

Day of Interest: **Saturday 16 April 2016**

Day 5 Forecast

On Friday, an upper-level cut-off low is expected to develop over northern NM. By 0000z Sunday, both the GFS and EC track the cut-off low eastward as strong upper-level diffluence develops between the low and a ridge extending northward from LA to IA. Associated DCVA to the east/northeast of the upper-level low will induce rising motion and surface cyclogenesis in the Panhandles/SE CO region. 10-15 kt southeasterly surface trajectories across the Panhandles and central TX may yield sufficient moisture, CAPE, and effective bulk shear values there, conducive to the development of severe weather in the afternoon/evening from the Panhandles southward to the TX/MX border east of a strengthening dryline.

While the GFS and EC solutions depict similar overall flow patterns, they differ in the placement of the low, with the EC being the more progressive of the two. The EC drives the low eastward into NE AZ while the GFS low hangs back over the four corners region. This difference is reflected in low-level characteristics, with the EC depicting a dryline bulging eastward into the southeastern TX Panhandle and 60+ dewpoints there. Meanwhile, the GFS shows similar moisture return but holds the dryline back in western TX. Warmer surface temperatures and slightly steeper lapse rates in the EC result in CAPE values of 1000 J kg^{-1} in the eastern TX Panhandle. The GFS also depicts a nose of CAPE $\sim 500 \text{ J kg}^{-1}$ extending northward along the dryline farther west. These values may be lower than those in the EC due to widespread morning precipitation across the area, which is taken with a grain of salt at this forecast hour.

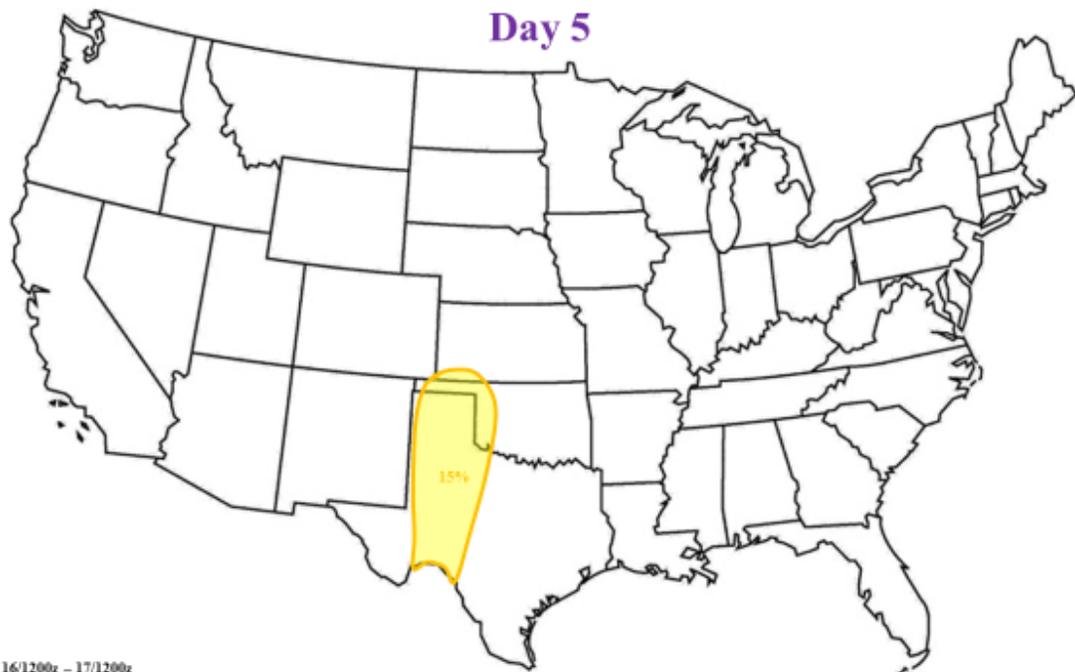
Multiple forecast concerns exist, including the timing of ejecting shortwaves, strength of moisture return, and convective mode. Any shortwave troughs that eject from the broader-scale cyclonic flow will likely have a large influence on convective potential. The latest EC depicts one such shortwave ejecting from the base of the cut-off low and tracking northeastward from 1800z Saturday – 0000z Sunday. This would be favorable for the development of convection downstream of it in an area of enhanced DCVA and synoptic-scale rising motion along the dryline; conversely, this situation would inhibit the development of convection along the dryline farther south into west-central TX in an area of mid-level subsidence. Meanwhile, the GFS shows no shortwaves ejecting through the area of interest at this time, precluding further confidence in areas of enhanced convective potential due to upper-level flow patterns.

Models also differ with respect to moisture return. While both the GFS and EC currently have dewpoints approaching the lower 60's in the region

of interest, they have been trending in different ways. The GFS has trended toward more anticyclonic trajectories, which would result in more recycled air and less efficient moisture return from the Gulf. On the other hand, the EC has trended toward more efficient moisture return and larger CAPE values. These trends will continue to be monitored.

Lastly, convective mode is a concern. Given the strongly meridional flow aloft in the Panhandles and north-south orientation of the dryline, initiating cells could quickly grow upscale and become a heavy rain event. Shear vectors become more perpendicular to the dryline farther south in TX, where more supercellular features may be possible. Although, weaker shear values (30 kts) could result in efficient upscale growth there as well. Currently, the EC solution favors a more discrete mode with shear vectors more perpendicular to a bulging dryline in the southern TX Panhandle, while the GFS solution remains unclear.

In all, convection appears probable in the Panhandles and areas southward, with severe hazards possible. This thinking justifies a broad slight risk across the area to include possible verifications of either the GFS or EC solutions. A trend toward the current EC solution would result in an eastward shift of this slight risk, while a trend toward the GFS solution would result in a westward shift. These trends will continue to be monitored.



Day of Interest: **Saturday 16 April 2016**

Day 4 Forecast

Summary

Severe thunderstorms capable of damaging wind gusts and hail are possible Saturday evening across parts of the southern high Plains.

Overview

A broad upper-level cut-off low will remain mostly stationary throughout the day on Saturday along the AZ/NM border. At the surface, a weak low southwest of the Rio Grande and tight pressure gradient in central TX will drive modest southeasterly winds across the area. This flow is expected to advect 50°F+ dewpoints into western TX beneath an EML and modest lapse rates aloft, resulting in CAPE values around 500-1000 J kg⁻¹. While marginal, these values collocated with deep layer shear around 40 kts and sufficient forcing along the dryline beneath PVA aloft may support severe thunderstorm potential in western TX.

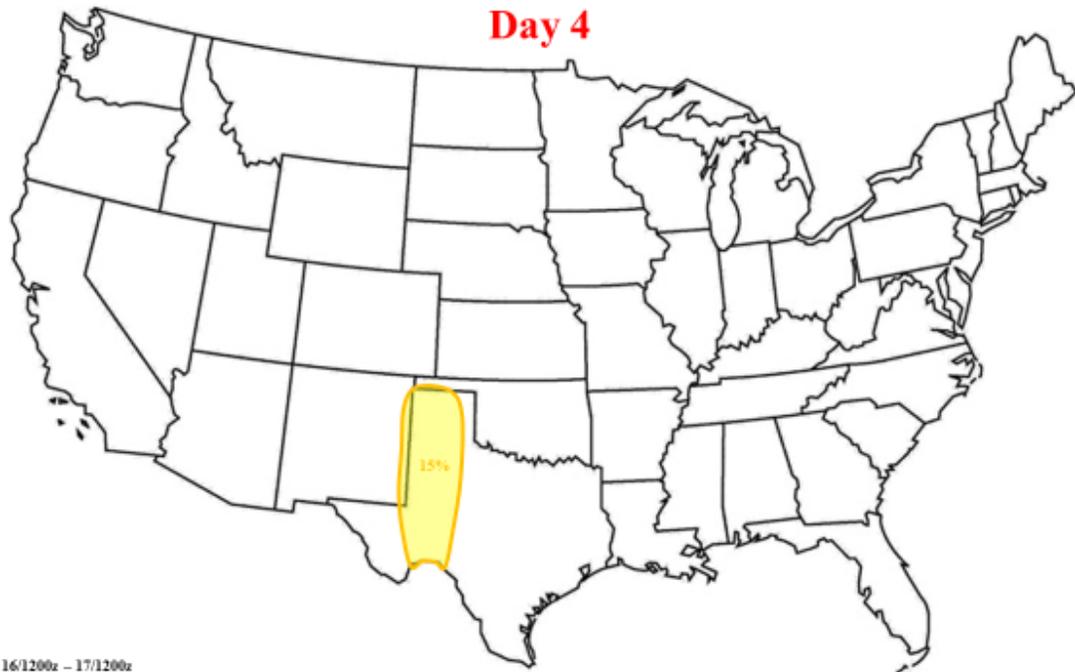
Western TX

Long-range models have come into better agreement regarding the position of an upper-level cut-off low centered in northwest NM and northeast AZ. Both the GFS and EC depict 500 mb wind maxima in the west-central TX Panhandle at 0000 UTC. This could enhance effective bulk shear in the region, but also suppress convection in certain areas due to ageostrophic motions. The EC also shows an upper-level shortwave trough located in the northern TX Panhandle at 0000 UTC; while the timing of these shortwaves is difficult to forecast this far in advance, a shortwave in this location would suppress convection to its south (upstream) via NVA aloft and synoptic-scale subsidence.

Farther south, higher dewpoints (approaching 60°F+) will likely yield larger CAPE values (1000-1500 J kg⁻¹). Closer proximity to the surface low should also result in more backed surface winds underneath southwesterlies aloft, yielding increased effective bulk shear. On the other hand, weaker DCVA and less synoptic forcing is evident in southern TX along the dryline, which may initially limit storm coverage.

In response to this forecast environment, a slight risk is drawn in western TX from the northwest Panhandle southward along the TX/NM border down to Mexico. This risk is shifted westward from the previous outlook in accordance with the EC trending toward the less progressive GFS solutions. It covers two areas in which severe convection may arise for different reasons: stronger synoptic forcing in a less buoyant environment

in the Panhandle, and less synoptic forcing in a more buoyant environment in southern TX. Both of these areas are east of a dryline, which will aid in convective development Saturday evening. These areas will continue to be monitored, potentially for the inclusion of two separate risk areas in later outlooks.



Day of Interest: **Saturday 16 April 2016**

Day 3 Forecast

Summary

Severe thunderstorms are possible Saturday in west-central TX. Damaging wind gusts and hail will be the primary hazards, but an isolated tornado or two cannot be ruled out.

Overview

A cut-off upper-level trough will rotate slowly eastward across the four corners region on Saturday and become situated in northwestern NM by 0000z Sunday. Given the equivalent barotropic nature of the system, little surface cyclogenesis is expected to occur during the forecast period, but weak, broad troughing is forecast from the Panhandles southward into Mexico. Surface southeasterlies will moisten the atmosphere east of a sharpening dryline with dewpoints climbing into the mid-50's. These 20 kt surface winds beneath 50+ kt southerlies aloft will result in shear values supportive of organized storms in western TX, possibly supercellular in nature.

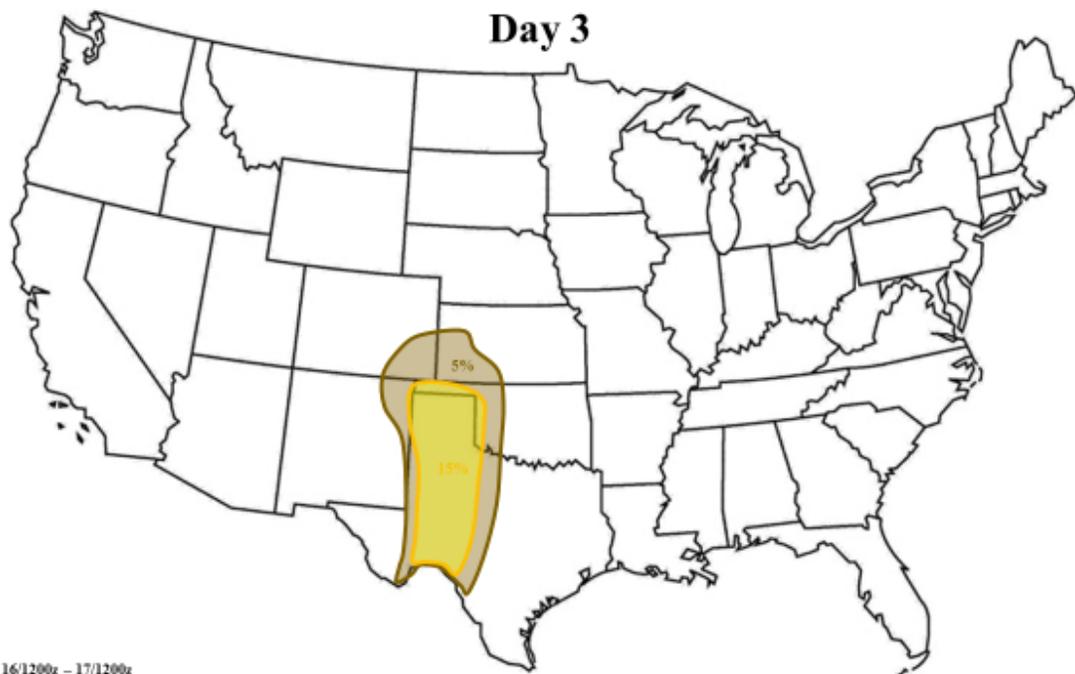
Western TX

Long-range models continue to come into better agreement regarding the overall setup on Saturday. The NAM also depicts an upper-level cut-off low with widespread 50+ kt southerlies at 500 mb over the TX Panhandle. Farther south, forecasts depict a more southwesterly, but weaker, flow aloft. This wind orientation above surface southeasterlies is more conducive for the formation of discrete storms moving off of the dryline, but shear magnitudes become questionable for sustaining organized storms.

The environment in this region is distinguished from the environment farther north in the Panhandle, where upper-level flow is stronger but oriented parallel to the dryline. Thus, severe storms appear possible at this time in western TX, with a mixed/linear mode favored in the Panhandle and mixed/discrete mode favored toward the south. As such, a slight risk is maintained in western TX from the Panhandle southward to Mexico along the east side of a dryline.

GFS and NAM solutions both show a WNW-ESE oriented shortwave in the southern TX Panhandle, which has been consistent in previous runs. If this feature remains, further outlooks will likely consolidate severe risk into two separate areas to account for synoptic-scale descent upstream of the shortwave in west-central TX. Regardless, these two areas must be

monitored for the potential for different types of severe convective development.



Valid: 16/1200z - 17/1200z

Day of Interest: **Saturday 16 April 2016**

Day 2 Forecast

Summary

Severe thunderstorms will be possible Saturday in the eastern TX Panhandle southward to the Mexico border. Damaging wind and hail will be the primary hazards, with a tornado or two also possible. Flooding is also probable.

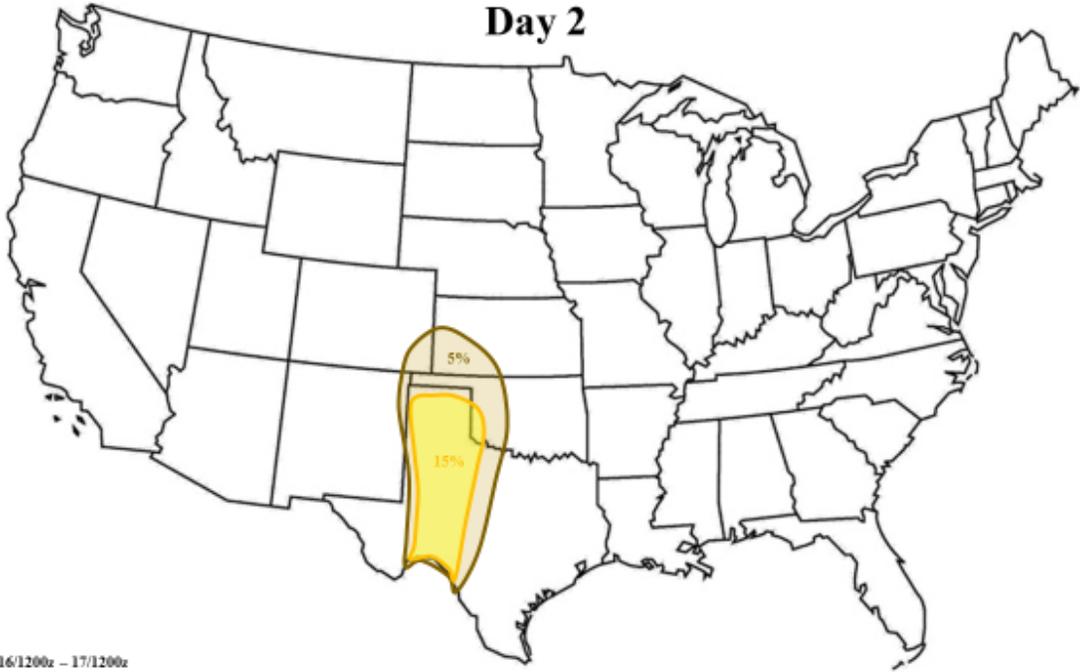
Overview

Guidance is consistent with an upper-level cut-off low rotating slowly eastward over northern NM throughout the day on Saturday. By evening, 50+ kt winds aloft will overspread the TX Panhandle with 35-40 kt flow present southwards toward the Mexico border. This flow combined with 15-20 kt surface southeasterlies will yield 40+ kt of shear throughout the area of interest, supportive of organized storms. Given these wind fields and 1000-1500 J kg⁻¹ of CAPE east of the dryline, supercells will initially be possible in the late afternoon and early evening; shear orientation with respect to the dryline will likely result in rapid upscale growth, though, especially in the eastern TX Panhandle. Initiating storms could remain discrete in southern TX but are expected to weaken quicker after moving into weaker flow aloft to the east.

Eastern TX Panhandle southward to Mexico

The discussion for this area remains similar to previous discussions regarding severe potential in the late afternoon and early evening. Except for a slight eastward trend in forecast dryline position, guidance has remained fairly consistent for this event. As such, a slight risk area is maintained on Saturday, with a slight shift eastward from previous outlooks.

Day 2



Valid: 16/1200z - 17/1200z

Day of Interest: **Saturday 16 April 2016**

Day 1 Forecast

Summary

Severe thunderstorms will be possible today in the eastern TX Panhandle southward to the Mexico border. Damaging wind and hail will be the primary hazards, with a tornado or two possible. Flooding is probable.

Overview

Guidance regarding upper-level flow remains consistent with a broad cut-off low rotating eastward through northern NM during the day. By evening, a belt of S/SE 60+ kt winds will be present atop a sharpening dryline, bulging eastward just south of the Panhandle. Synoptic forcing for ascent combined with dryline mixing will result in convective development in the afternoon and evening, with damaging winds and hail being the primary threats.

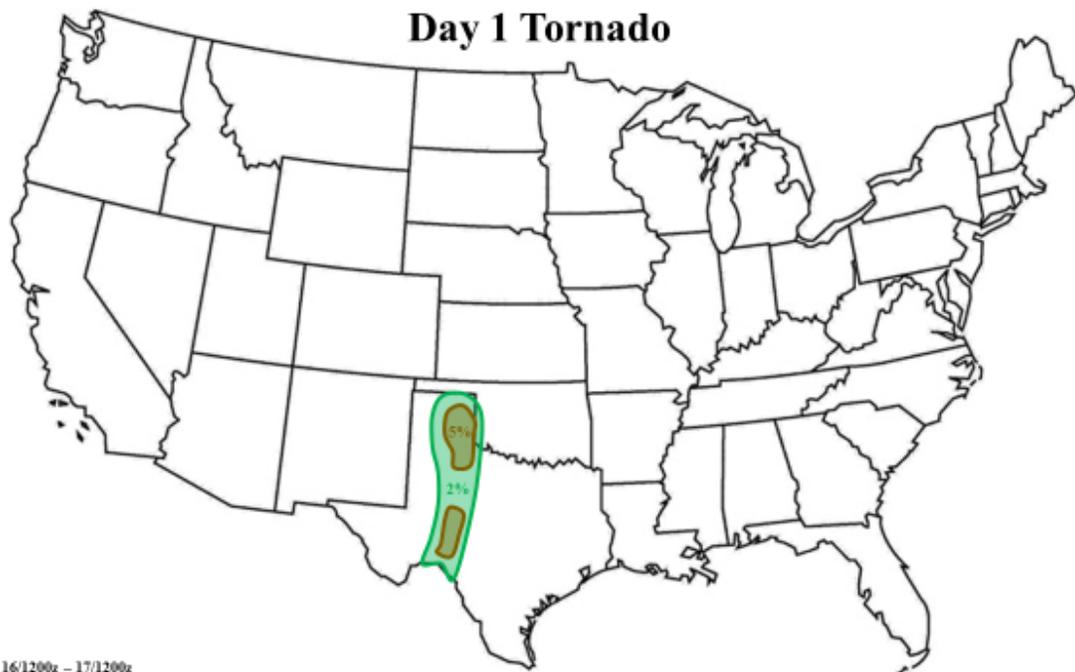
Eastern TX Panhandle southward to Mexico

Today's situation walks a fine line between a severe event and a heavy rainfall event. The primary concern in the eastern TX Panhandle will be the orientation of bulk shear with respect to the dryline and subsequent convective mode. Modest southeasterly winds at the surface will help orient effective bulk shear vectors off the dryline, but not by much. Weak mid-level lapse rates as observed by 12z profiles will lead to relatively low SBCAPE values (around 1000-1500 J kg⁻¹) and *may* prohibit upscale growth, but CIN is forecast to be negligible. Lastly, short-range models are consistent with the development of a dryline bulge in the southern TX Panhandle. North of the bulge, shear vectors will be oriented more perpendicular to the dryline, favoring discrete mode there, while convection to the south may either be inhibited or grow upscale. This thinking is the reasoning for the separate higher tornado risk areas, given the lower chances for discrete storms south of the bulge.

Farther south, shear will be oriented more perpendicular to the dryline, and synoptic forcing appears weaker than in the Panhandle. Thus, cells that develop farther south will likely be discrete throughout the evening, with all hazards possible.

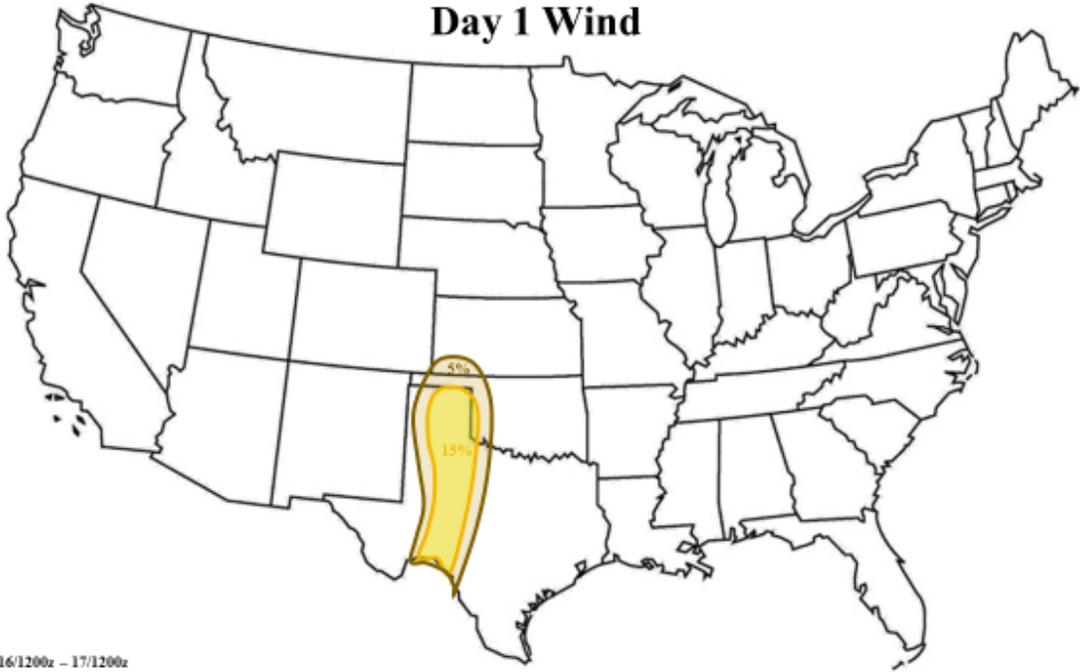
Atmospheric recovery in the eastern TX Panhandle may also be an issue in the wake of ongoing convection there this morning. An expansive deck of clouds is also present behind these showers, which will inhibit much surface warming for at least the next few hours. Return of CAPE sufficient for afternoon convection is likely, but the degree of warming may limit severe potential here and warrants further monitoring.

In general, thermodynamic and wind fields support the development of severe convection along the dryline late this afternoon and evening from the eastern TX Panhandle southward to Mexico. Mixed modes with some supercellular features are possible in the eastern TX Panhandle, with discrete supercells more likely farther south. Although lapse rates will not be very steep, hail and damaging winds are possible along the extent of the dryline. Tornado potential will be low throughout the day due to expected mixed modes, especially farther north, but will maximize in the evening with the onset of a strengthening low-level jet. Storms are expected to diminish after sunset due to the boundary layer stabilizing, with non-severe rain bands possibly continuing overnight. This will lead to a flood threat, especially in southwest OK.



Valid: 16/1200z - 17/1200z

Day 1 Wind



Valid: 16/1200z - 17/1200z

Day 1 Hail



Valid: 16/1200z - 17/1200z

Day of Interest: **Saturday 16 April 2016**

Verification

Severe thunderstorms occurred in the eastern TX Panhandle southward toward the Mexico border with all hazards present. A few storms were tornado warned with strong mesocyclones evident in radar scans, but only two were reported in central TX between the Lubbock and Midland latitudes. Numerous hail events were reported throughout the risk area, with some larger than 2", as well as a few wind reports.

By 1800z, the dryline had bulged eastward between Amarillo and Lubbock and began initiating convection, primarily on the northern side of the bulge. This initiation was earlier than expected, and was likely influenced by the ejection of a speed max aloft and associated DCVA downstream. This favored synoptic-scale destabilization and cap-breaking prior to maximum heating. As forecast, these storms became quasi-linear within the next couple hours due to bulk shear oriented mostly along the dryline.

Farther south, convection struggled to initiate earlier due to DAVA from the shortwave ejecting aloft. Nonetheless, a few storms initiated south of the dryline bulge in an area where shear was more perpendicular to the dryline. As forecast, a couple of these storms became dominant and tracked east-northeastward. Storm coverage was low in this area (as expected, hence the forecasted 2% tornado risk there), but these storms were the only ones of the day that resulted in tornado reports.

Convection continued to initiate farther south as the day went on due to stronger heating and synoptic forcing from the cut-off low shifting eastward. A cluster of storms formed between Midland and the border and consolidated into one primarily dominant storm; the hail from this storm was reported. While no more events were reported from this storm, its discrete nature was well-forecasted but occurred farther westward than expected. No initiation occurred farther south than this storm.

In all, this event was well-forecasted. Convection initiated along the dryline bulge in the early afternoon and continued southward along the dryline in the afternoon. Risk areas could have been shifted westward in southern TX, since the dryline did not mix as far east as expected there. Also, the northern 5% tornado risk area could have been reduced to 2%, given the expected mixed/linear convective mode there. Below, Day 1 forecasts are overlaid with SPC storm reports for verification purposes.

