WOC FY16 Severe WES Simulation Guide: 23 May 2015 OUN

Simulation Data Time Range: 21:00 UTC 23 May 2015 to 01:10 UTC 24 May 2015
Case Data Time Range: 18:00 UTC 23 May 2015 to 03:00 UTC 24 May 2015

Phase 1: Threat Assessment (21:00-22:00 UTC)
Phase 2: Mesoscale/Storm-scale Evolution (22:00-00:30 UTC)
Phase 3: Decision Support (00:30-01:00 UTC)

General Instructions:

This is a simulation focused on effective warning methodologies for severe storm threats occurring **between 21:00 UTC May 23, 2015 to 01:00 UTC May 24, 2015** in the Norman, Oklahoma Forecast Office (OUN) County Warning Area (CWA). The simulation is intended for students who have completed the F16 WOC Core and Severe Tracks. The performance objectives of the simulation training are based on applying knowledge learned from instruction in RAC and WOC, specifically:

1. Correctly assess the potential of severe storm hazards (tornadoes, wind, and hail) in a CWA.
2. Demonstrate effective storm interrogation techniques to identify severe storm structures.
3. Demonstrate effective storm-based warning strategies (polygon shape and warning details) at stated decision points to maximize lead time, minimize false alarm areas, and provide actionable messages.
4. Demonstrate effective risk communication messaging strategies in the warning methodology process.

The primary severe weather hazards for this simulation are:

- tornadoes
- hail
- damaging wind

However, you can also use this simulation to practice hydrometeorological assessment, storm interrogation, warning development and messaging for flash flooding threats as well. The May 23, 2015 event produced widespread flash flooding in the Norman CWA so it may be useful to use this simulation for issuing flash flood warnings. Please refer to the WOC Flash Flood Track for simulation objectives related to flash flooding. The simulation is designed to last for a maximum duration of 4 hours but you can use the WES-2 Bridge Simulation Controls to modify starting and ending times, or shorten the duration of the phases in the simulation by using the “Skip” function.

WES-2 Bridge Setup and Case Installation Instructions:

Refer to the **READ ME FIRST - Simulation Quick Start Guide** file which contains the instructions for starting up the simulation.

For this particular type of simulation, there are 3 reminders :

Note 1: Make sure you click on “PLAY” from the Simulation Control Window (this window might be covered up by another window).

Note 2: Make sure you open a Text Window (to compose warnings from WarnGen).

Note #3: Make sure you click on the box in the simulation setup window to remove OUN Warnings. (Otherwise, the trainee’s warnings will display alongside archived OUN warnings.)

Simulation participant controls and responsibilities:

1) Analyze base meteorological data starting at 21:00 UTC on 23 May 2015, interrogate storms and issue Tornado and Severe Thunderstorm Warnings and Statements as appropriate for **selected** storms in the OUN CWA for Phase 2 (starting at 22:00 UTC)

2) Answer all questions **as directed by your WOC facilitator** provided at the stated decision points in Phase #1, #2, and #3. You can opt to answer the questions at the conclusion of the simulation.
3) Submit answers on a computer **(with internet connectivity)** using the WOC Severe WES-2 Simulation Answer Form. (Your facilitator will have flexibility on trainee decision points to enable simulation control and any required answers)
4) Participate in a simulation debrief with your WOC training facilitator assessing the results of your warning performance and discussing actions for student improvement based on accomplishment of the performance objectives.
5) Complete the **WDTD FY16 WOC Severe WES Simulation** material (1 question) in the CLC.

Case Data Availability: (Case Size ~ 30 GB)

Point	Grid	Radar	Satellite	Warnings	Reports
METAR NLDN Lightning Raob (no 12Z data)	GFS80 DGEX GFS40 HRRR NAM12 NAM40 RAP13 RAP40 LAPS	KTLX KVNX KFDR (1800-0200 UTC) **NO MRMS** **NO FSI** **NO FFMP**	GOES product best res 1 km VIS	OUN and adjacent CWAs	WESSL Case data script provides timed reports and injects to support warning decision process from 2100-0100 UTC.

Note: Radar data is available from **1800 UTC to 0200 UTC s**o you can modify the simulation data time range to accommodate different simulation times and periods for issuing warnings/statements. Make sure you set **simulation end time to 0110 UTC to enable** all radar data to display through 0100 UTC which supports required WESSL and simulation questions.

Phase 1: Threat Assessment (2100-2145 UTC)

Event Synoptic Discussion at 2100 UTC:

April into May 2015 was the start of an abnormally wet period across the Southern Plains. A very active southern branch of the jet stream developed producing a series of deep, progressive troughs over the southwestern United States which became semi-permanent features across the region during this period. The upper level jet structure produced a long duration of deeper layer shear and high impact severe weather events for most for the month of May in Oklahoma and Texas. Toward the end of the month, the deep shear was not as strong as the earlier parts of the month, but still was sufficient for organized, severe weather including supercells. Norman had already received 18.01 inches of rain on 13 separate days since May 5, including 4.67” just four days previously on May 19. Thus, the ground was very saturated and there was considerable lower tropospheric moisture present across Oklahoma and north Texas. By 1200 UTC on May 23rd, Water vapor satellite imagery indicated a large, upper low located over eastern Utah with a mid-level trough extending southward into the northern Gulf of California. A 500 mb shortwave trough extended across central Colorado into the Texas Panhandle and was lifting slowly northeastward into the Southern Plains. Large areas of upward vertical velocity from synoptic lift was tapping into the broad swath of deep moisture moving from southwest Texas into northwest Oklahoma and much of Kansas producing an extensive area of clouds and convective precipitation.

According to the 2100 UTC Weather Prediction Center (WPC) surface analysis (figure 1), there is a stationary front extending west to east from the southern Texas Panhandle across south-central Oklahoma before becoming a warm front across southern Arkansas into central Mississippi. The entire front was lifting northward as a warm front during the past 6 hours but had has become stationary in south-central Oklahoma. Though poorly analyzed by the 1200-1800 UTC model runs, there was a shallow thunderstorm outflow boundary which has pushed southeastward into portions of west-central OK and northwest Texas, strengthening the overall cold pool from ongoing convection north of the stationary front. The synoptic scale surface low was situated at 2100 UTC in extreme southeast Colorado. The stationary front was forecast by the models to lift northward into central Oklahoma by 1800 UTC and to the OK/KS border by 0000 UTC.

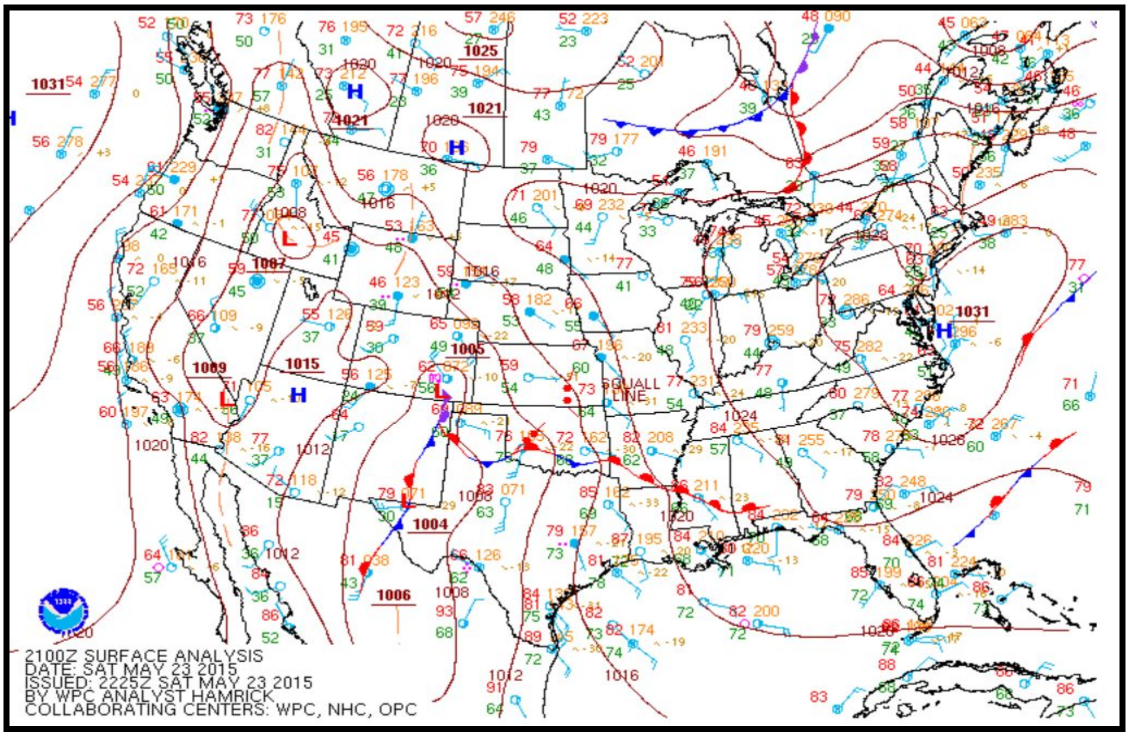

Figure 1: WPC surface analysis for 2100Z Sat May 23 2015

<u>Environmental Assessment Summary for Phase 1:</u>

- The airmass behind the thunderstorm outflow boundaries is saturated and stable with temperatures in the upper 50s and low 60s. Temperatures south of the outflow boundary and north of the warm front are in the low to mid 70s with dewpoints in the low 70s and were consequently becoming more unstable with time and SBCAPE values ranging from 2000 J/kg in the west and south OKC metro areas to 3000 J/kg along the Red River.
- Effective bulk shear ranged from 30 to 55 kts south to north across the OUN CWA.

- 0-1 km SRH from 200 to 400 m2/s2 in nw OK
- Mean parcel LCLs forecast by the RAP are around 500-800 m AGL
- Parameters from the 12z sounding at OUN: MUCAPE 1349 J/kg, 627 LCL, PW: 1.23” (please use the zoom feature on figure 2 to display the values).
- Forecast soundings (using the zoom feature on figure 3) indicate moderate tornado potential based on increasing shear and the resulting hodograph (large loop in lowest km) with a saturated profile starting at 00z (Note: this is an important learning point: always evaluate the high-res model output on an hourly basis to determine the range of expectations for potential impacts)
- STP values ~ 1 in much of southern part of the CWA throughout the simulation time period
- The Storm Prediction Center (SPC) has a categorical Slight Risk from much of west TX into southwest/central OK (figure 5)

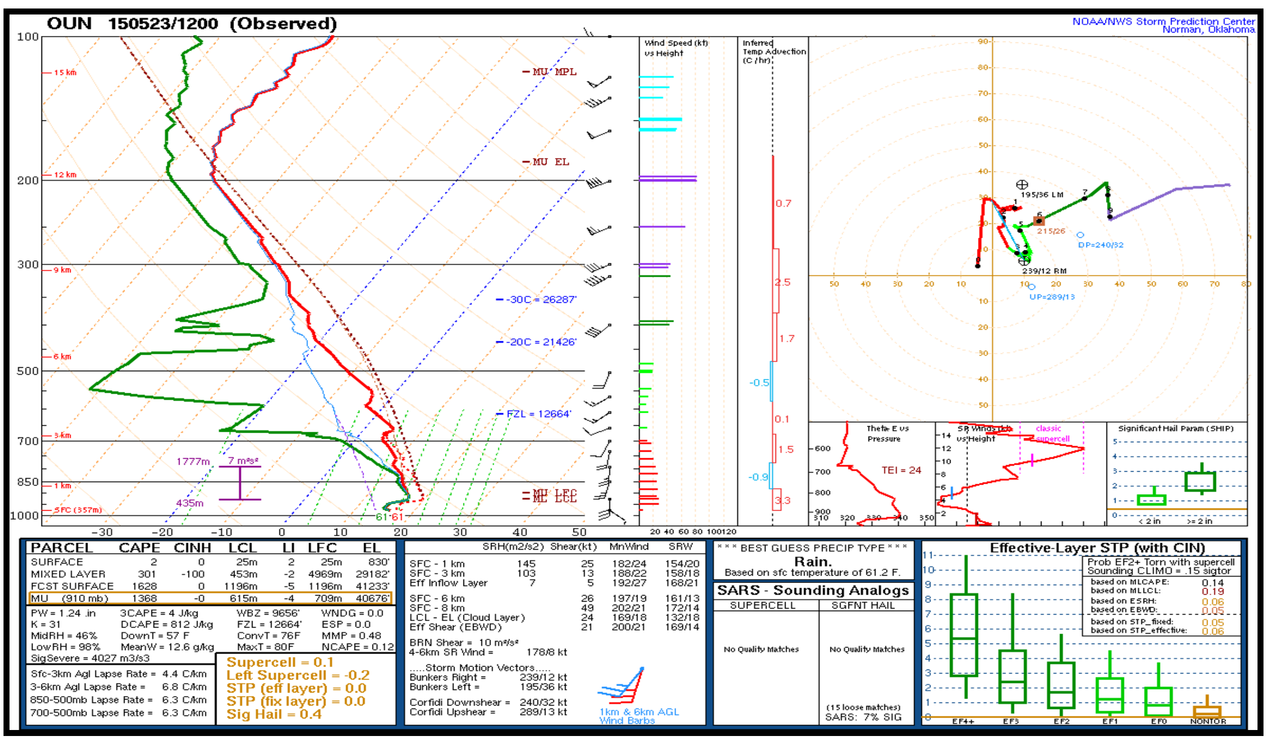

Figure 2: 1200 UTC 23 May 2015 OUN Sounding (from SPC web site)

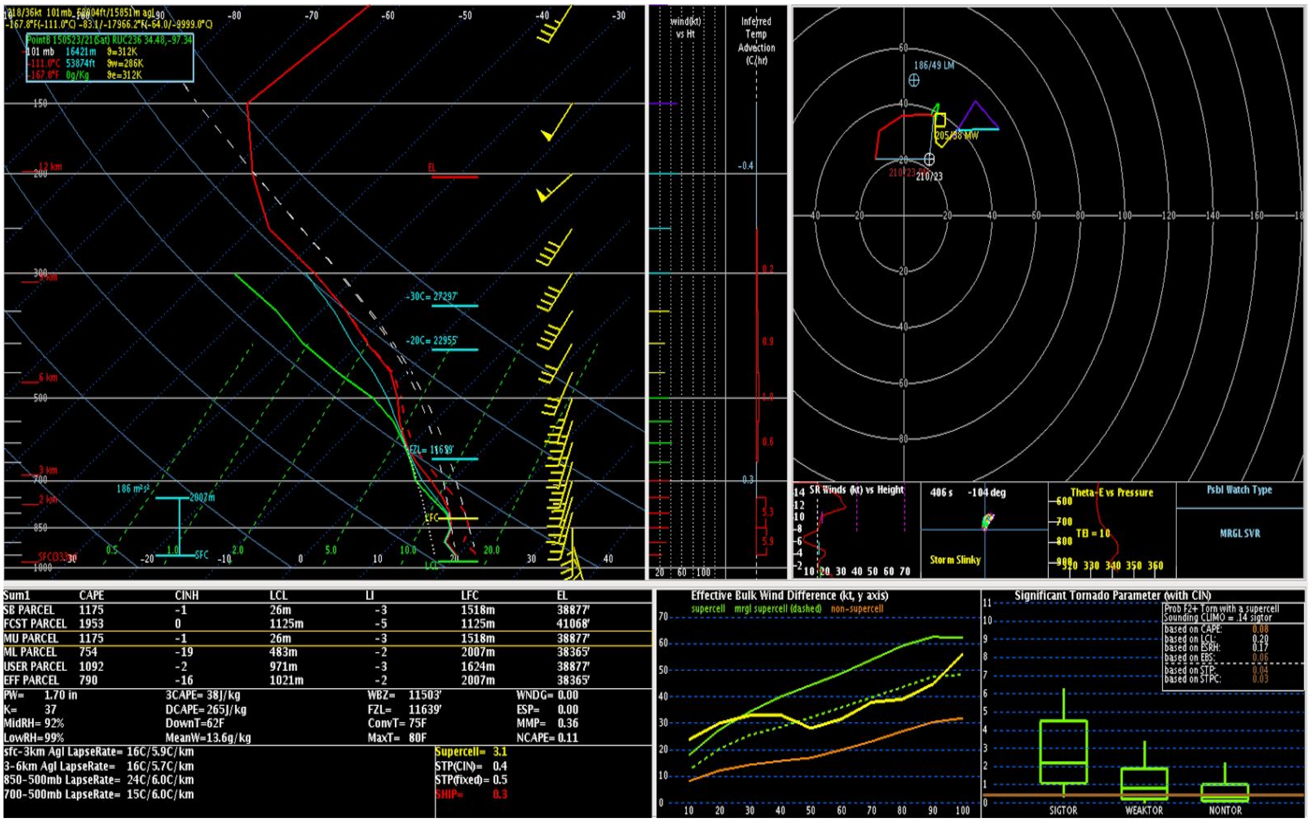

Figure 3: 2100 UTC 00 hr RAP sounding for south central OK (location B shown on map below)

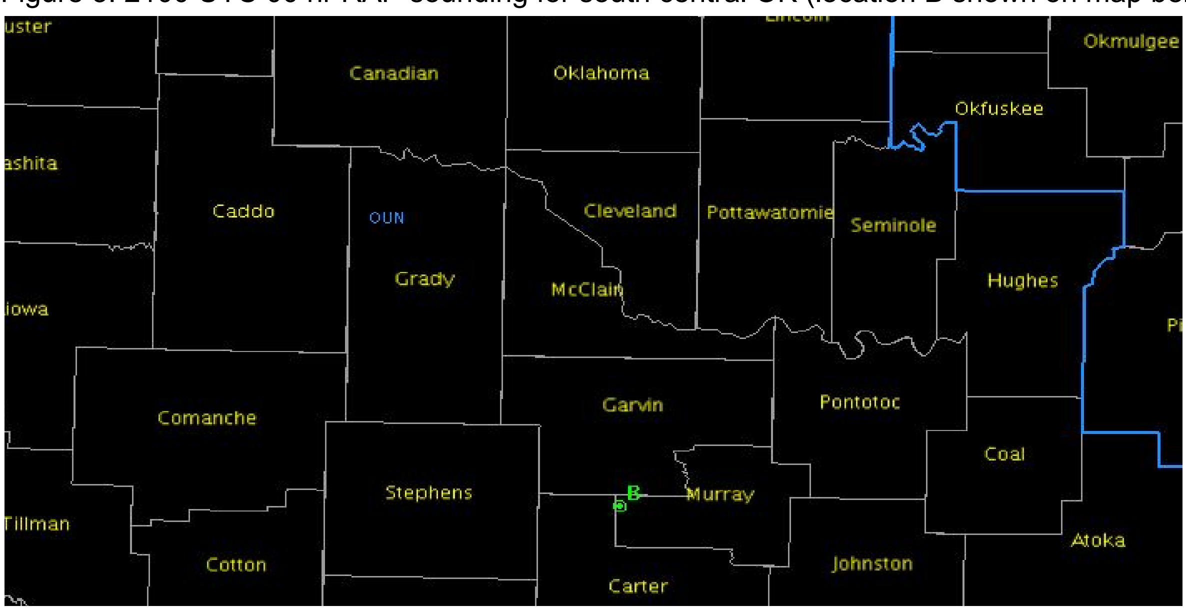

Figure 4: Map showing location of Point B.

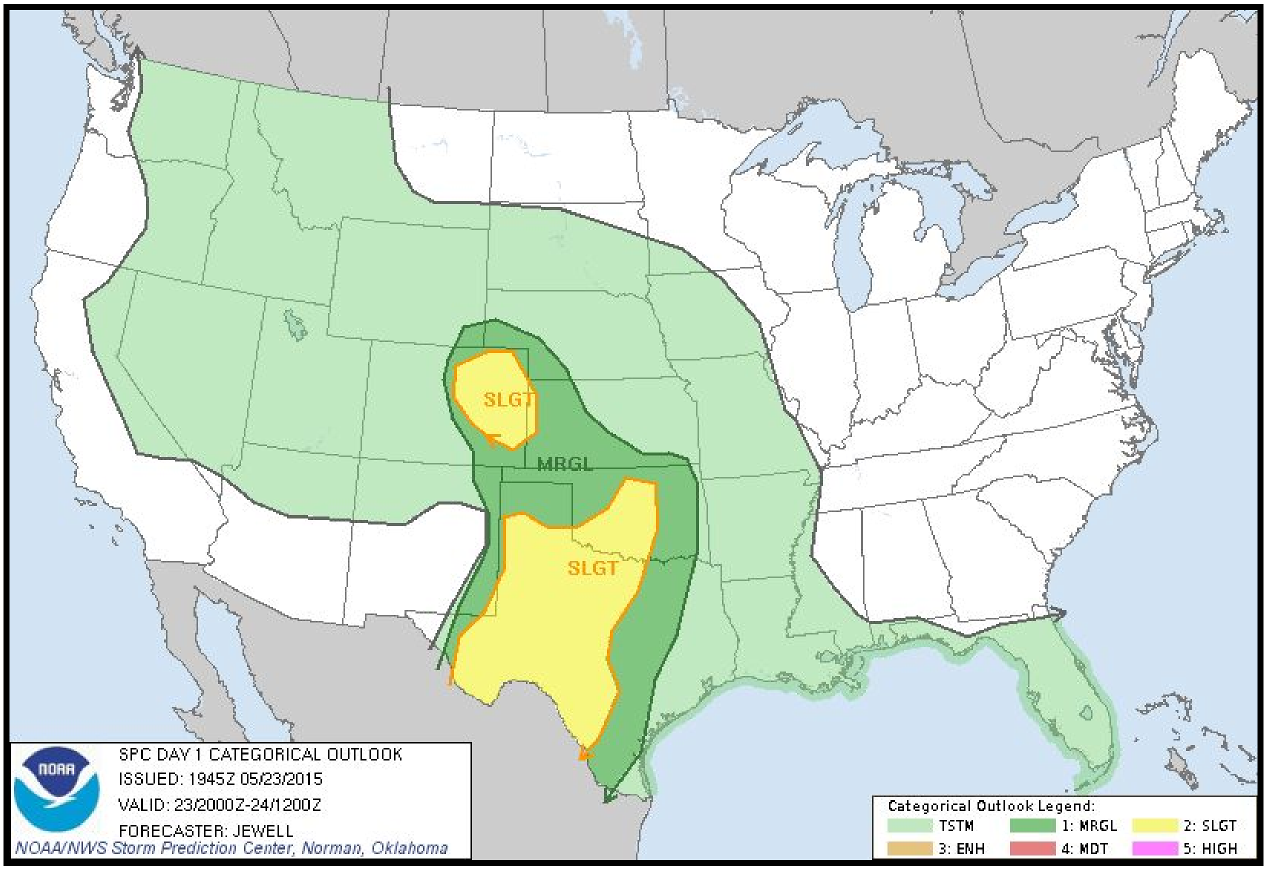

Figure 5: SPC Day 1 Categorical Outlook Valid 2000z 05/23/2015 to 1200z 05/24/2015

Question #1:

Based on your environmental assessment through 2100 UTC, including observations and model forecast soundings, briefly describe the risk of tornadoes, hail, and damaging winds expected in the OUN CWA for the next 4 hours (2100 to 0000 UTC). Keep your answer limited to 1-2 paragraphs.

Enter your answer via the AWOC Severe WES-2 Simulation Answer Form.

Phase 2: Mesoscale and Stormscale Evolution (2200-0000 UTC)

Overview:

During this phase, there are multiple mesoscale and storm-scale boundary interactions affecting storm evolution and warning decisions. For example, there is the quasi-stationary surface frontal boundary across the CWA and associated thunderstorm outflow boundaries. After 0000 UTC, there are indications of storms training along and north of the quasi-stationary boundary. Thus, during this period, there are significant warning polygon challenges with multiple storm mergers and interactions.

Ahead of the large area of thunderstorms and trailing stratiform precipitation across western and central Oklahoma into Kansas, discrete storms are starting to rapidly develop by 2200 UTC with almost every storm showing some signs of low-level inflow notches, trailing appendages and/or brief rotation. Recall that the airmass in this portion of the CWA, unlike the stable-rain cooled regions across northwest Oklahoma, is moderately unstable with SBCAPEs to 1500-2500 J/kg. In addition, the LCL heights are in the neighborhood of 500-800 meters AGL or less. Effective bulk shear from the 2100 UTC run of the RAP ranges from 30-40 kts with 0-1 SRH = 150-250 m2/s2.

To help assess the simulation performance objectives, **there are 4 specific Warning Decision Points in Phase #2.** As part of the warning process, please provide your warning decision rationale and input these various warning attributes for the prescribed decision points including:

- **The Type** of Warning Decision (Issue a Tornado Warning (TOR) based on radar, Issue a TOR based on spotter report, Issue a Severe Thunderstorm Warning (SVR) based on radar, or issue no warning.
- **The Data Basis** for Warning Decision (low-level reflectivity structure, etc.)
- **The Threat Motion** (Direction and speed)
- **The Warning Decision Time** (if issuing a warning)
- **The Duration of the Warning** (for Decision Points #2, #3, #4)

A. Warning Decision Point #1 (2214 UTC)

Focus on the storm developing west of Pocasset in Grady County from 2200 - 2214 UTC. Analyze the storm characteristics and trends, then make your warning decision. After making your decision and creating your polygon/warning text on WES-2, enter the warning type, issuance time, basis and the primary data used (if applicable) to make your warning decision.

Phase 2 Question # 1:
Please provide various decision point input via the Google AWOC Severe Simulation Answer Form

B. Warning Decision Point #2 (2219 UTC)

Remain focused on the storm near Pocasset in Grady County. Analyze the storm characteristics (especially trends) then make your warning decision. In addition to your warning (or statement) type, you will be assessed on the specific basis used for the warnings and the primary data used to make your warning decision.

Phase 2 Question #2:
Please provide various decision point input via the Google AWOC Severe Simulation Answer Form

Continue in storm monitoring mode and issue warnings/statements as necessary.

C. Warning Decision Point #3: (2316 UTC)

Your specific warning decision focus now is on the storms lifting north-northeastward from east of Blanchard in McClain County to west of Norman in Cleveland County. You have received spotter reports on local TV of tornado damage in Blanchard. Quickly analyze the storm characteristics (especially trends) then make your warning decision. For your answer in the Google form, provide the warning (or statement) type, basis, and primary data that was used to make your warning decision.

Phase 2 Question #3:
Please provide various decision point input via the Google AWOC Severe Simulation Answer Form

D. Warning Decision Point #4 (0000 UTC)

The Focus is now on three intensifying storms moving into and through Garvin County during the period from 2330-0030 UTC. Analyze the storm structure and issue warnings/statements as needed as storms evolve and show varying signs of circulation and potential tornadic/hail threats from 2330 UTC to 0030 UTC. There is one prescripted warning decision point requiring a response in the Answer Form at 0000 UTC for two storms in close proximity west and east of Maysville in northern Garvin County. You don't have to wait until 0000 UTC to warn for these storms. After generating the polygon/warning text on WarnGen, enter warning inputs on the Google Form including the type, basis, duration and primary data used to make your warning decisions. Since there are numerous severe storms in the OUN CWA occurring during this period, focus just on the Garvin County storms.

Phase 2 Question #4:
Please provide the decision point input via the Google AWOC Severe Simulation Answer Form

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Phase 3: Decision Support (0030-0100 UTC)

Overview:

The thunderstorm outflow boundary and associated cold pool have continued to push southward through the OKC metro, Moore, and Norman by 0030 UTC bringing more heavy rain and more stable conditions to Oklahoma County and northern Cleveland County. However, south of the boundary, the airmass remains unstable and discrete storms continue to show signs of periodic, shallow, low-level rotation. In this phase of the simulation, you will need to provide **decision support to 3 inquiries** from core partners and/or the public.

Phase 3 Decision Support #1 (0039 UTC):

You receive a Tweet from the public on your NWS Twitter account at 0039 UTC with a photo of a low-hanging cloud that the person is calling a tornado near Earlsboro (a town with a population of 628 in Pottawatomie County).

Phase 3 Decision Support Question #1:

Respond to the Twitter report using the **Google AWOC Severe Simulation Answer Form**

Phase 3 Decision Support #2 (0055 UTC):

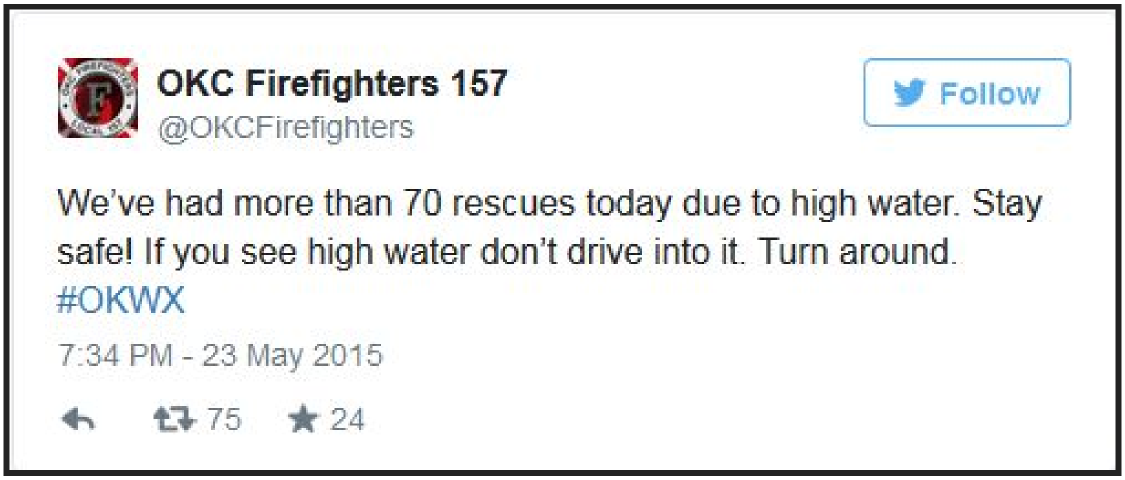
You receive a WESSL report indicating a call from an Emergency Manager at 0055 UTC requesting confirmation of a wall cloud reported over Highway 177 and Little River in Pottawatomie County.

Phase 3 Decision Support Question #2:

Respond to the request with guidance to the Pottawatomie County EM using the **Google AWOC Severe Simulation Answer Form**.

Phase 3 Decision Support #3 (Overnight forecast for OKC Metro):

Your last task before the simulation ends at 0100 UTC is to provide a short message of the expected risks of all severe weather hazards in the OKC metro to media and EMs for the overnight period of May 23 (roughly from 0100 to 1200 UTC 24 May 2015. There have been numerous reports of water rescues from high water due to flash flooding in Oklahoma and Cleveland County (See Tweet below) so officials need to know the risks responders might be exposed to during the overnight hours. The media is also asking about additional severe weather threats.



OKC Firefighters 157
@OKCFirefighters

Follow

We've had more than 70 rescues today due to high water. Stay safe! If you see high water don't drive into it. Turn around. #OKWX

7:34 PM - 23 May 2015

75 24

Enter your summary of expected severe weather risks in the OKC Metro during the overnight period using the **[Google AWOC Severe Simulation Answer Form](#)**.