunderstorms.



SPC – A Good Place To Start

www.spc.noaa.gov

Outlooks Tab

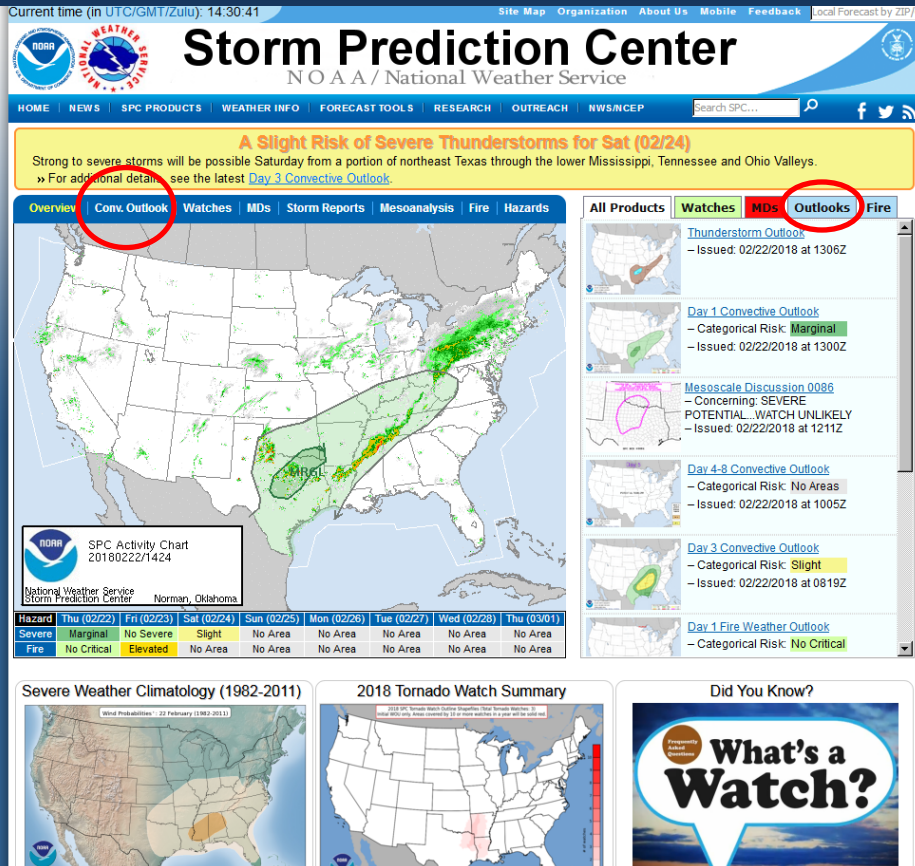
- Convective Outlook
- Probabilistic Graphics
 - Categorical
 - Tornado
 - Hail
 - Wind
- Discussion

Nerd Scale

Motor
cycle



Pocket
Protector





SPC – A Good Place To Start

VALID 161830Z - 171200Z

...THERE IS A MDT RISK OF SVR TSTMS FROM SERN SD AND PARTS OF ERN NEB THROUGH SRN MN...NRN/CNTRL IA INTO SWRN WI...

...THERE IS A SLGT RISK OF SVR TSTMS FROM PARTS OF THE NRN AND CNTRL PLAINS INTO UPPER MIDWEST...

...SUMMARY...

SEVERE THUNDERSTORMS CAPABLE OF POTENTIALLY WIDESPREAD DAMAGING WIND...VERY LARGE HAIL AND TORNADOES...A COUPLE OF WHICH COULD BE SIGNIFICANT...WILL OCCUR TODAY INTO TONIGHT FROM PARTS OF SOUTHEAST SOUTH DAKOTA AND CENTRAL AND EASTERN NEBRASKA EASTWARD ACROSS MUCH OF IOWA...SOUTHERN MINNESOTA...INTO WISCONSIN.

...SYNOPSIS...

A TROUGH OVER THE WRN U.S. WILL INTENSIFY DURING THE DAY ONE PERIOD IN RESPONSE TO THE EQUATORWARD PROGRESSION OF MID AND UPPER-LEVEL JET STREAKS FROM THE FAR NERN PACIFIC INTO THE TROUGH BASE OVER THE GREAT BASIN. DOWNSTREAM FROM THESE DEVELOPMENTS...MORNING WATER VAPOR IMAGERY INDICATES A LOW-AMPLITUDE SHORT-WAVE TROUGH PROGRESSING INTO THE NRN AND CNTRL PLAINS WITH THIS FEATURE CONTINUING ENEWD INTO THE UPPER GREAT LAKES BY LATE TONIGHT/EARLY TUESDAY.

AT THE SURFACE...A LEE CYCLONE OVER WRN SD WILL DEVELOP EWD ALONG A NWD-MOVING WARM FRONT INTO CNTRL MN BY 17/00Z BEFORE REACHING NRN WI BY 17/12Z. MEANWHILE...SECONDARY LOW PRESSURE OVER NERN CO WILL DEVELOP INTO SWRN NEB WHILE A DRYLINE SLOWLY MIXES EWD OVER THE CNTRL AND SRN HIGH PLAINS.

...NRN/CNTRL PLAINS INTO UPPER MIDWEST TODAY THROUGH TONIGHT...

12Z OBSERVED SOUNDINGS FROM LBF...DDC...AND TOP SHOWED A VERY MOIST BOUNDARY LAYER WITH LOWEST-100-MB MEAN-MIXING RATIOS OF 14-15 G PER KG SURMOUNTED BY 700-500-MB LAPSE RATES OF 8-9 C/KM. DIFFERENTIAL ADVECTIONS ASSOCIATED WITH A NEWD-MIGRATING 40-50 KT LLJ AND STRENGTHENING SWLY FLOW IN THE 700-500-MB LAYER WILL RESULT IN THE DEVELOPMENT OF A SIMILAR THERMODYNAMIC STRATIFICATION INTO THE MID

Discussion

- Can be very technical
- Look at the summary, synopsis, and anything under the header "NRN/CNTRL Plains"

Nerd Scale

Motorcycle



Pocket Protector



SPC – A Good Place To Start

Local forecast by
"City, St" or "ZIP"
City, St Go

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NCEP Quarterly
Newsletter

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All SPC Forecasts
Current Watches
Meso. Discussions
Conv. Outlooks
Tstm. Outlooks
Fire Wx Outlooks
RSS Feeds
E-Mail Alerts

Weather Information
Storm Reports
Storm Reports Dev.
NWS Hazards Map
Watch/Warning Map
National RADAR
Product Archive
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Public Severe Weather Outlook

[Print Version](#)

Note: During early morning hours (approximately 6am Central time), the SPC will produce a multimedia briefing MP4 file shortly after the PWO issuance. Please check back momentarily for a link to this MP4 file on this page. Please note the briefing may be out of date **5 hours** after its issuance and there will be **no subsequent updates** during the day. Please send comments or questions to spc.feedback@noaa.gov or via the [feedback](#) page.

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IAZ000-ILZ000-MNZ000-MOZ000-WIZ000-221800-

PUBLIC SEVERE WEATHER OUTLOOK
NWS STORM PREDICTION CENTER NORMAN OK
0450 AM CDT SUN MAY 22 2011

...SEVERE THUNDERSTORMS EXPECTED OVER PARTS OF THE MID AND UPPER
MISSISSIPPI VALLEY THIS AFTERNOON AND EVENING...

THE NWS STORM PREDICTION CENTER IN NORMAN OK IS FORECASTING THE
DEVELOPMENT OF TORNADES...LARGE HAIL AND DAMAGING WINDS OVER PARTS
OF THE MID AND UPPER MISSISSIPPI VALLEY THIS AFTERNOON AND EVENING.

THE AREAS MOST LIKELY TO EXPERIENCE THIS ACTIVITY INCLUDE

EASTERN AND SOUTHERN IOWA
WESTERN AND NORTHERN ILLINOIS
SOUTHEAST MINNESOTA
NORTHEAST MISSOURI
WESTERN AND SOUTHERN WISCONSIN

ELSEWHERE...SEVERE STORMS ARE ALSO POSSIBLE FROM THE SOUTHERN PLAINS
THROUGH THE OZARKS INTO THE UPPER GREAT LAKES.

A POTENT UPPER LEVEL STORM CONTAINING STRONG JET STREAM WINDS NOW
OVER NEBRASKA WILL TRACK NORTHEAST INTO SOUTHERN MINNESOTA LATER
TODAY...AND INTO WISCONSIN TONIGHT.

AHEAD OF THIS FEATURE...INCREASINGLY WARM AND HUMID AIR WILL SPREAD
NORTHEAST ACROSS MISSOURI INTO MUCH OF IOWA...ILLINOIS...WISCONSIN
AND SOUTHEAST MINNESOTA.

A COLD FRONT ASSOCIATED WITH THE UPPER LEVEL DISTURBANCE WILL SWEEP
EAST ACROSS THOSE STATES LATER TODAY AND TONIGHT...AND WILL SERVE AS
A FOCUS FOR INTENSE THUNDERSTORMS AS DAYTIME HEATING FURTHER
DESTABILIZES THE REGION.

THE COMBINATION OF STRONG THUNDERSTORMS WITH WIND PROFILES THAT WILL
BE FAVORABLE FOR STORM ROTATION MAY YIELD A FEW TORNADES...ONE OR
TWO OF WHICH COULD BE STRONG...IN ADDITION TO VERY LARGE HAIL AND
DAMAGING WINDS.

Public Weather Outlook (PWO)

- More user friendly (i.e. It's in English)
- More similar to an Area Forecast Discussion from a Forecast Office
- Usually linked at the top of the Day 1 Outlook page and on the SPC home page

Nerd Scale

Motorcycle



Pocket
Protector



NWS North Platte





SPC – A Good Place To Start

www.spc.noaa.gov

MDs = Mesoscale
Discussions

- Technical
- Usually precedes a watch
- Circles the area of interest

Nerd Scale

Motorcycle



Current time (in UTC/GMT/2ulu): 14:30:41 Site Map Organization About Us Mobile Feedback Local Forecast by ZIP

Storm Prediction Center

N O A A / National Weather Service

HOME | NEWS | SPC PRODUCTS | WEATHER INFO | FORECAST TOOLS | RESEARCH | OUTREACH | NWS/NCEP

A Slight Risk of Severe Thunderstorms for Sat (02/24)
Strong to severe storms will be possible Saturday from a portion of northeast Texas through the lower Mississippi, Tennessee and Ohio Valleys.
» For additional details, see the latest [Day 3 Convective Outlook](#).

Overview | Conv. Outlook | Watches | **MDs** | Storm Reports | Mesoanalysis | Fire | Hazards

All Products | Watches | **MDs** | Outlooks | Fire

Thunderstorm Outlook
– Issued: 02/22/2018 at 1306Z

Day 1 Convective Outlook
– Categorical Risk: **Marginal**
– Issued: 02/22/2018 at 1300Z

Mesoscale Discussion 0086
– Concerning: SEVERE
POTENTIAL WATCH UNLIKELY
– Issued: 02/22/2018 at 1211Z

Day 4-8 Convective Outlook
– Categorical Risk: No Areas
– Issued: 02/22/2018 at 1005Z

Day 3 Convective Outlook
– Categorical Risk: **Slight**
– Issued: 02/22/2018 at 0819Z

Day 1 Fire Weather Outlook
– Categorical Risk: **No Critical**

SPC Activity Chart
20180222/1424
National Weather Service
Storm Prediction Center
Norman, Oklahoma.

Hazard	Thu (02/22)	Fri (02/23)	Sat (02/24)	Sun (02/25)	Mon (02/26)	Tue (02/27)	Wed (02/28)	Thu (03/01)
Severe	Marginal	No Severe	Slight	No Area	No Area	No Area	No Area	No Area
Fire	No Critical	Elevated	No Area	No Area	No Area	No Area	No Area	No Area

Severe Weather Climatology (1982-2011)

2018 Tornado Watch Summary

Did You Know?

What's a Watch?



Discussion Key Words

- Moisture
 - "Dewpoint > X"
 - Generally, 50° = Okay 60° = Good 70° = High
 - "Dewpoint Depression < 15°F/9°C"
 - closer it is to zero, the more moisture/fuel there is
 - "Precipitable Water"
 - 0.50 to 1.25 inches = low moisture content
 - 1.25 to 1.75 inches = moderate moisture content
 - 1.75 to 2.00 inches = high moisture content
 - 2.00 inches or above = very high moisture content



Discussion Key Words

- Instability
 - "Lapse Rates"
 - Greater than $6.5^{\circ}\text{C}/\text{km}$ (minimum) at mid levels 2-6km
 - Greater than $8^{\circ}\text{C}/\text{km}$ better
 - "Convective Available Potential Energy (CAPE)"
 - CAPE of $1,500\text{ J/kg}$ = very unstable, $> 2,500\text{ J/kg}$ extremely unstable
 - "Lifted Index (LI)"
 - Less than -4 (large) less than -7 (extreme)



Discussion Key Words

- Lift
 - “Front / Boundary”
 - Storms should be along a boundary or on the “warm side” of a front
 - Dryline
 - “Forcing for Ascent”
 - “Negatively Tilted Trough”
 - “Short Wave Trough”
 - “Jet Streak”



Discussion Key Words

- Spin
 - “Shear / BRNSHR”
 - Sfc-6km Shear > 35kt favorable, > 45kt very favorable
 - Sfc-1km Shear > 20kt very favorable for tornadoes
 - BRN Shear > 35m²/s² favorable for supercells
 - “Helicity”
 - 0-1km (m²/s²) >100 favorable, >150 very favorable
 - 0-3km >250 is favorable
 - “Storm Relative Wind”
 - 0-2km represents low level storm inflow (>15kt favorable)



Discussion Key Words

- Combination Indices
 - “Sig Tor Parameter” A multiple ingredient, composite index that takes a look at vertical shear, instability, and other ingredients/indices that are traditionally used to forecast significant (EF2 or greater) tornadoes. A majority of significant tornadoes have been associated with tornadoes greater than 1.
 - >1.0 Favorable
 - > 3.0 Very Favorable
 - “Supercell Composite Parameter” It was developed with the intent that any value greater than 1 or 2 would indicate a risk for updraft rotation. This is comprised primarily of shear and instability inputs.
 - > 1.0 Favorable
 - > 2.0 Very Favorable

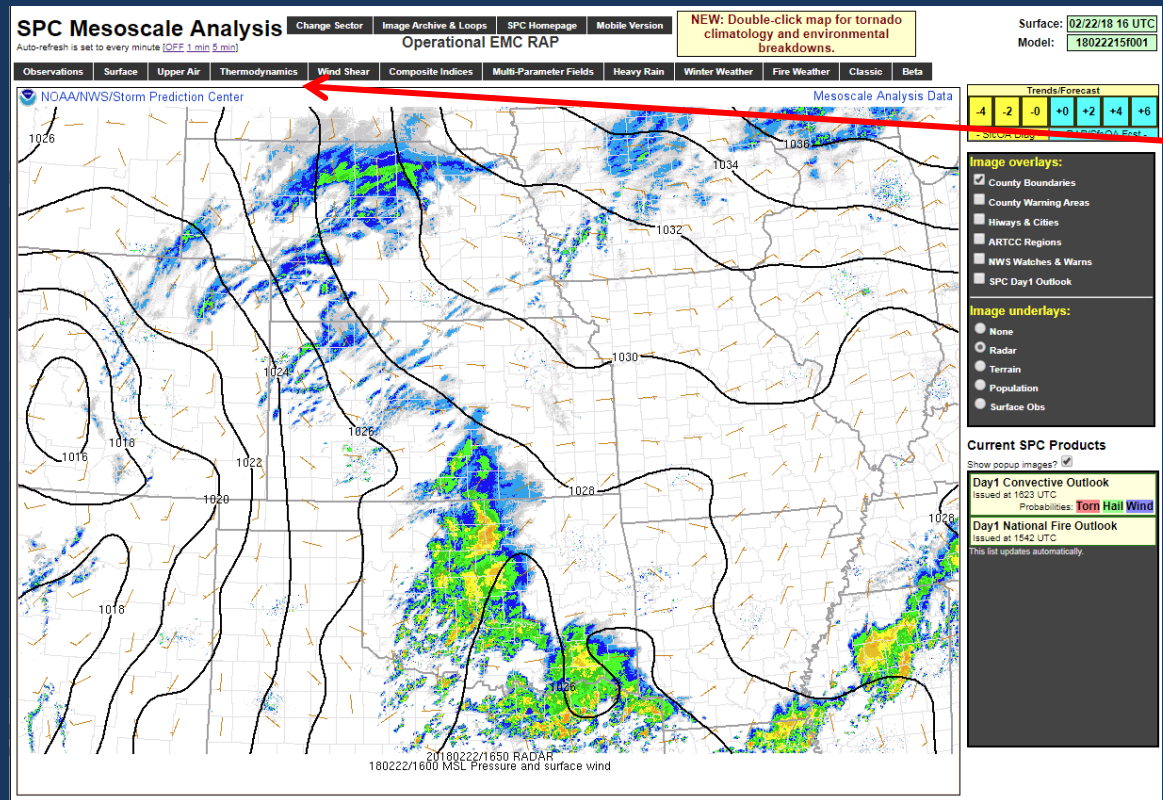


Discussion Key Words

- Other Indices and Terms
 - “Lifting Condensation Level (LCL)” the height at which an air parcel will become saturated when it is lifted and cooled. This is a reasonable estimate of where the cloud bases will be.
 - 3,200ft – 5,000ft (1000-1500m) favorable
 - < 3,200ft (1000m) very favorable
 - “Low Level Jet (LLJ)” a ribbon of stronger winds that forms, usually later in the day. Can increase moisture supply and shear.



Where to Find This Information



Thermodynamics Wind Shear Composite Indices

Nerd Scale



<http://www.spc.noaa.gov/exper/mesoanalysis/>

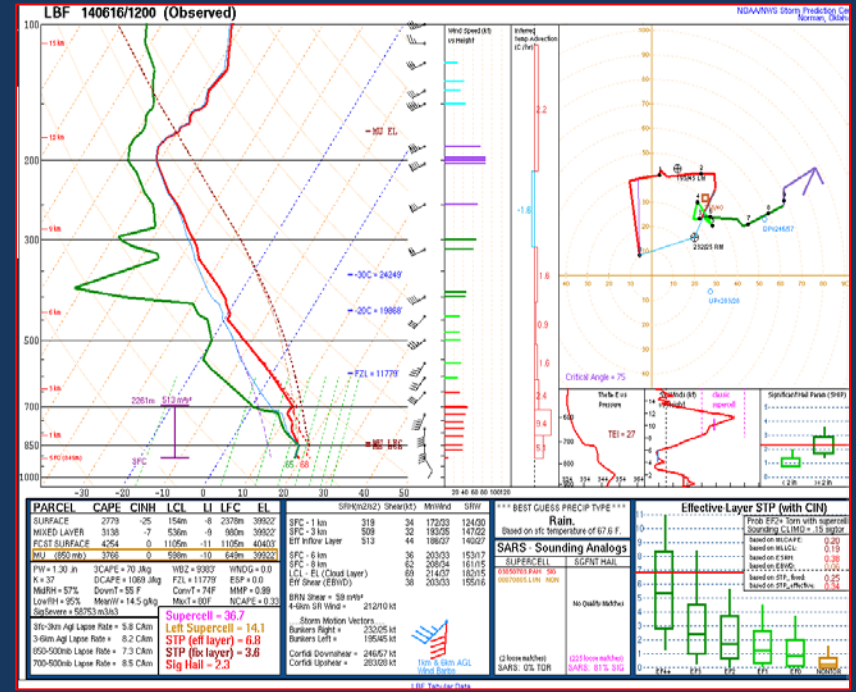
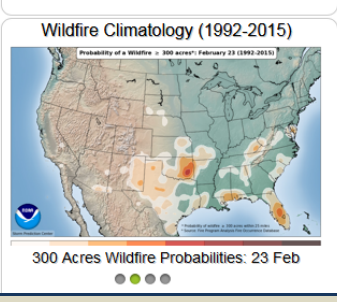
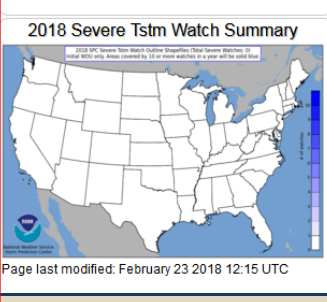
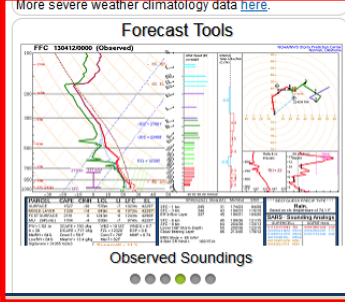
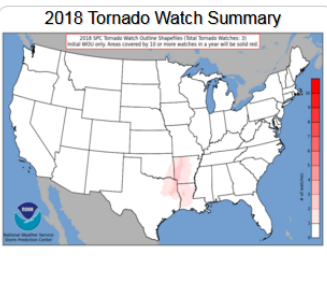
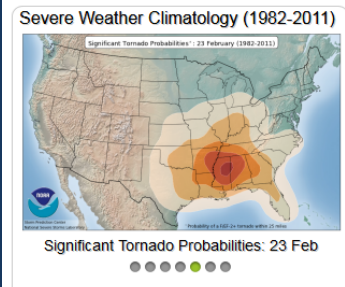
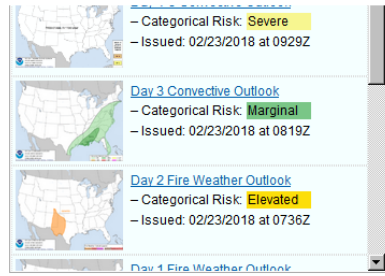
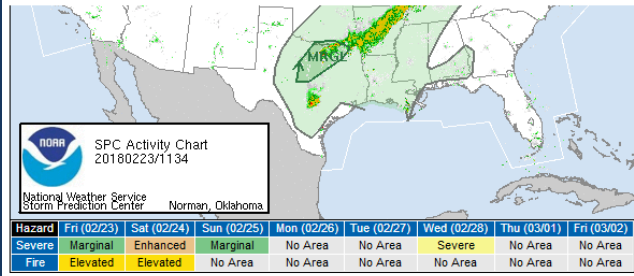


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Where to Find This Information



Nerd Scale

Motor cycle

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Pr
or

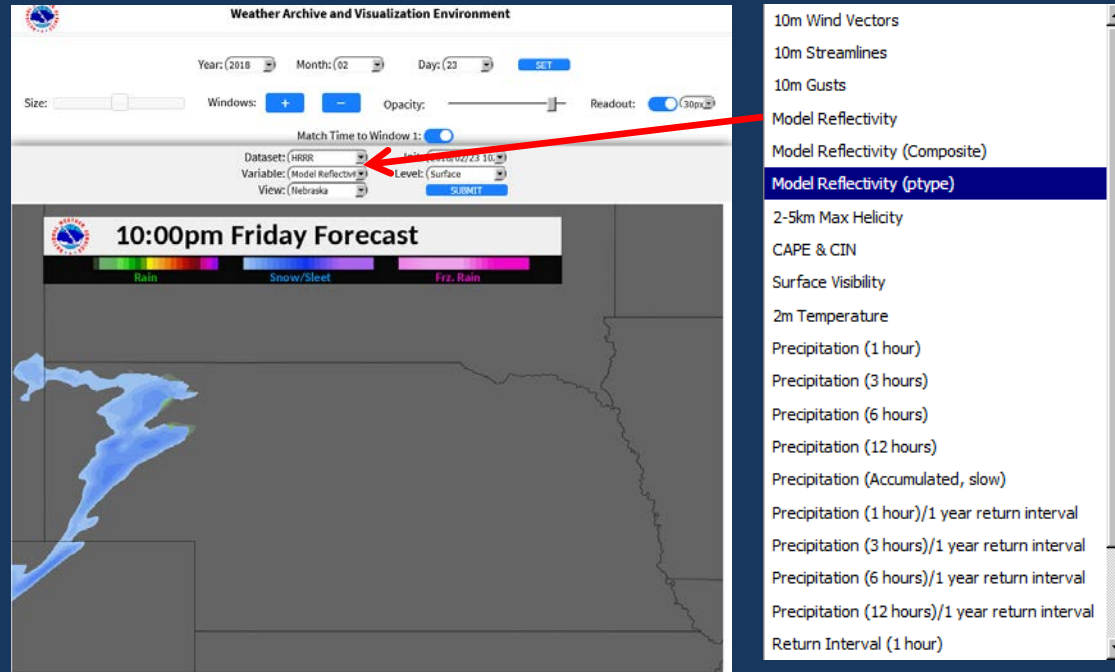
Facebook Twitter YouTube





Forecasting Tools on the Web

- Weather Archive and Visualization Environment (WAVE)
http://ssd2.wrh.noaa.gov/WAVE/index_bill.php



"Dataset" = Which model?

For thunderstorms, choose:

HRRR

RAP

ARW

NAM (3km)

Nerd Scale

Motor
cycle



Pocket
Protector



Forecasting Tools on the Web

- Pivotal Weather
<http://www.pivotalweather.com/model.php>
- College of DuPage
<http://weather.cod.edu/forecast/>
- CIRA GOES-16 Satellite Data Viewer
<http://col.st/KTbBr>



References on the Web

- Severe Weather Indices

https://www.weather.gov/media/lmk/soo/SvrWx_Fcstg_TipSheet.pdf

- Skew-T Tutorial

http://www.weather.gov/source/zhu/ZHU_Training_Page/convective_parameters/skewt/skewtinfo.html

- Comprehensive Severe Weather Forecast Checklist

https://www.weather.gov/media/sgf/research/severe_weather_checklist.pdf



References on the Web

- SPC's Severe Thunderstorm Forecasting Video Series (Advanced)

<http://www.spc.noaa.gov/exper/spcousom/>

Local forecast by "City, St" or "ZIP"

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NCEP Quarterly Newsletter

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All SPC Forecasts
Current Watches
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Tstm. Outlooks
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RSS Feeds
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Weather Information
Storm Reports
Storm Reports Dev.
NWS Hazards Map
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NOAA Weather Radio
Research
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Misc.

**Severe Thunderstorm Forecasting
Video Lecture Series**

Storm Prediction Center
Norman, Oklahoma

THE UNIVERSITY OF OKLAHOMA
SCHOOL OF METEOROLOGY

We present a video lecture series on severe thunderstorm forecasting, a collaboration between the NOAA Storm Prediction Center, The University of Oklahoma, the NOAA National Severe Storms Laboratory, and the NOAA Warning Decision Training Division. This is based on a three-semester-hour graduate-level course offered at The University of Oklahoma about applications of meteorological theory to the forecasting of severe thunderstorms (Meteorology 5403/4403: Applications of Meteorological Theory to Severe-Thunderstorm Forecasting). This course is led by SPC forecasters Ariel Cohen and Richard Thompson, and University of Oklahoma faculty member Steven Cavallo. During each spring semester from 2015 to 2017, this course has provided an opportunity to bridge the academic and operational disciplines of meteorology, allowing students to learn from experienced forecasters who

It depends on the video...

Nerd Scale

Motorcycle



Pocket
Protector



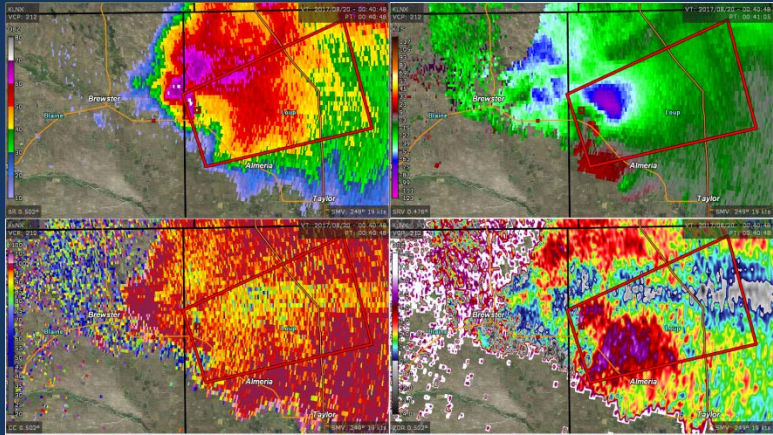
Today's Topics

- Brief Review of last year's season
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Tornadogenesis: Things we know

- Not all thunderstorms produce tornadoes
- Supercell storms have a better chance of producing tornadoes
 - But...not all supercells produce tornadoes



- A hook echo does not guarantee a tornado
But it does indicate a rotating updraft



Tornadogenesis: Things we know

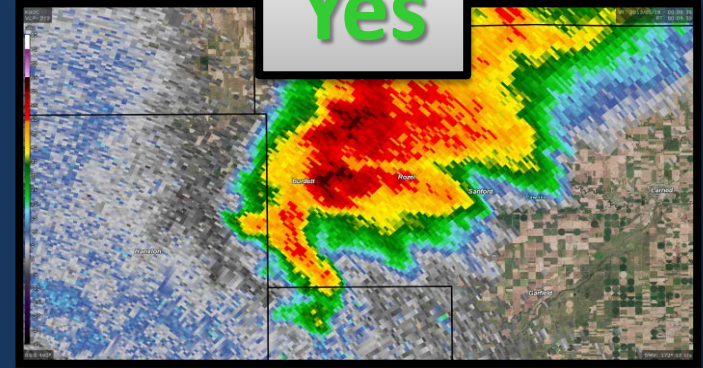
- Unless you are very close to the radar (within 5-15 miles) the circulation that may show up on radar is Not the tornado
 - Represents the “tornado cyclone” which is the parent low-level circulation
 - In most cases (> 30 miles from the radar) you are seeing the low-level mesocyclone



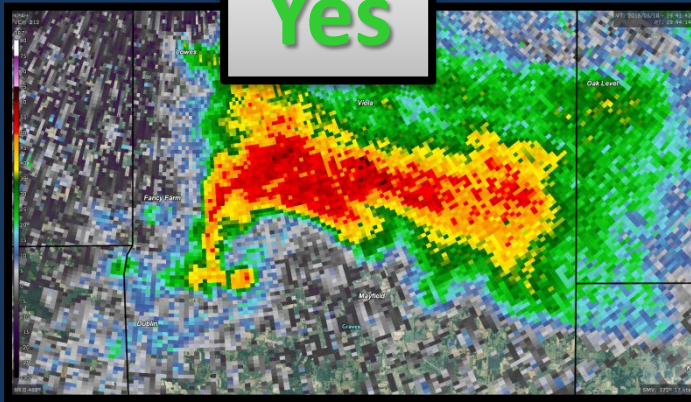
Tornadogenesis: Things we know

- Very similar looking supercells may not all produce tornadoes

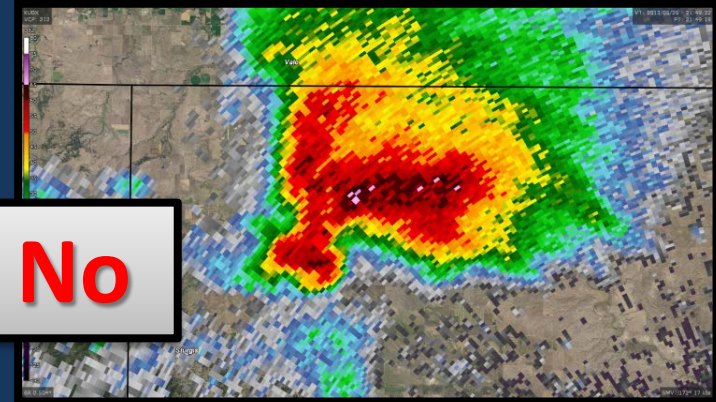
Yes



Yes



No





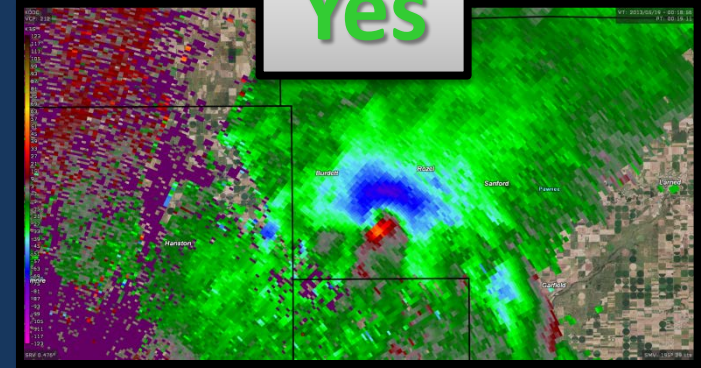
Tornadogenesis: Things we know

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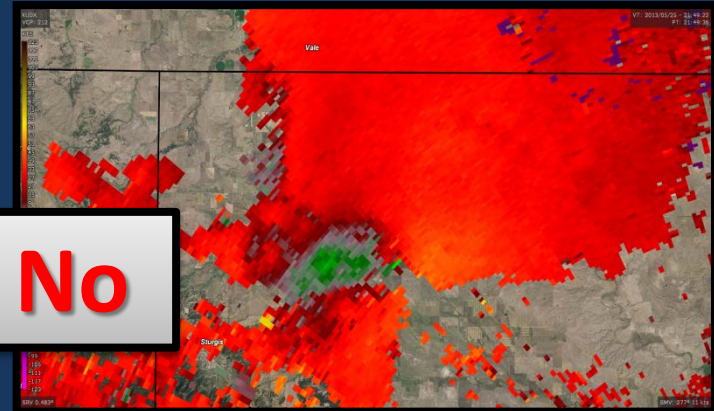
Yes



Yes



No





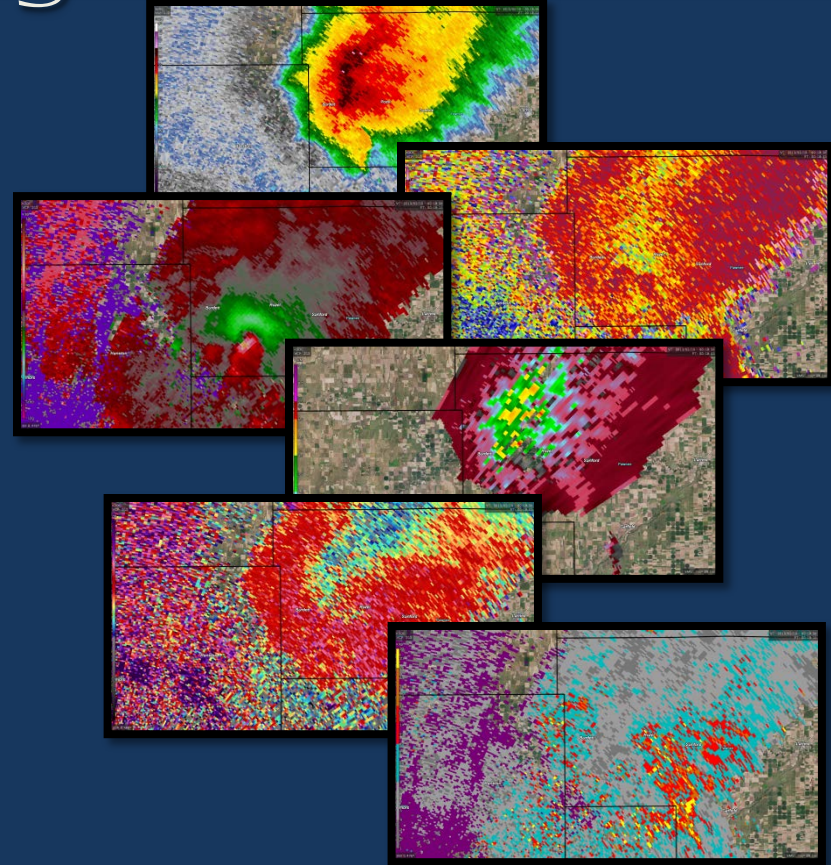
Why didn't they all produce a tornado?

- All supercells have rotation
- However a very specific cascade of events HAS to occur to generate tornadic scale rotation at the ground
- There is more to understanding radar than a "velocity couplet"



Challenges

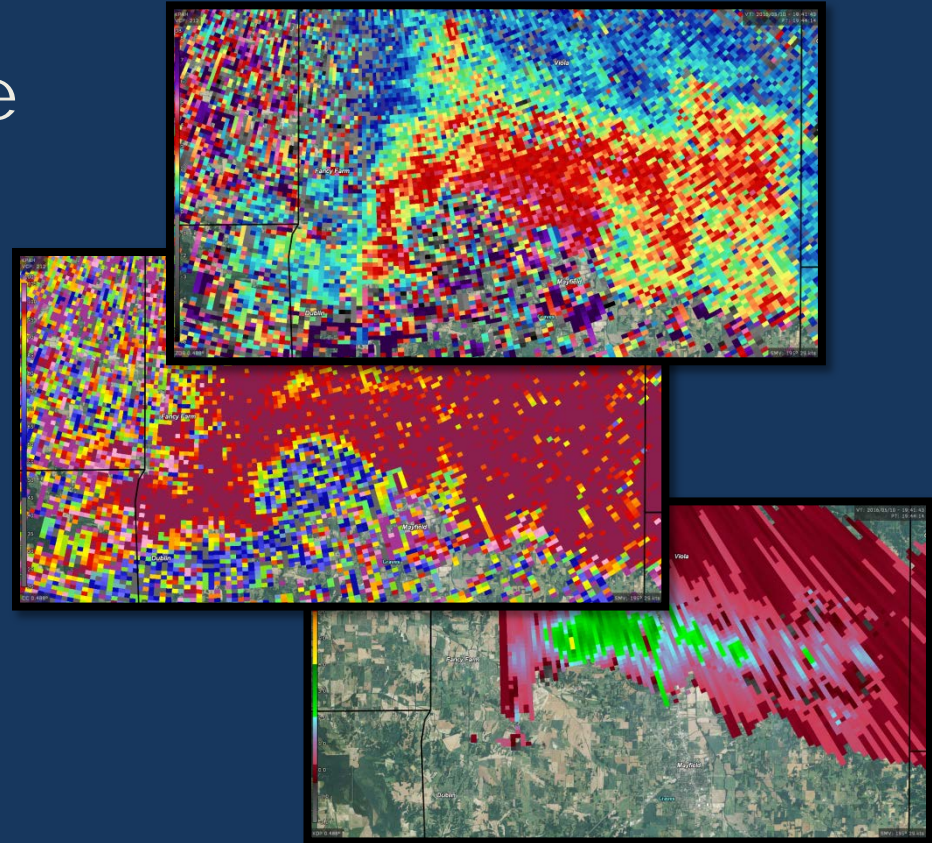
- In supercells, a downdraft is needed to generate tornadic scale rotation at the ground
 - Downdrafts are not detected by the radar, but are rather inferred from looking at many levels and many different radar products
 - Radar images by themselves are only snapshots in 2D at a specific time





Challenges

- Downdrafts must not be too "cold" otherwise tornado processes won't be successful
 - Radar does not include temperature data
 - How can we know?
 - **Dual Pol technology**





More things we know:

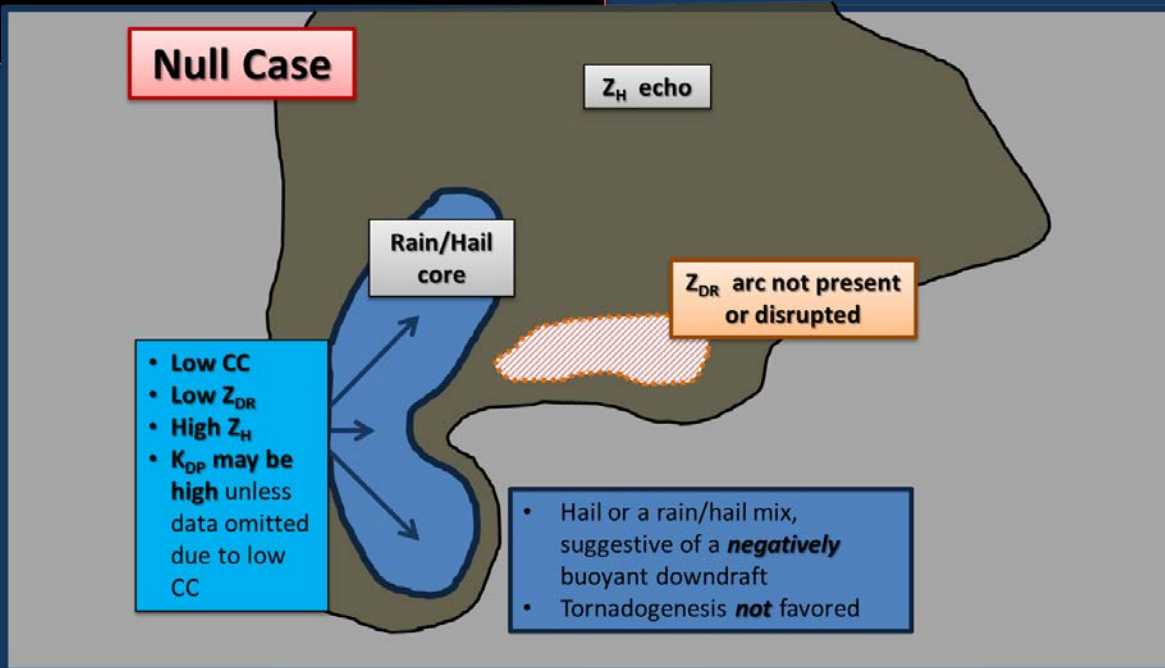
- Cold downdrafts in a supercell are not favorable for tornadogenesis
- Portions of the storm that contain a lot of hail or rain/hail mixed will likely generate a cold downdraft
- **Dual Pol technology can help us determine whether hail is present**





More things we know:

Local study of several cases provides input to the development of a conceptual model for storms not likely to produce tornadoes:

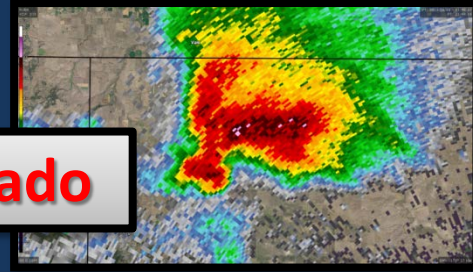




Local research

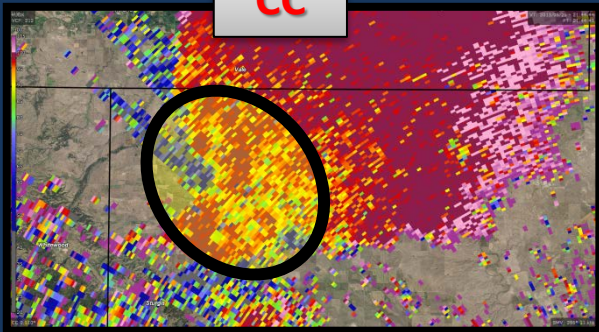
Going back to this storm:

No Tornado

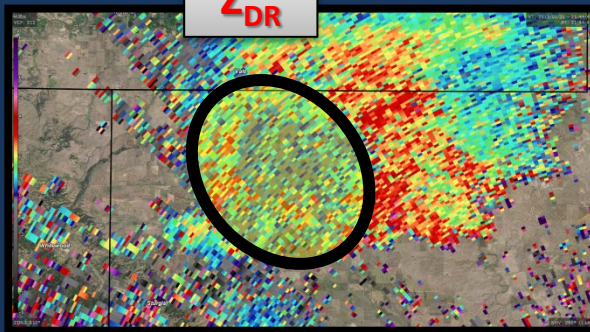


What clues did Dual Pol data have?

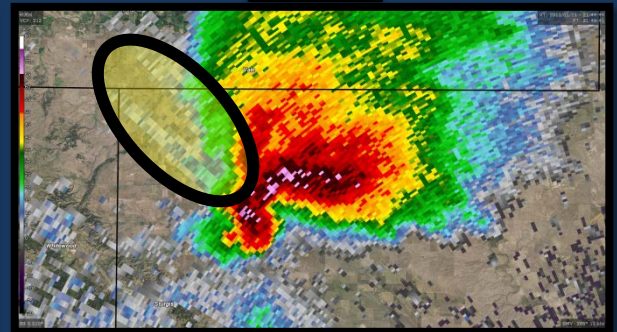
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Z_{DR}



Z



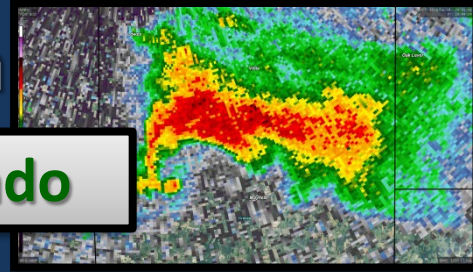
All indicators of hail in the critical downdraft portion of the storm



Local research

Going back to this storm

Tornado

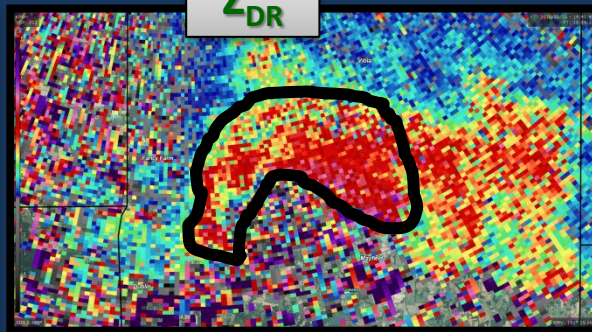


What clues did Dual Pol data have?

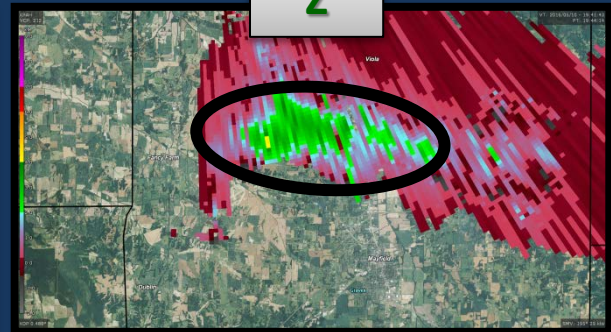
CC



Z_{DR}



Z



All indicators that low level circulation could increase markedly



What info from spotters is critical?

- Rotating updraft
 - Confirms the presence of a supercell
- Wall cloud
 - Flat base or ragged?
 - Rotating?
- Funnel or tornado?
 - Only you can see if the storm is interacting with the ground! (Dust swirl)





When reporting a funnel...

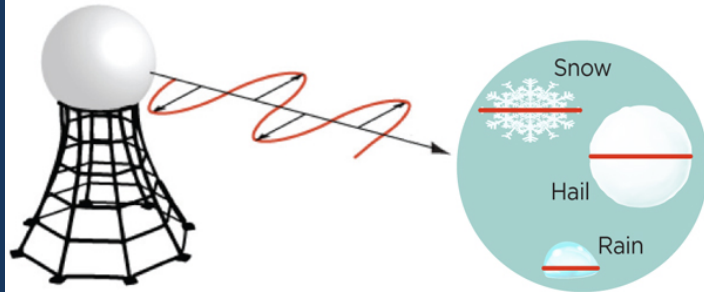
- Note which side of the wall cloud it is on
 - For true supercell tornadoes, if you are standing with your back to the inflow, the funnel/tornado should be on the *right side* (cyclonic) of the wall cloud
 - If on the left side the tornado may be anticyclonic
 - If only a funnel is observed ***it is critical to look at the ground*** for rotation
 - Increasing research suggesting tornadoes form from the very low levels -> upward
 - Condensation funnel may not seem visibly connected with the ground
 - ***But the circulation might be!***



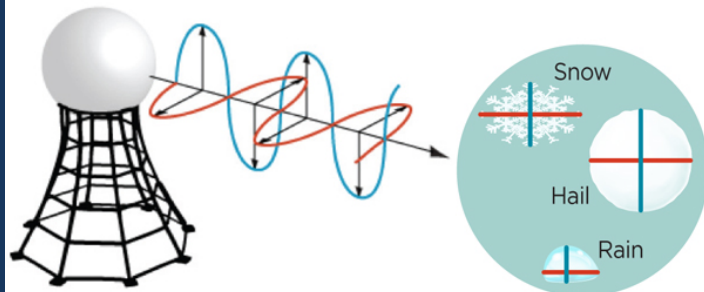
Dual-Pol Radar

Non-Polarization vs. Dual-Polarization Radar

Current Radars (non-polarization)



New Dual-Pol Radars (polarization)



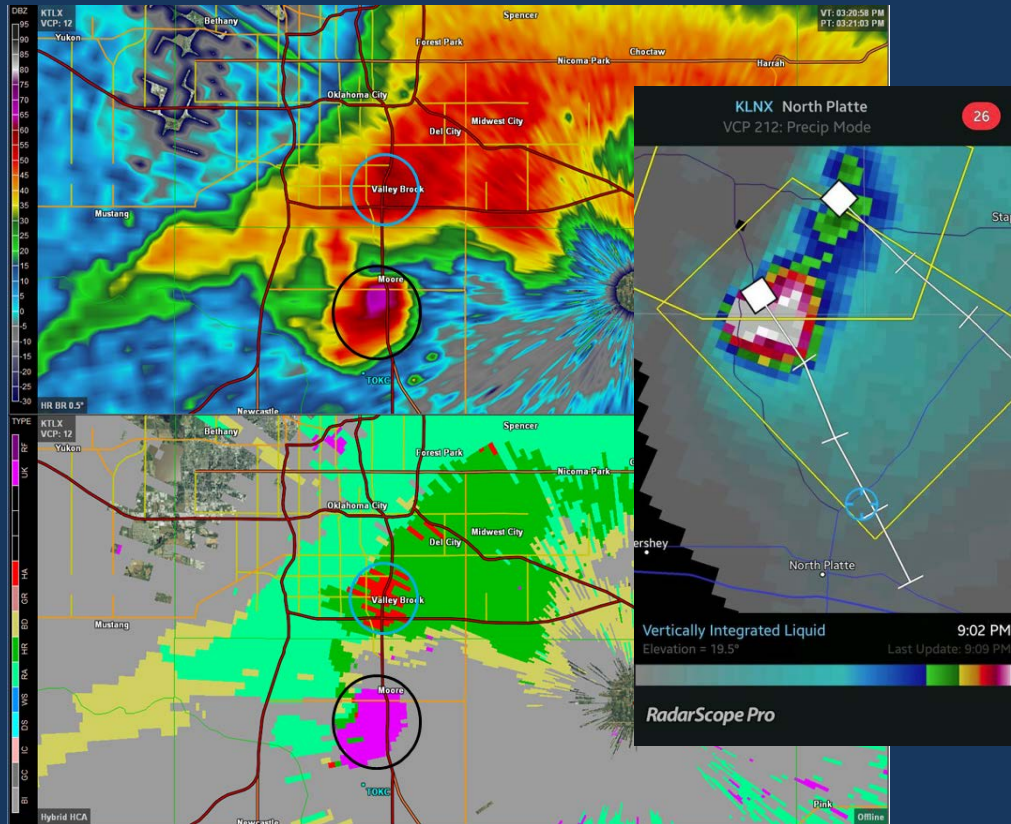
— Horizontal electric field wave — Vertical electric field wave

- Improves accuracy of precipitation (amount) estimates
- Can tell the difference between rain, hail, snow, or debris / organic matter like birds, insects
- Can estimate droplet distribution (rainfall rates)



Useful Stuff – large hail

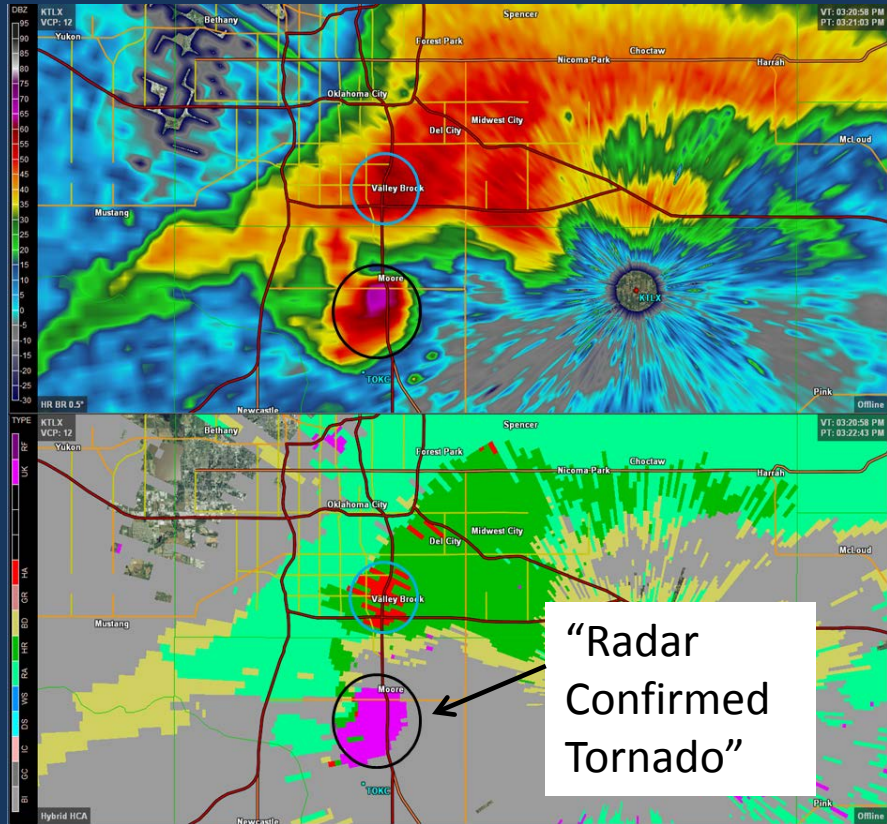
- High Reflectivity
- “Hydrometeor Classification” = Red / Large hail
- High “Digital VIL”
- ZDR near zero





Useful Stuff – Tornado Confirmed

- High Reflectivity
- Hook Echo
- Velocity
"Couplet"
- "Hydrometeor Classification" =
Purple / Biological





Break!





Today's Topics

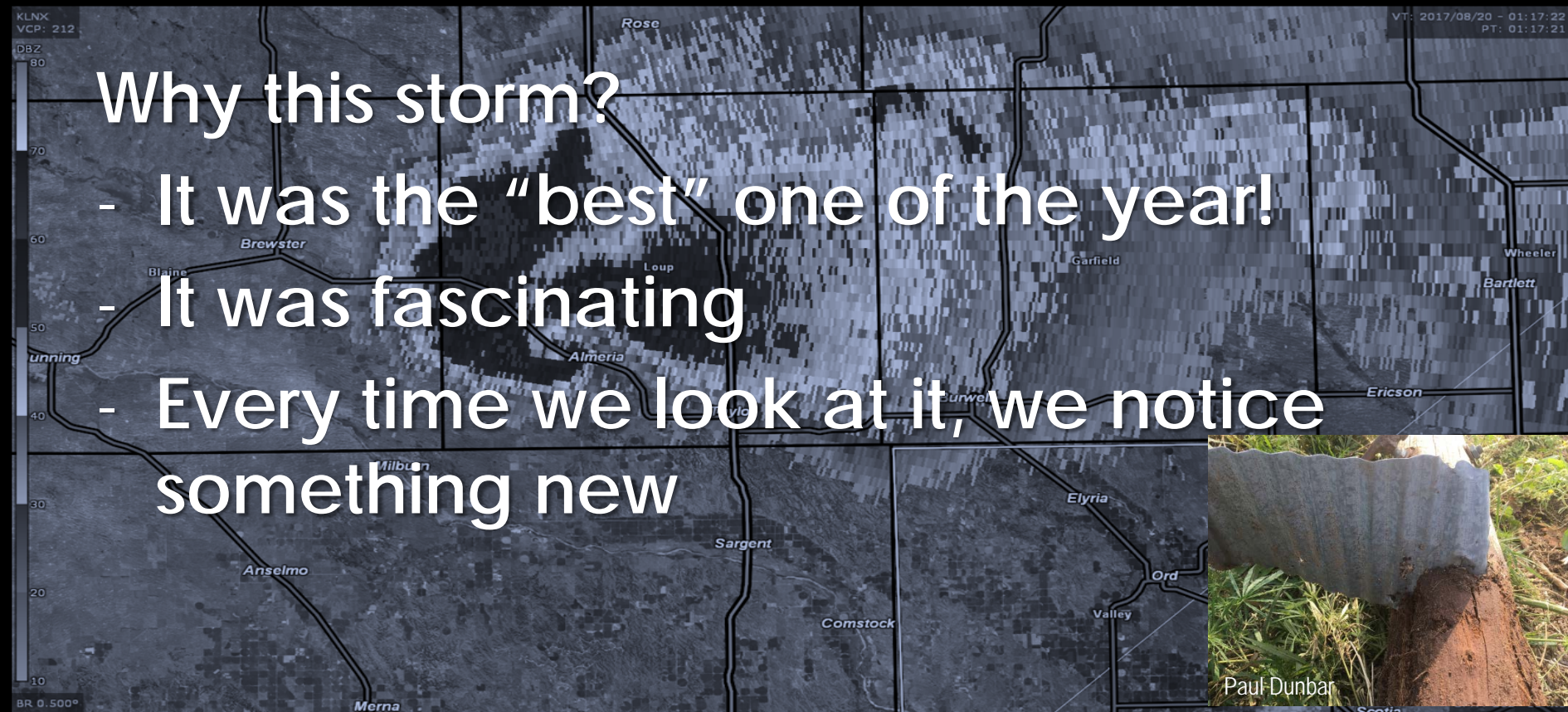
- Brief Review of last year's season
- Forecasting Severe Weather
- Tornadogenesis & Advanced Radar Interpretation
- A look at the Almeria Storm
- Spotting, Reporting, and Safety



Almeria

Why this storm?

- It was the “best” one of the year!
- It was fascinating
- Every time we look at it, we notice something new





Set-Up – August 19th



Stormy at Times Through Monday

Sat. Sun. Mon.



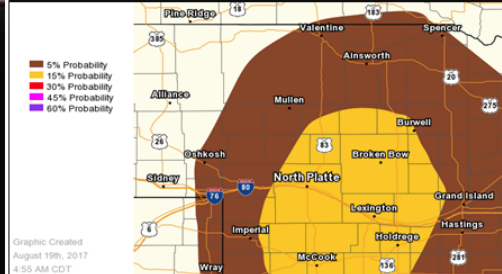
Near 90 80s/90s 80s/90

S 10-15 SE 5-15 SE 5-15

- Evening/night storm chances
Today & Sunday
 - Some storms could be strong (hail & wind)
- Morning lows generally upper 50s to mid 60s

This Afternoon and Tonight

Today's Severe Hail & Wind Risk



Timing: After 4pm



Hazards: Lightning,
Hail, Wind

8/25/2017 10:21 AM CT

National Weather Service · North Platte, Nebraska



The morning forecast highlighted the chance for thunderstorms on the 19th and through the weekend leading up to the Solar Eclipse. Primary hazards were expected to be strong wind and hail. The tornado probability was less than 2%



Set-Up – August 19th



Today's Severe Weather Outlook

Location

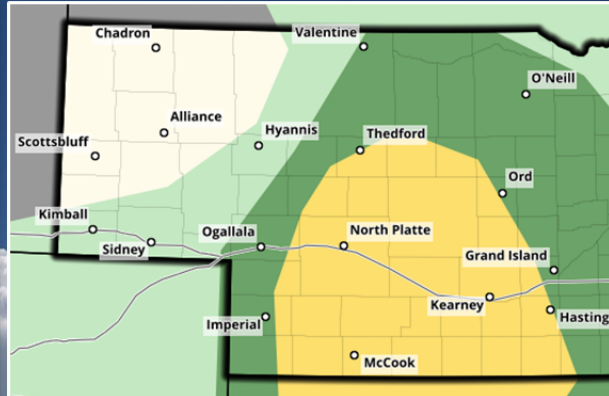
- Southeast of a line from Imperial to Valentine

Timing

- After 4 pm CT through 9 pm CT.

Primary Hazards

- Large Hail and damaging winds



Remain weather aware! Stay tuned to weather.gov, NOAA Weather Radio, or local media for warnings. **Lightning can be deadly – when thunder roars, go indoors!**

5	High
4	Moderate
3	Enhanced
2	Slight
1	Marginal
	Thunder

National Weather Service
North Platte, NE

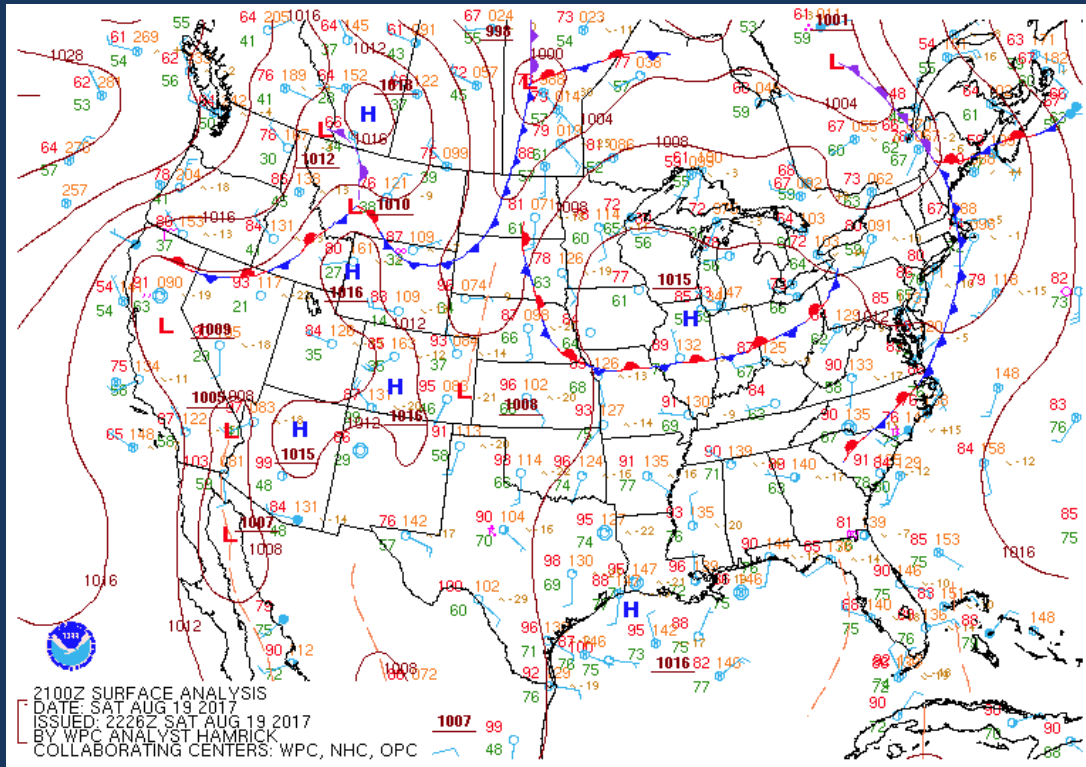
Graphic created
8/25/2017 10:17 AM CT

Building a Weather-Ready Nation
weather.gov/LBF

Day 1 Thunderstorm Outlook from the Storm Prediction Center had much of central Nebraska in a Slight Risk for severe thunderstorms. Loup County and the town of Almeria were on the northern edge of this area.



Set-Up – August 19th



The afternoon surface analysis showed a stationary front in eastern Nebraska and a trough moving into western Nebraska. Aloft, a short wave disturbance moved out of Wyoming and into the Panhandle. This disturbance was expected to provide some broad lift needed to generate thunderstorms in the afternoon and evening.

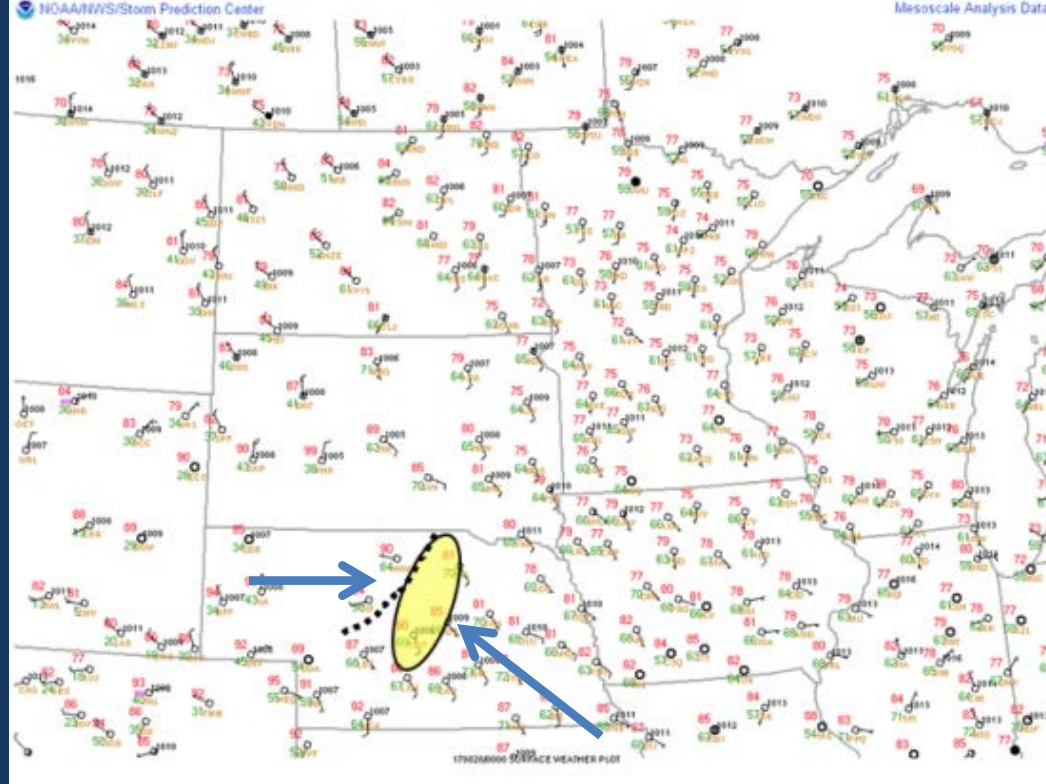


Remember...Severe Thunderstorms

- **Moisture** – surge of moisture arriving from the plains this day
- **INSTABILITY** – Plenty. Over 2500 J/kg of CAPE (we'll go over that later) on the morning sounding
- Lift – Lee Trough, upper level disturbance, and a Dryline
- *Spin* – Modest on this day but additional spin provided by a low level jet and nearby storm interaction



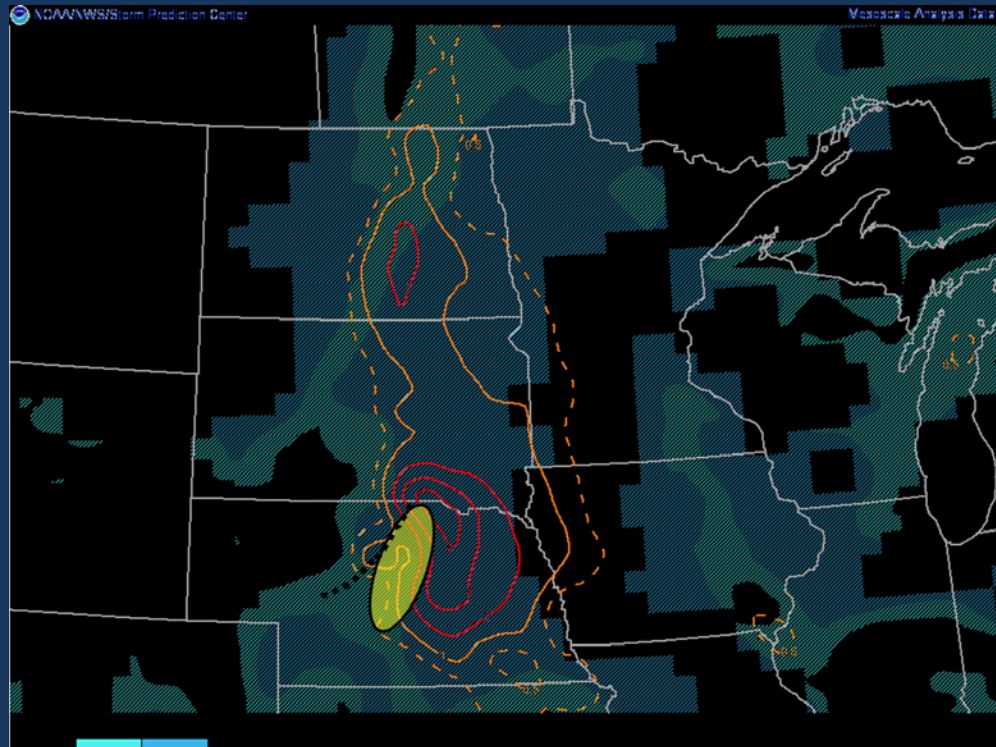
Set-Up – August 19th



This figure shows the surface map at the time the thunderstorm underwent rapid intensification. Notice how the winds to the west of the line and the winds toward the east of the line are going in opposite directions. This shows an area of strong convergence, which would provide a source for lift.



Set-Up – August 19th

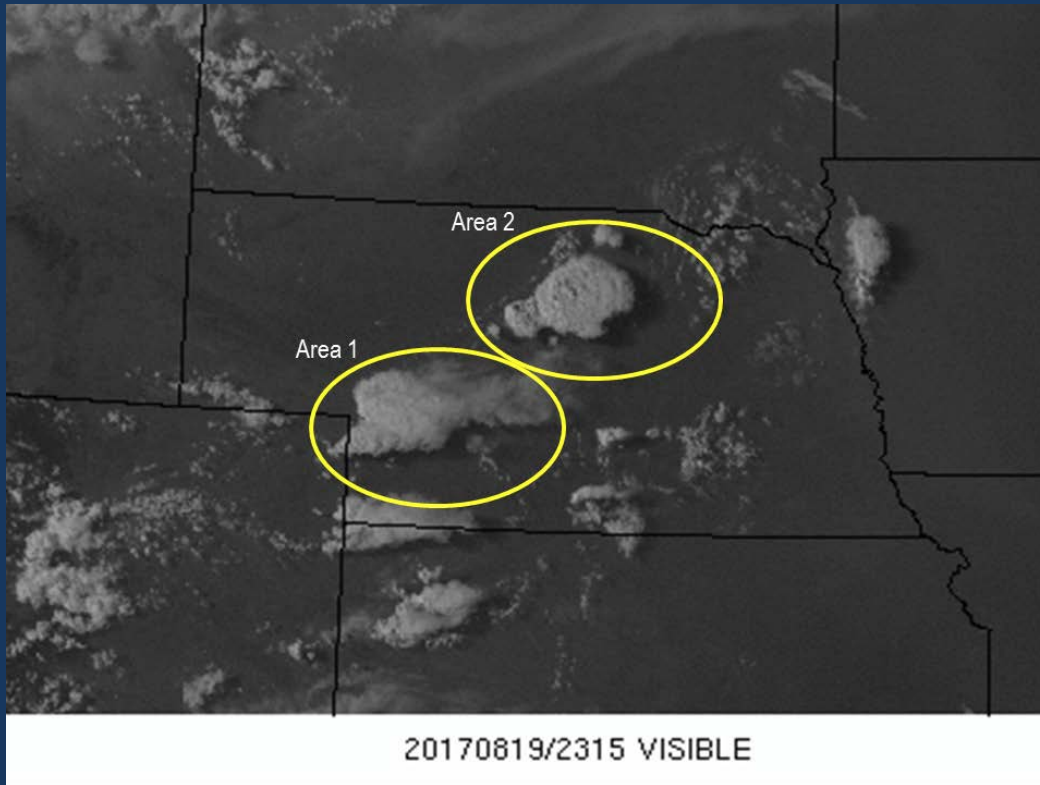


The red and orange lines in this image show the "Significant Tornado Parameter".

Note the sharp increase from west to east. This indicates that the storm was moving into an environment that was favorable for tornadoes at this time (around 7:00pm CDT)



Set-Up – August 19th

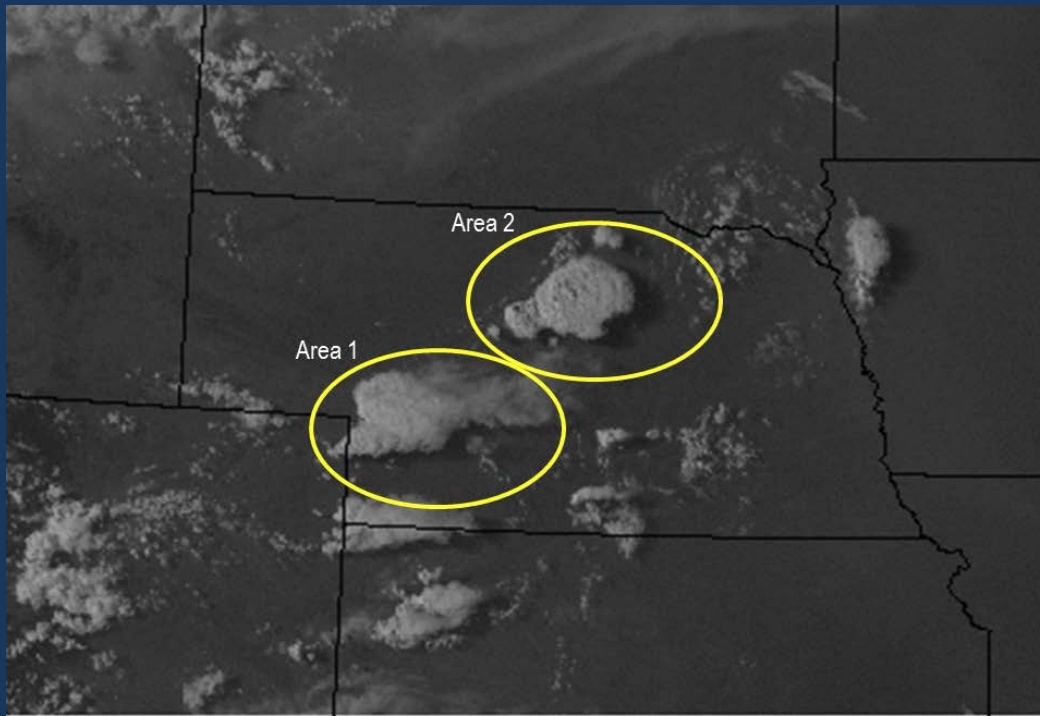


As the storms started developing, the southern cluster was in what was supposed to be the more favorable airmass. The models had this area as the primary area to watch for much of the day.

The second area of development looked like, in the model data, they would present more of a straight-line wind threat.



Set-Up – August 19th



20170819/2315 VISIBLE

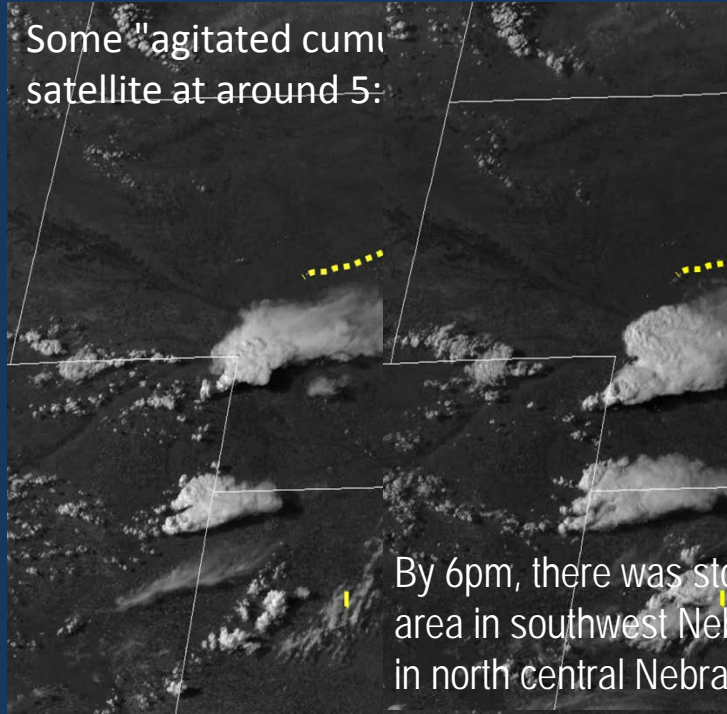
Area 1 ended up never sustaining any storms that moved into it.

This left all of the energy available for Area 2...

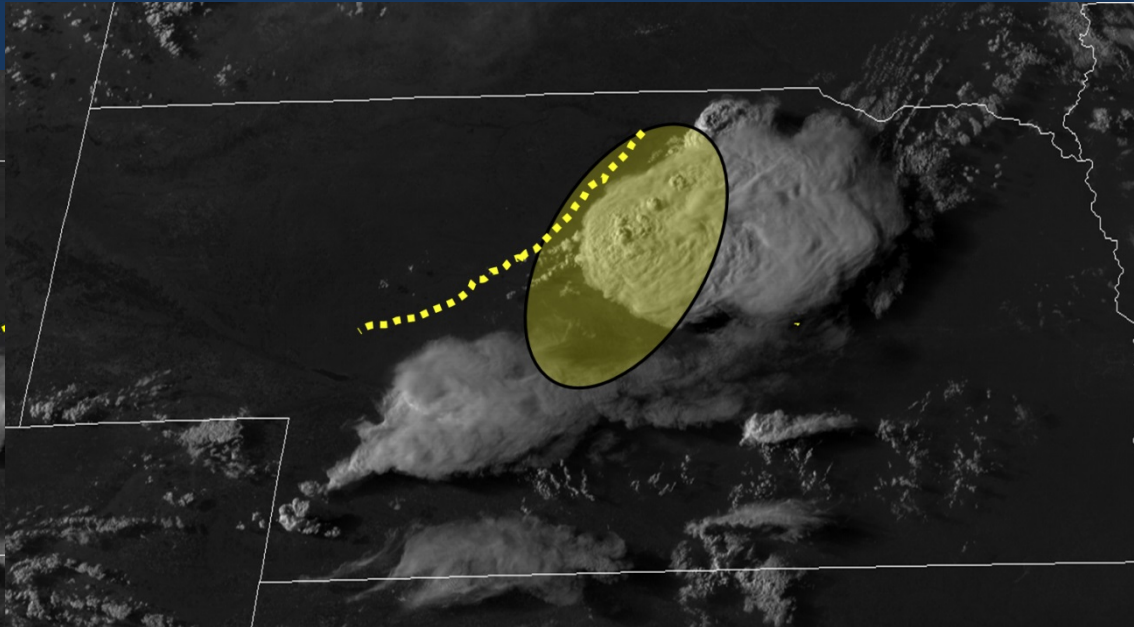


Satellite Data

Some "agitated cumi
satellite at around 5:



By 6pm, there was st
area in southwest Ne
in north central Nebra

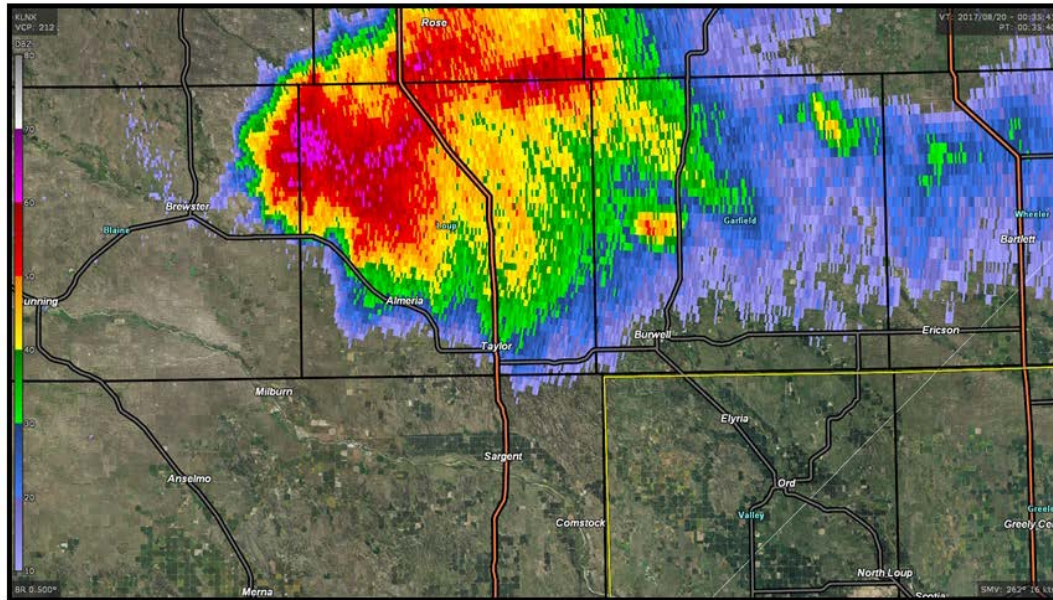


20 min later...you can see how quickly the storm grew once it
approached the better instability, moisture, and spin in the atmosphere.
It only grew larger from here. (but these are visible satellite images and
we began to lose daylight)



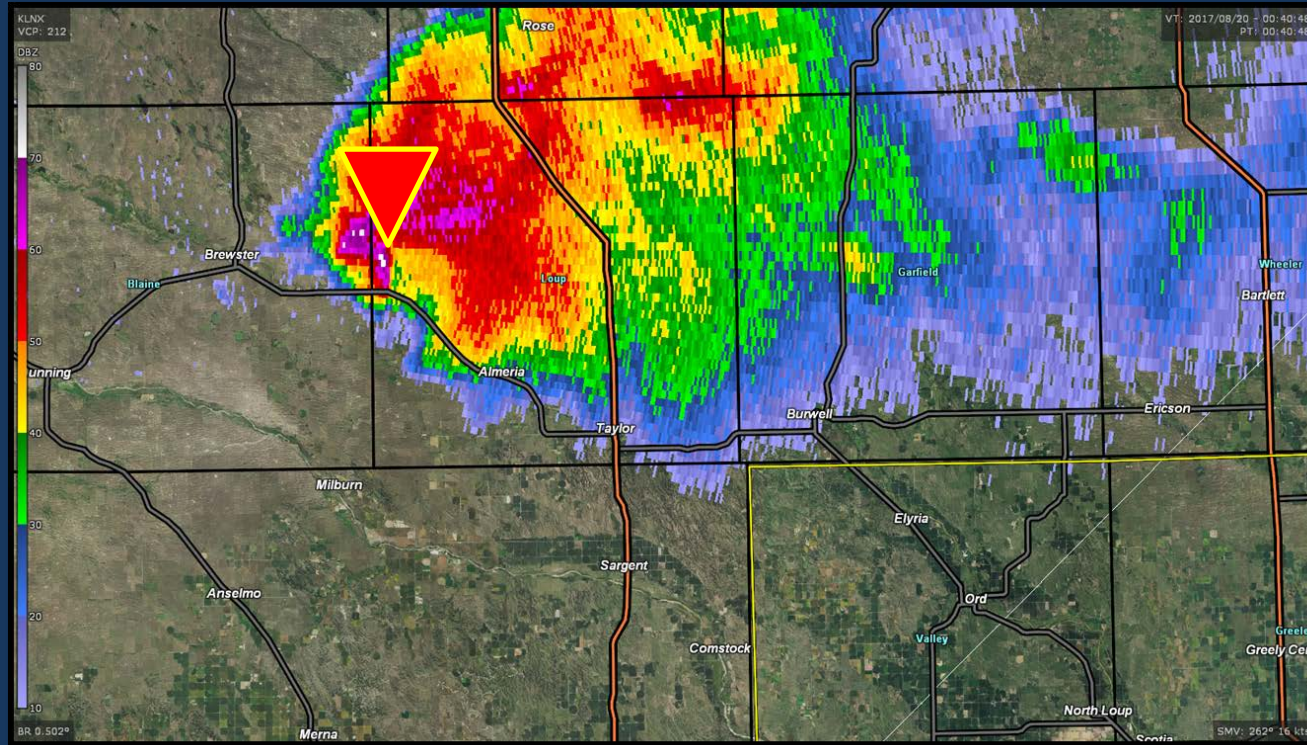
Radar

0.5° Reflectivity





Radar Reflectivity



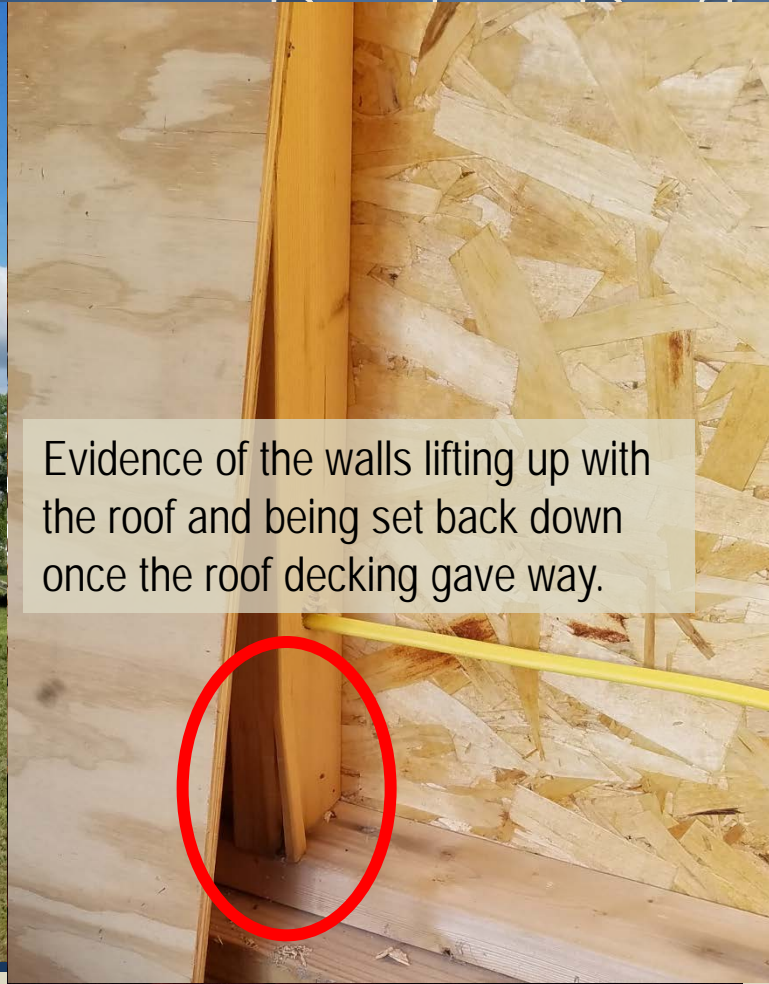
Tornado #1

Got a few trees

EF-0

Est. 65mph Winds





Tornado #2

Partial roof loss on home. Trusses were anchored with hurricane clips. Snapped power poles.

EF-1
Est. 105mph Winds



Tornado #3

Snapped Poles, trees,
large quonset hut lifted,
twisted about 90
degrees, and collapsed.

EF-1

Est. 100 mph Winds



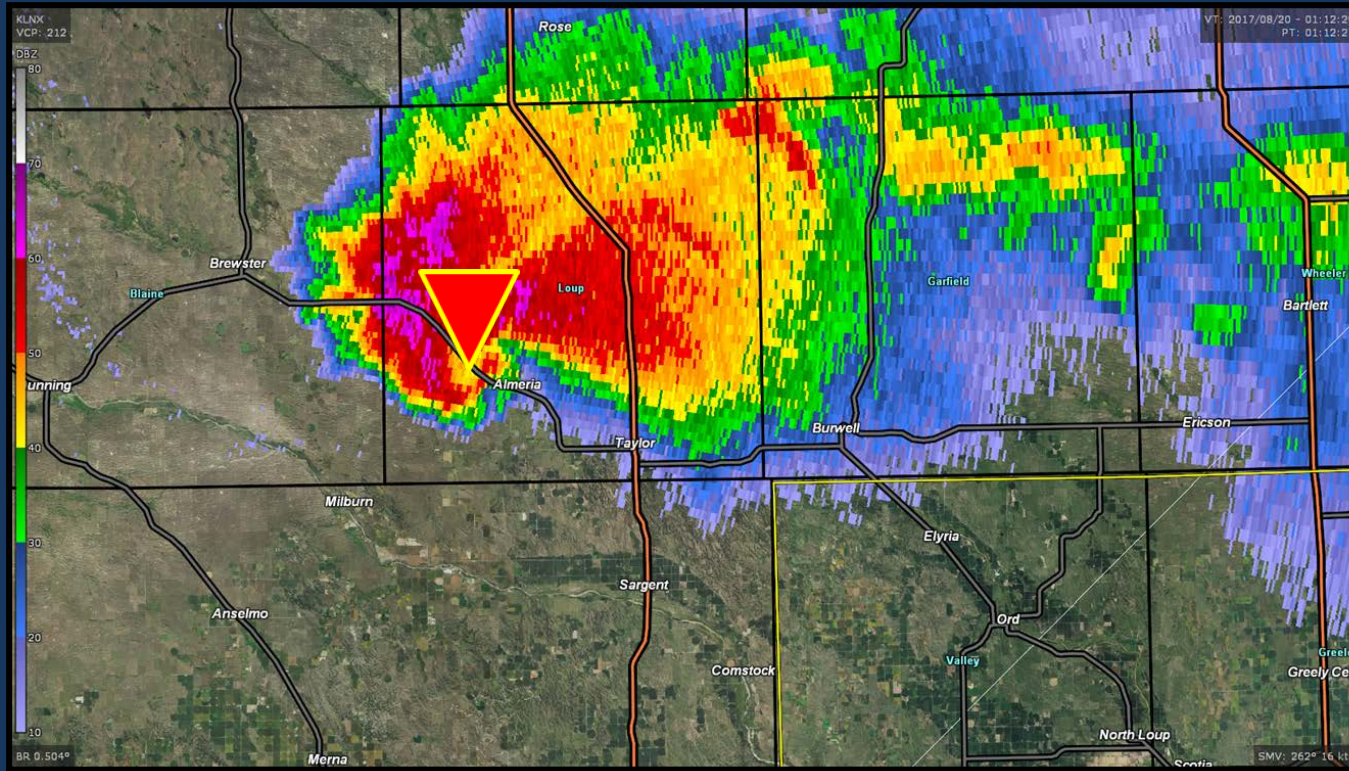
Radar Reflectivity

Tornado #4

The crop circle.

EF-0

Est. 75mph Winds





Attic access



Paneling sucked off of the wall due to missile entering attic and causing suction. Window was also broken and paneling ended up across the room by the window

ornado #5

the Dunbar Ranch,
merous trees debarked,
isted, uprooted, poles
apped.

F-2
st. 120mph Winds



0.5° Storm-Relative Velocity





Video – Ann Wurst





Today's Topics

- Brief Review of last year's season
- Forecasting Severe Weather
- Tornadogenesis & Advanced Radar Interpretation
- A look at the Almeria Storm
- Spotting, Reporting, and Safety



Spotting & Reporting





What We Want to Know

- Who you are (trained spotter)
- What you saw (weather event or damage)
 - Let us know your uncertainty
- When & where the event occurred
 - Distance & direction to nearest town
 - Well-known road (highway) or landmark
 - Latitude/longitude



How to Reach Us

Severe Weather Spotter Line

1-800-603-3562

**Alternate number in operations
308-532-0921**

Facebook and Twitter: NWSNorthPlatte

**Immediate reports best *if safe*,
delayed reports also appreciated**



Severe Thunderstorm Criteria

One or more of the following:

- ✓ Tornado
- ✓ Wind: 58+ mph
- ✓ Hail: 1" + diameter
- ✓ Flash flood





Estimating Wind Speed

30 - 40 mph	Whole trees in motion
40 - 50 mph	Twigs or small branches breaking
50 - 60 mph Severe = 58+	Slight structural damage; Large branches breaking
60+ mph	Down or snapped trees; Structural damage
70 / 100 mph	Pivot systems flipped: empty / full



It's Easy to Over-estimate Wind





Hail Size Reports

- Size of largest hailstone
 - Estimated or measured
 - Pictures are appreciated
- Any damage
- Wait until it's done hailing to collect!





Hail Reference Chart



Pea: $\frac{1}{4}$ "



Dime: $\frac{2}{3}$ "



Penny: $\frac{3}{4}$ "



Nickel: $\frac{7}{8}$ "



Quarter: 1"



Half Dollar: $1\frac{1}{4}$ "



Ping Pong Ball: $1\frac{1}{2}$ "



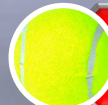
Golf Ball: $1\frac{3}{4}$ "



Hen Egg: 2"



Billiard Ball: $2\frac{1}{4}$ "



Tennis Ball: $2\frac{1}{2}$ "



Baseball: $2\frac{3}{4}$ "



Softball: $4\frac{1}{2}$ "



CoCoRaHS

**"Spot" year-round:
We appreciate rainfall
and snowfall reports!**



www.cocorahs.org



NWS North Platte





Safety

Man who mowed lawn with tornado behind him says he 'was keeping an eye on it.'

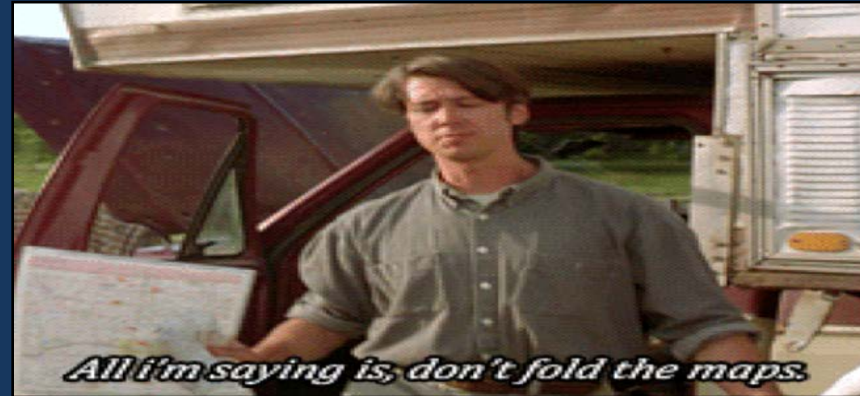
THE CANADIAN PRESS
JUNE 3, 2017 04:59 PM

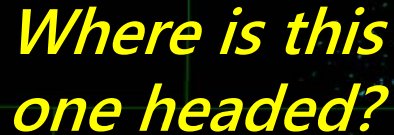




A Few Rules to Spot By

- Maintain situational awareness
- Multiple lines of communication
- Know your escape routes
 - Map/atlas a good idea
- Know where safe shelters are located
- No report is worth your life!







Tornado Safety - Outside

- Seek sturdy shelter immediately!
 - Overpasses do NOT count

If not possible:

- Drive out of its path *if* tornado is visible *and* traffic is light
- Last resort: get lower than the roadway and cover your head

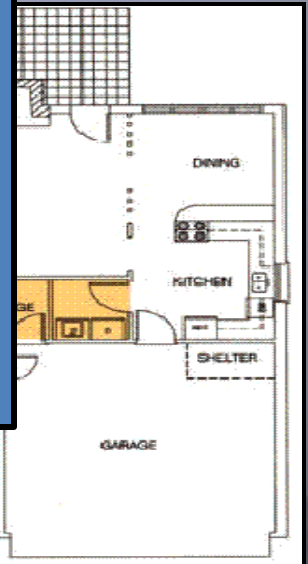




Tornado Safety - Inside

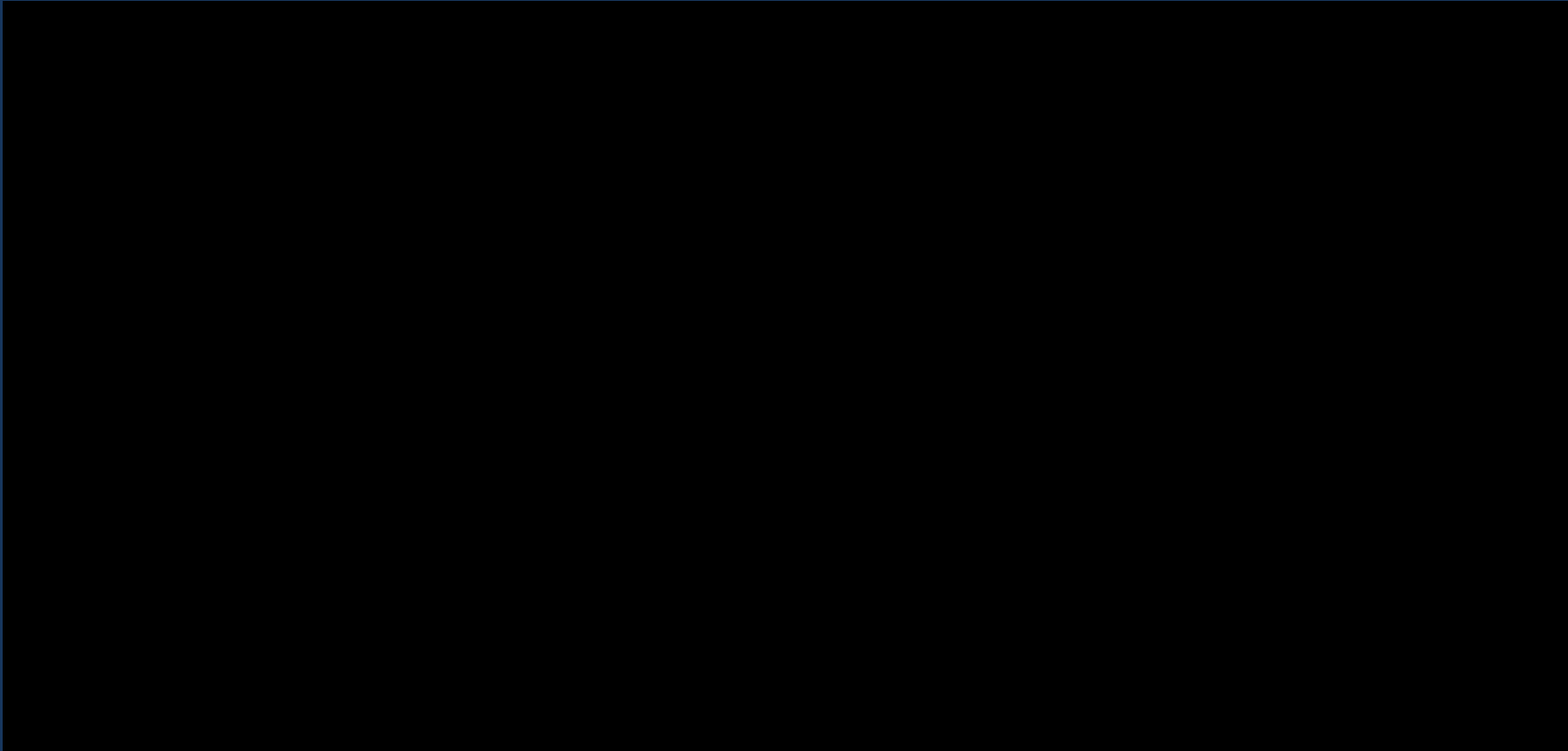
- Lowest possible floor
 - Basement or storm shelter if available
- Stay away
 - Closet, u
- Get down head
 - Pillows, blankets, bike helmet
- **If in a mobile home, find sturdier shelter**

Bottom line:
**Put as many walls
between you and the
tornado as possible**





Flooding Safety



Lightning Safety

- Don't forget about this while spotting!
- Flash-to-distance
 - Count the number of seconds between the flash and the thunder
- Can strike away from you
 - Bolts from the blue

Bottom line:
Hear thunder?
You're close enough to
be struck by lightning!

When



er

doors!

activities.

ostantial building
ed vehicle.

after storm to
tivities.



www.lightningsafety.noaa.gov





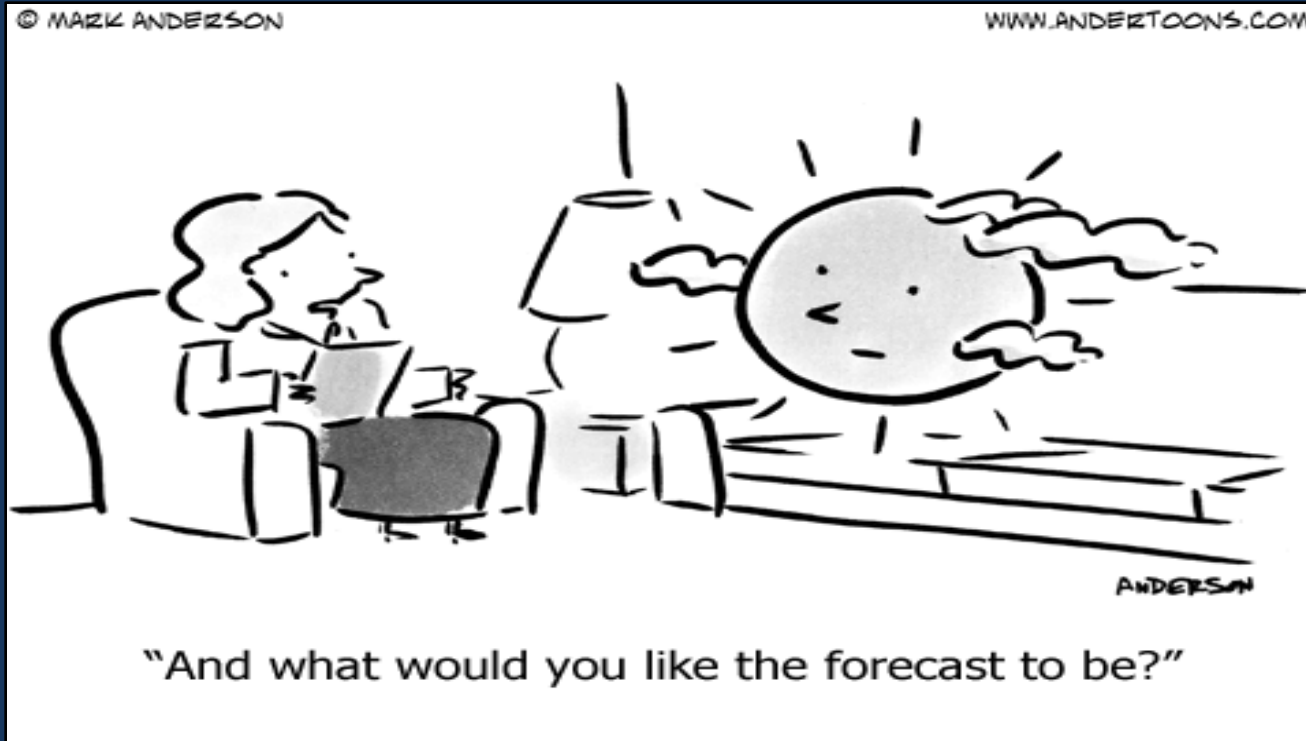
Lightning Safety

- 80% of lightning fatalities from not seeking shelter during recreational activities
- Trees do not count as shelter
- Fishing boat on a lake = bad idea
- If stuck outside, crouch – don't lie down





NWS Products and Services

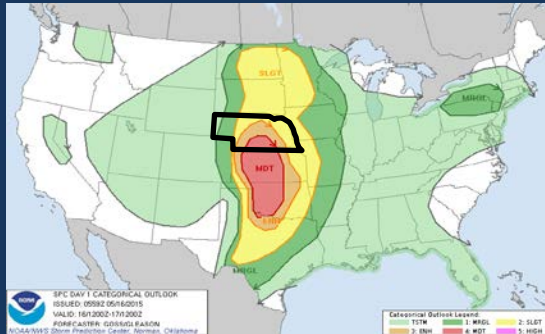




Severe Weather Products

OUTLOOK

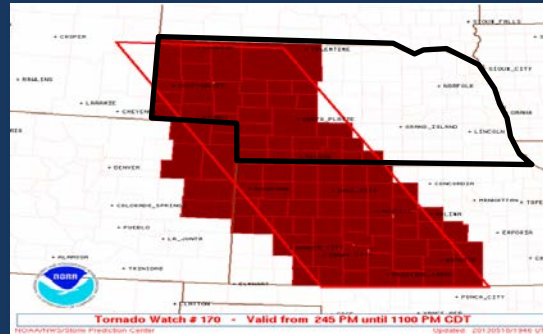
Days Ahead



Highlights general area at risk for severe weather

WATCH

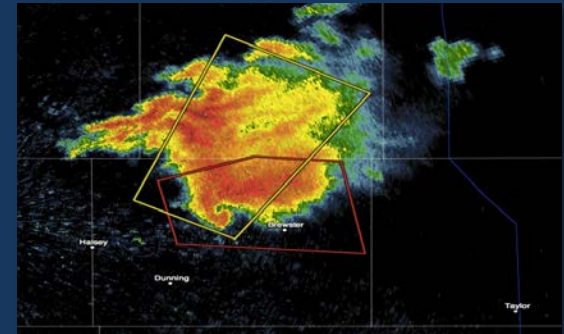
Hours Ahead



Conditions are favorable for severe weather over the next several hours.
Plan, prepare, and be aware!

WARNING

NOW



Severe weather is imminent or occurring in the area.
Take immediate action to protect life and property!



Hazardous Weather Outlook

- Updated each morning & afternoon, more if needed
- Highlights potential weather hazards through 7 days
- Spotter Information Statement

THIS HAZARDOUS WEATHER OUTLOOK IS FOR PORTIONS OF WESTERN AND NORTH CENTRAL NEBRASKA.

.DAY ONE...TONIGHT.

SCATTERED SEVERE THUNDERSTORMS ARE EXPECTED TO DEVELOP THIS EVENING ACROSS MUCH OF WESTERN AND NORTH CENTRAL NEBRASKA. THE RISK IS GREATEST ALONG AND NORTH OF A LINE FROM VALENTINE TO AINSWORTH AND ONEILL WHERE WIND GUSTS TO 80 MPH MAY DEVELOP. HAIL TWO INCHES OR LARGER IN DIAMETER IS POSSIBLE ACROSS NORTHERN SHERIDAN COUNTY. AN ISOLATED TORNADO MAY FORM BETWEEN VALENTINE AND GORDON.

EXTREME INSTABILITY WILL PROMOTE THE DEVELOPMENT OF SEVERE THUNDERSTORMS ELSEWHERE ACROSS WESTERN AND NORTH CENTRAL NEBRASKA. WIND DAMAGE AND LARGE HAIL ARE THE THREAT IN THIS AREA.

.DAYS TWO THROUGH SEVEN...THURSDAY THROUGH TUESDAY.

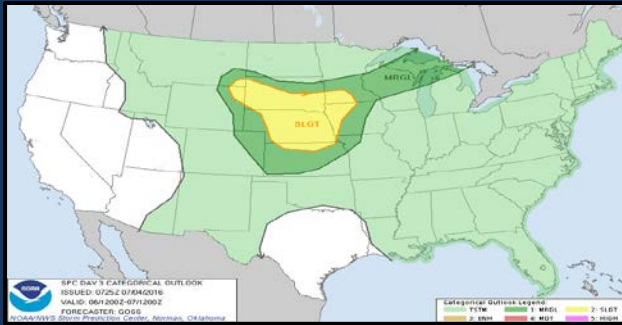
THUNDERSTORMS ARE POSSIBLE THURSDAY AND SATURDAY THROUGH TUESDAY. STORM COVERAGE IS EXPECTED TO BE MOSTLY ISOLATED. THE RISK OF SEVERE WEATHER IS LOW AT THIS TIME.

.SPOTTER INFORMATION STATEMENT...

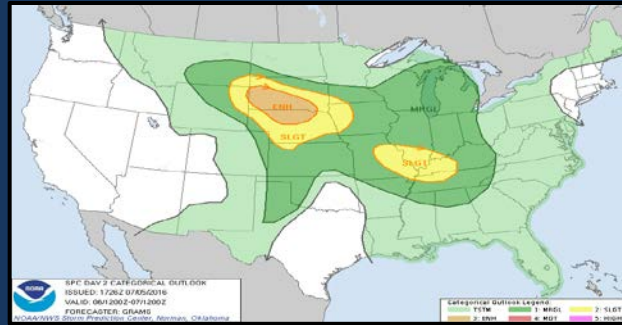
SPOTTER ACTIVATION MAY BE NEEDED THIS EVENING ACROSS PARTS OF WESTERN AND NORTH CENTRAL NEBRASKA.



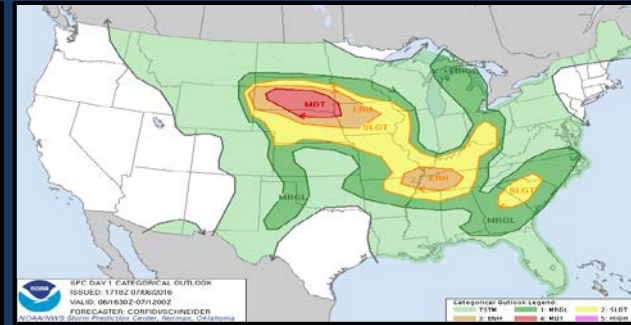
Outlooks for July 6, 2016



2 Days Out
Slight Risk
(Cat. 2)



1 Day Out Enhanced Risk (Cat. 3)

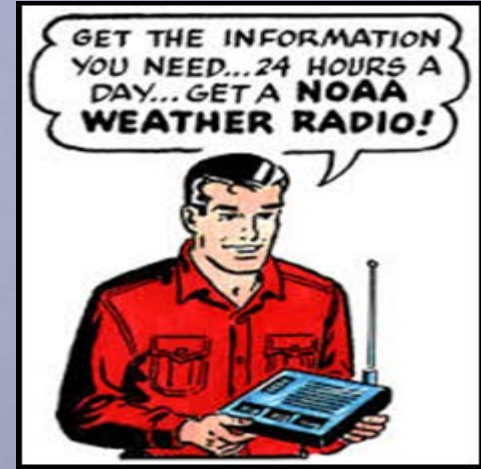


Day Of
Moderate Risk
(Cat. 4)



Where to Find Our Stuff

- Weather.gov/LBF
- Mobile.weather.gov
 - “Widget” (not an app)
- Facebook.com/NWSNorthPlatte
- Twitter: @NWSNorthPlatte
- NOAA Weather Radio
- Other providers:
 - Local media
 - Phone carriers





Thank You For Your Service!

Questions?

Please fill out the survey on the back of the white card and bring it up when you're done



NWS North Platte

