

From a Pyrocumulus to a Severe Thunderstorm: An Environmental Analysis of an Anomalous Southern Plains Wildfire

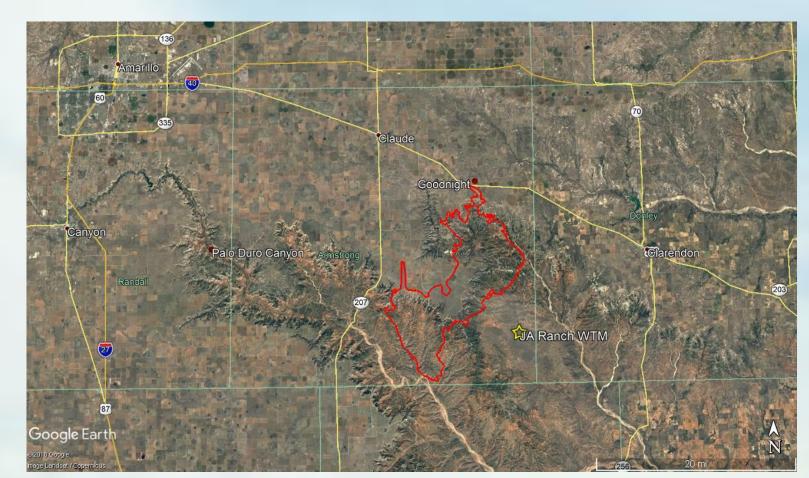
Kaitlin Rutt¹, Stephen Bieda III¹, Aaron Ward¹, B.J. Simpson¹, Todd Lindley², Nick Nauslar³, Brian Curran⁴, Steve Fano⁵ and Phillip Ware² (1 NWS Amarillo, 2 NWS Norman, 3 Storm Prediction Center, 4NWS Midland, 5NWS Dallas/Fort Worth)

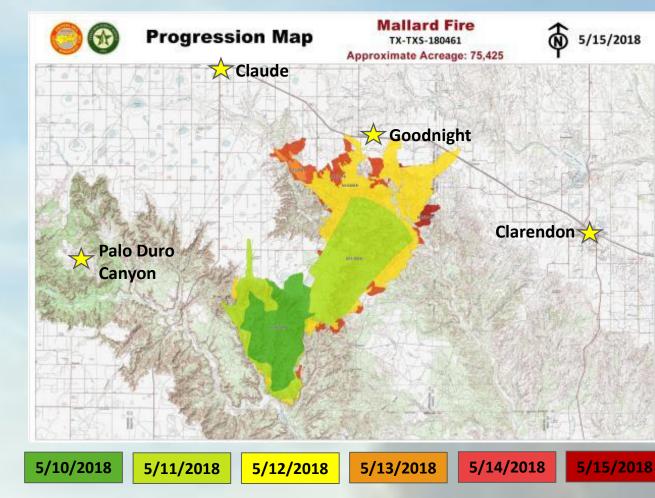
Definitions

- Pyrocumulus (pyroCu): A cumulus formed by a rising thermal from a fire, or enhanced by buoyant plume emissions from an industrial combustion process
- Pyrocumulonimbus (pyroCb): An extreme manifestation of a pyrocumulus cloud, generated by the heat of a wildfire, that often rises to the upper troposphere or lower stratosphere
 - → Characteristics: Lightning, thunder, hail or a fibrous or diffuse upper portion

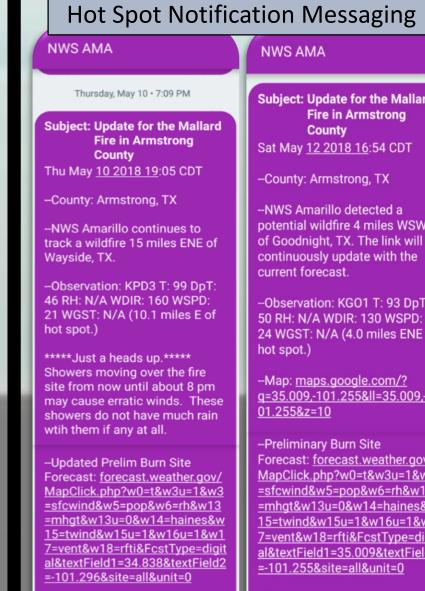
Overview of the Mallard Fire

- May 8, 2018 to May 29, 2018: Initiation of fire to containment
- Size: 30,566 hectares (75,530 acres)
- May 11, 2018: Fire produced pyroCb, which later became a severe thunderstorm





National Weather Service Messaging



Request official Spot Forecas

Amarillo NWS Chatroom May 11, 2018 <Mallard Fire- IMET-steve.fano> AMA- will the fire weather watch stay

- for tomorrow, or will there be an upgrade? <NWS Amarillo Coordinator Desk> Steve, the Fire Weather Watch is going <Mallard Fire- IMET-steve.fano> Thanks. thats what I need to know. appreaciate all the help today <NWS Amarillo Coordinator Desk> You betcha Steve.
- <media-rich.putnam> Looks like that fire to the west of Clarendon is now <Mallard Fire- IMET-steve.fano> Did you pick up a strike. <NWS Amarillo Coordinator Desk> Yep, we are seeing many in cloud lightning strikes on the lightning detection product. seeing some CGs. That is intense for a fire to produce that much
- <NWS Amarillo Coordinator Desk> Yep, anytime Steve

<em-erica.childers> ok thank you

Amarillo NWS Chatroom May 12, 2018 <em-erica.childers> Can I get a forecast and potential wind shifts or approaching storms for the area between Goodnight and Claude please? <nwsbot> AMA issues Severe Thunderstorm Warning [wind: 60 MPH, hail: 1.00 IN1 for Collingsworth, Donley ITX1 till 8:45 PM CDT Link: https://nwschat.weather.gov/vtec/#2018-O-NEW-KAMA-SV-W-0016 east of this area through the rest of tonight. Southeast winds should continue in the 15 to 25 mph range with higher gusts and then they should turn more southerly toward sunrise and decrease into the 10 to 15



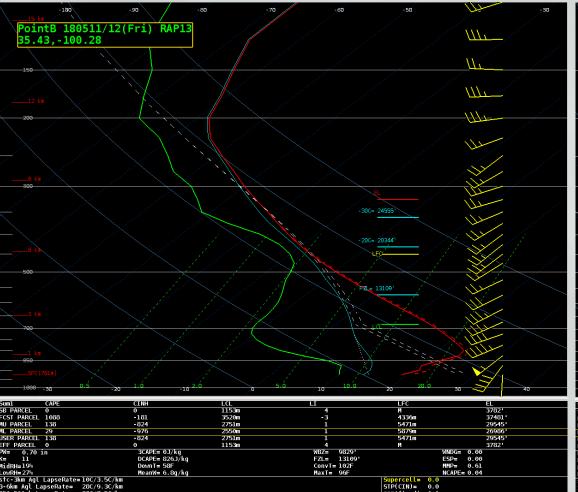
Amarillo NWS Chatroom May 13, 2018 <media-john.harris> Jason Boggs checked in about 6:55 pm, saying he saw

lightning start a grassfire 3 miles south of Wheeler. The fire was on the west side of hwv 83. <nwsbot> AMA continues Severe Thunderstorm Warning [wind: 70 MPH, hail: 1.25 IN1 for Hemphill, Wheeler [TX] till 7:30 PM CDT Link: https://nwschat.weather.gov/vtec/#2018-O-CON-KAMA-SV-W-0013 <nws-melissa.beat> Thanks for the info John

Synoptic Setup

May 11, 2018

May 11, 2018 12z Sounding



Dewpoint (shaded),

Surface Pressure (black

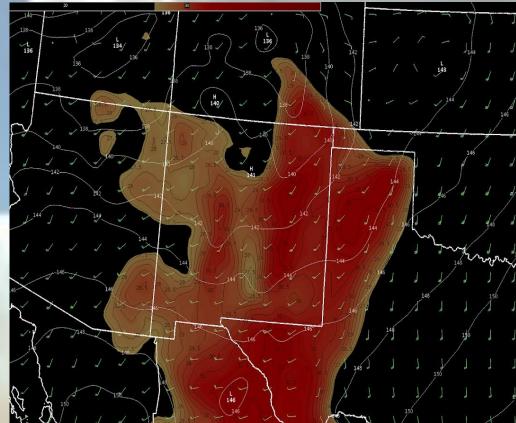
contour), and Surface

Relative Humidity (brown

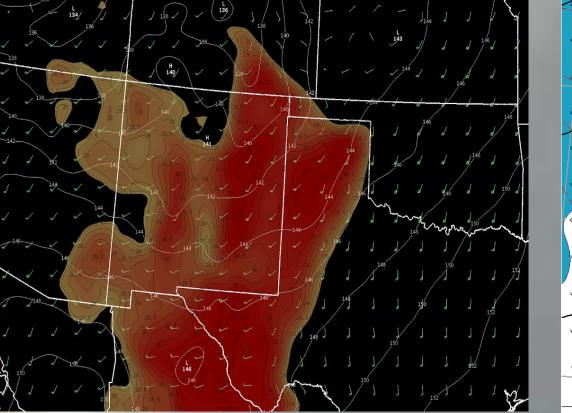
dashed contour)

00z Sounding

850mb Heights (white contour), 850mb Temps (shaded) and Winds



500mb Heights (black contour), 500mb Temps (red dashed) and Winds (green barbs) (barbs and shaded)



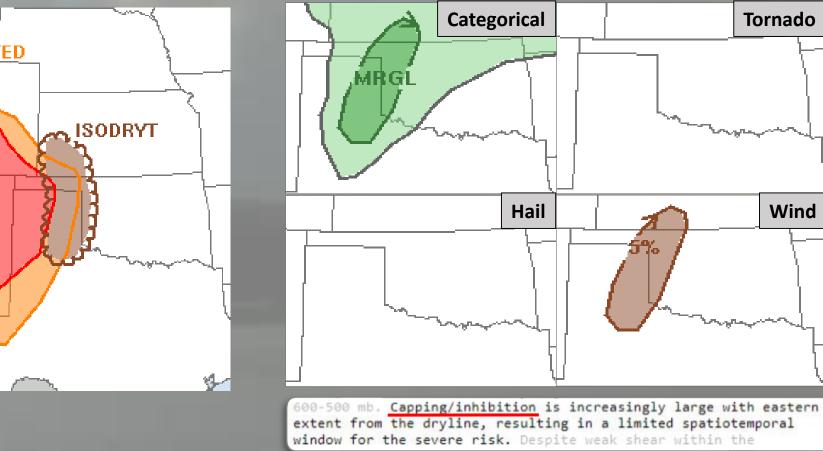
Mixed Layer Convective Available Potential Energy (MLCAPE) (shaded, J/kg), 0-6 km Shear (barbs, knots), and Level II Radar Reflectivity (dBZ)

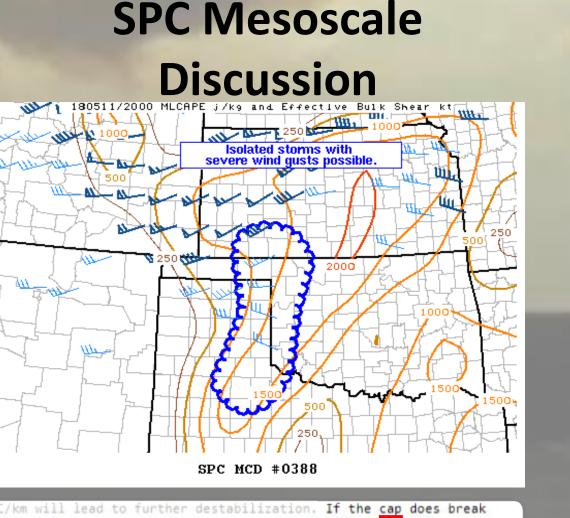
Radar Reflectivity (dBZ) and

GOES-16 Fire Temperature

100°W

1430z SPC Categorical 0700z SPC Fire Outlook Outlooks





s afternoon, marginal shear around 25 to 30 knots will support

multicell organization. The high-based nature of these

Results

- Lightning Jumps:
 - → 60 total Earth Networks Total Lightning Network (ENTLN) flashes at
 - → 53 total ENTLN flashes at 2342Z
- Storm Reports:
 - → Quarter size (1 inch) hail one mile north of Wheeler, Texas at 0006Z
 - → 62 mph wind speed three miles north of Putnam, Oklahoma at 0220Z

