# A Coastal Carolina Convective Case using Cloud Top Cooling from UW-CIMSS

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**GOES-R Proving Ground Virtual Forecaster Forum**

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# High-level CTC algorithm overview

- Compute box-averaged 11 micron brightness temperature (**BT**) for current time and previous time, using specific categories from GOES Cloud Typing product

- Unfiltered Cloud Top Cooling (**CTC**) Rate is calculated by differencing box average 11 micron BT for current time from previous time

- Algorithm performs tests to eliminate most of false CTC due to cloud motion (and additional checks reduce false cooling further)

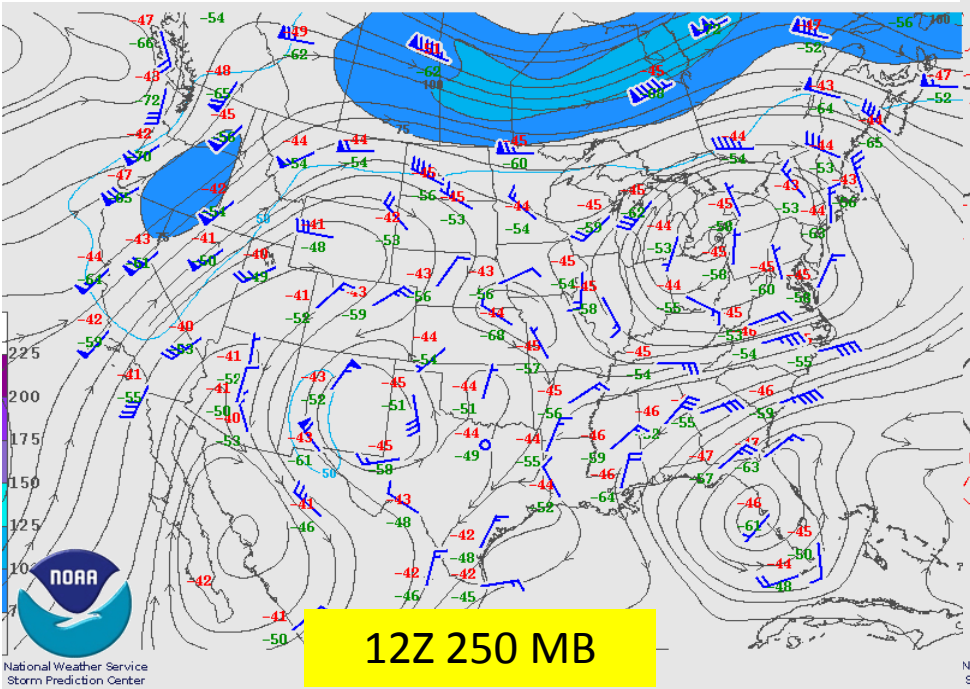
- Complete approach details can be found in Sieglaff et al. (2011) and (2013a)

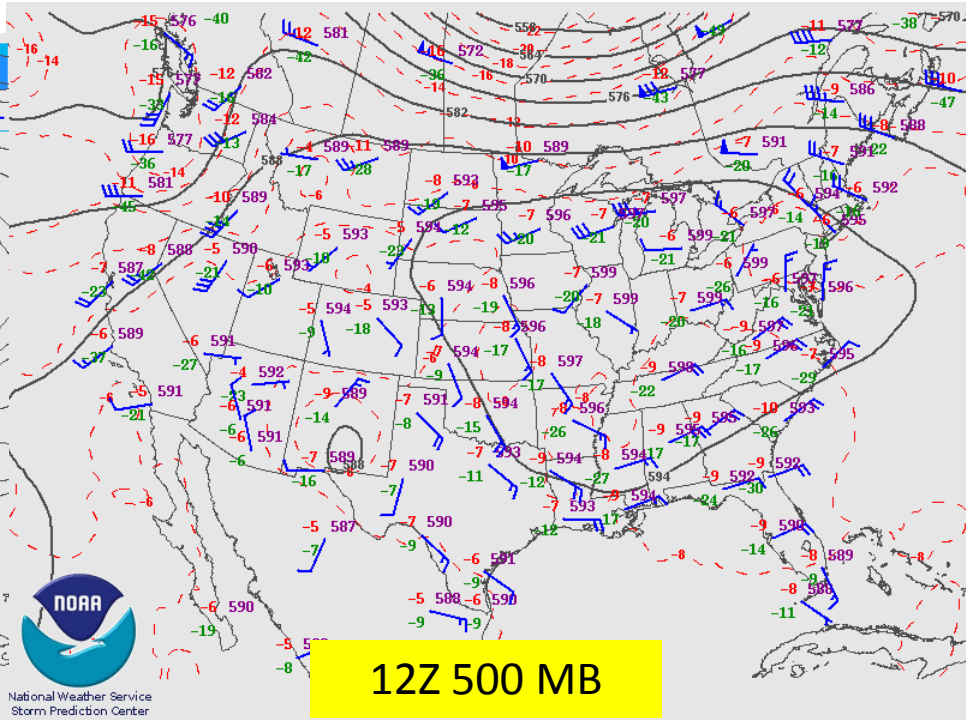
# IMPORTANT NOTES

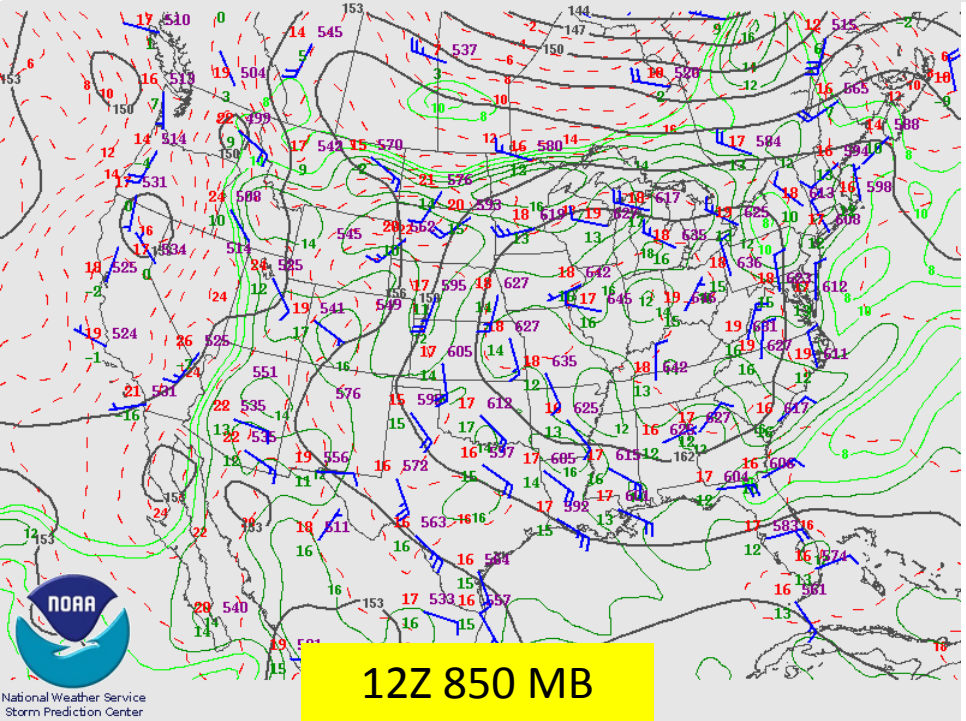
- No one product alone should be used in making convective warning decisions (unless it's all you have).
- Understanding the potential threat for convection, especially severe convection, is important BEFORE satellite, radar, and fused products start showing their "signals".
- The CTC product (as it was used last summer) is somewhat limited by the temporal resolution of the current GOES products. There is more potential for this type of product once the more frequent GOES-R images are available.
- Once the cirrus shield from the initial convection starts becoming plentiful, the utility of the CTC product diminishes.

# July 17, 2013 Case

- A somewhat atypical severe weather event (convection moving NE to SW).
- Threat potential somewhat underestimated by both SPC and local forecasters during the morning of the event.
- Atmosphere unstable, but not extraordinarily so by July standards in the southeast U.S.



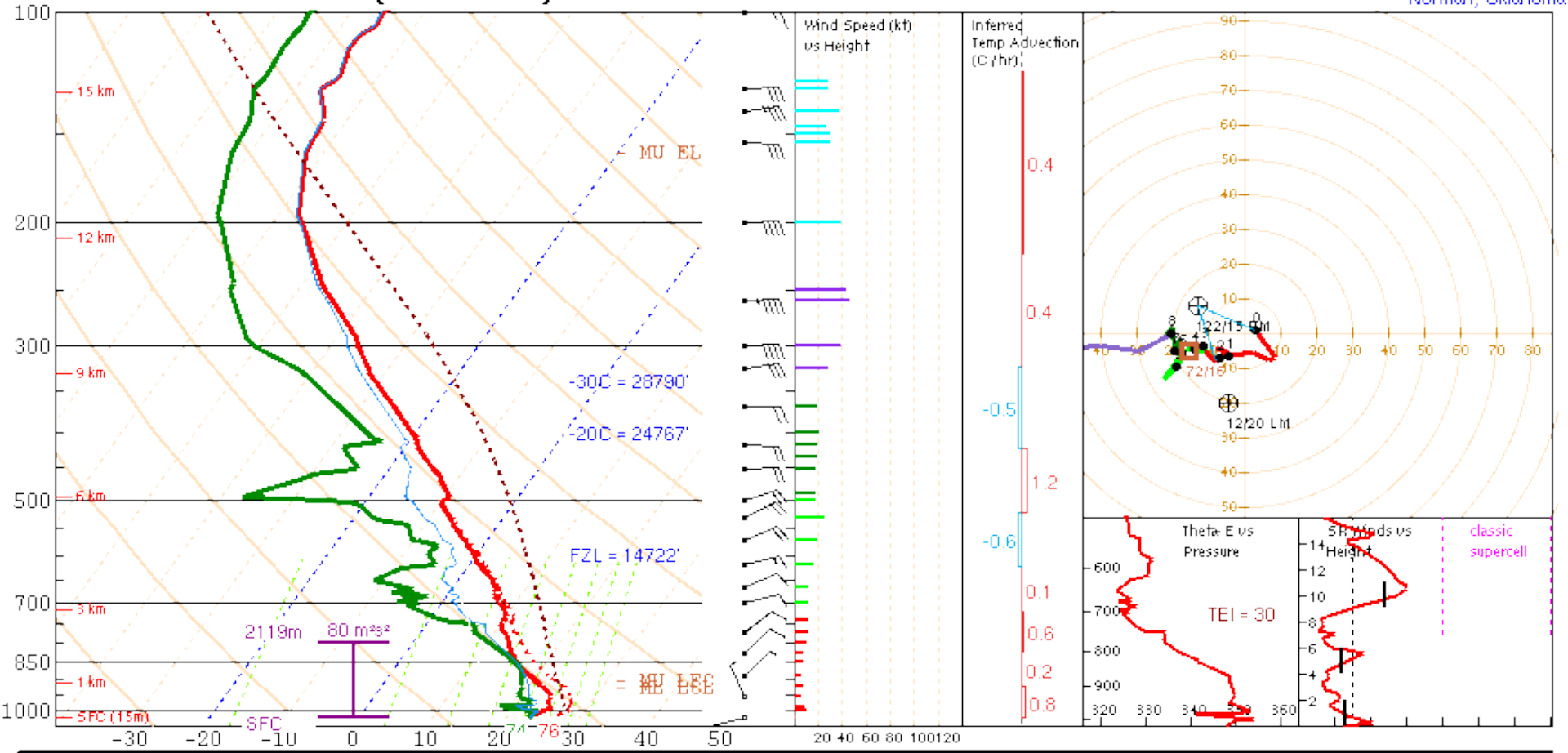




- Deep Layer Ridge over upper Midwest
- Mid and Upper Level Low over Florida and the Eastern Gulf of Mexico
- Wind Speeds not Impressive at any Level.

# CHS 130717/1200 (Observed)

NOAA/NWS Storm Prediction Center
Norman, Oklahoma




| PARCEL | CAPE | CINH | LCL | LI | LFC | EL |
|---|---|---|---|---|---|---|
| SURFACE | 2069 | -88 | 127m | -6 | 1452m | 42579' |
| MIXED LAYER | 2280 | -38 | 863m | -7 | 1403m | 42579' |
| FCST SURFACE | 3439 | 0 | 1405m | -9 | 1405m | 45243' |
| MU (1000 mb) | 3422 | -22 | 279m | -9 | 1041m | 45243' |

| | | | |
|---|---|---|---|
| PW = 1.90 in | 3CAPE = 107 J/kg | WBZ = 11946' | WNDG = 0.0 |
| K = 31 | DCAPE = 679 J/kg | FZL = 14722' | ESP = 0.0 |
| MidRH = 63% | DownT = 65 F | ConvT = 87F | MMP = 0.46 |
| LowRH = 83% | MeanW = 16.1 g/kg | MaxT = 91F | |
| SigSevere = 25189 m3/s3 | | | |

| | |
|---|---|
| Sfc-3km Agl Lapse Rate = | 5.7 C/km |
| 3-6km Agl Lapse Rate = | 6.4 C/km |
| 850-500mb Lapse Rate = | 6.5 C/km |
| 700-500mb Lapse Rate = | 6.8 C/km |

**Supercell = 3.1**
**Left Supercell = -0.7**
**Sig Tor (CIN) = 0.0**
**Sig Tor (fixed) = 0.0**
**Sig Hail = 0.8**

| | SRH(m2/s2) | Shear(kt) | MnWind | SRW |
|---|---|---|---|---|
| SFC - 1 km | 66 | 10 | 335/6 | 311/21 |
| SFC - 3 km | 92 | 15 | 30/6 | 324/17 |
| Eff Inflow Layer | 80 | 14 | 13/5 | 319/18 |
| SFC - 6 km | | 21 | 52/9 | 337/15 |
| SFC - 8 km | | 24 | 58/10 | 341/14 |
| Lower Half Storm Depth | | 22 | 55/10 | 339/14 |
| Cloud Bearing Layer | | 40 | 67/13 | 357/13 |

BRN Shear = 22 m²/s²
4-6km SR Wind = 19/17 kt

.....Storm Motion Vectors.....
Bunkers Right = 122/15 kt
Bunkers Left = 12/20 kt

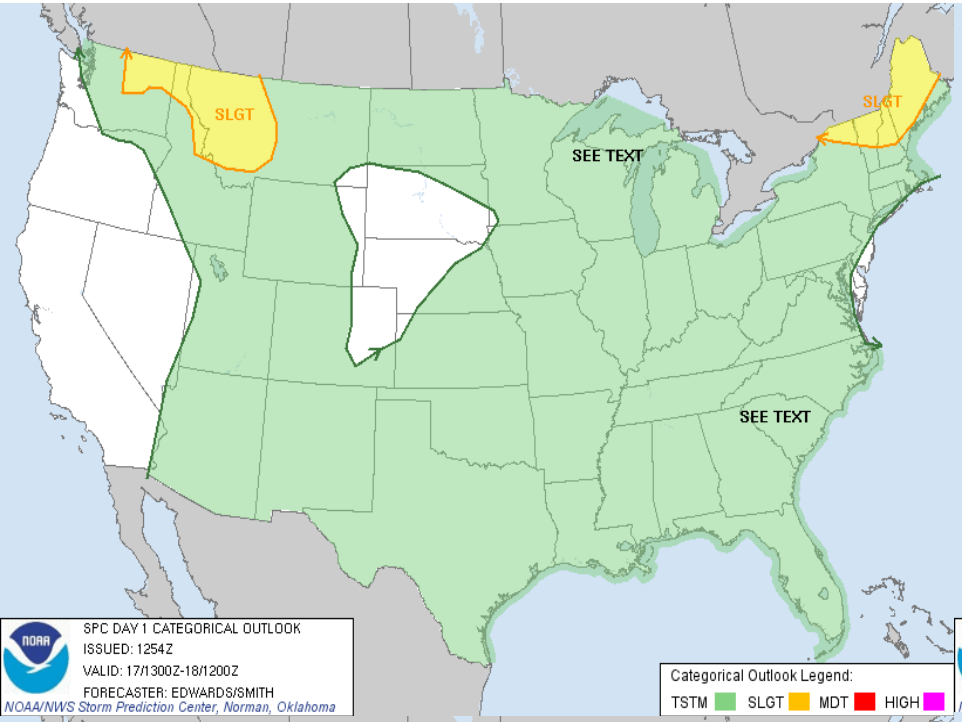
Corfidi Downshear = 83/35 kt
Corfidi Upshear = 92/17 kt

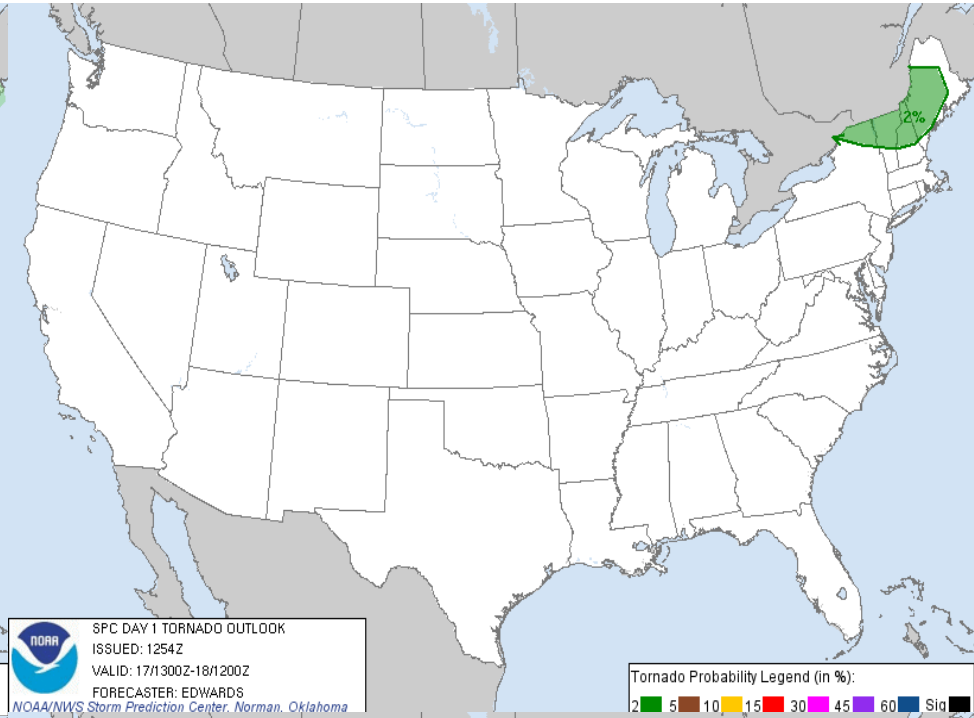
1km & 6km AGL Wind Barbs

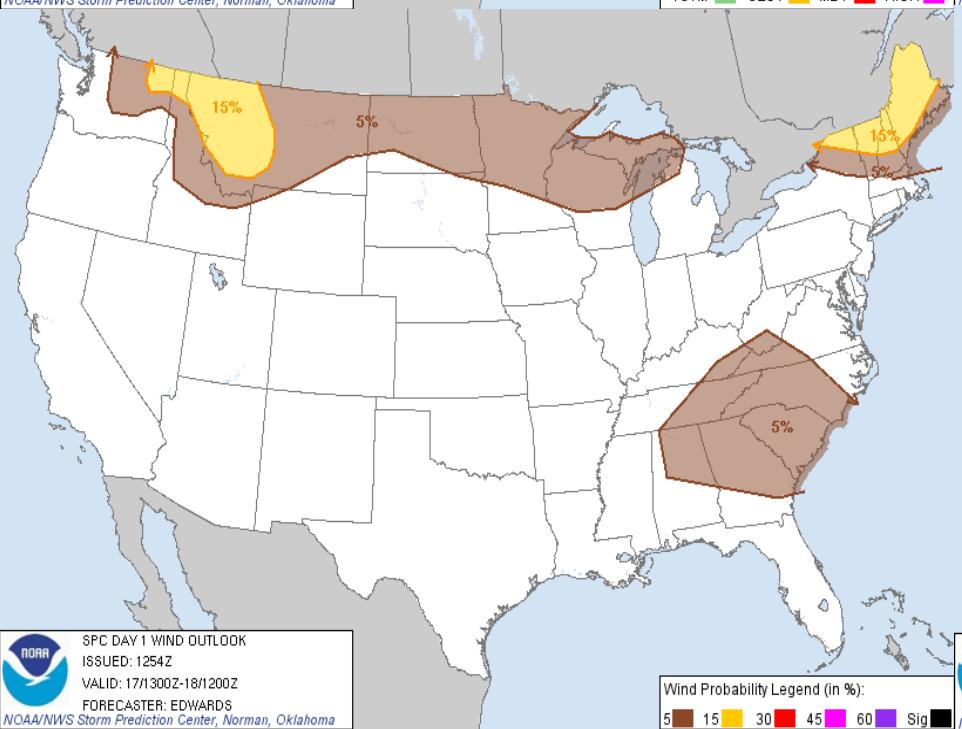
* * * BEST GUESS PRECIP TYPE * * *
**Rain.**
Based on sfc temperature of 75.6 F.

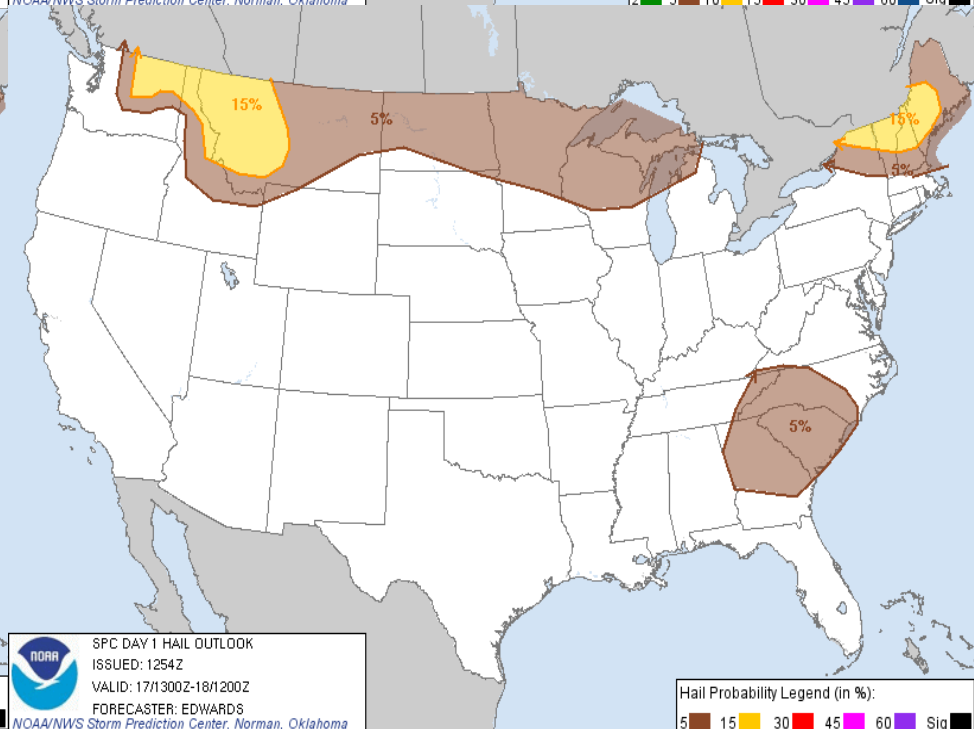
## SARS - Sounding Analogs

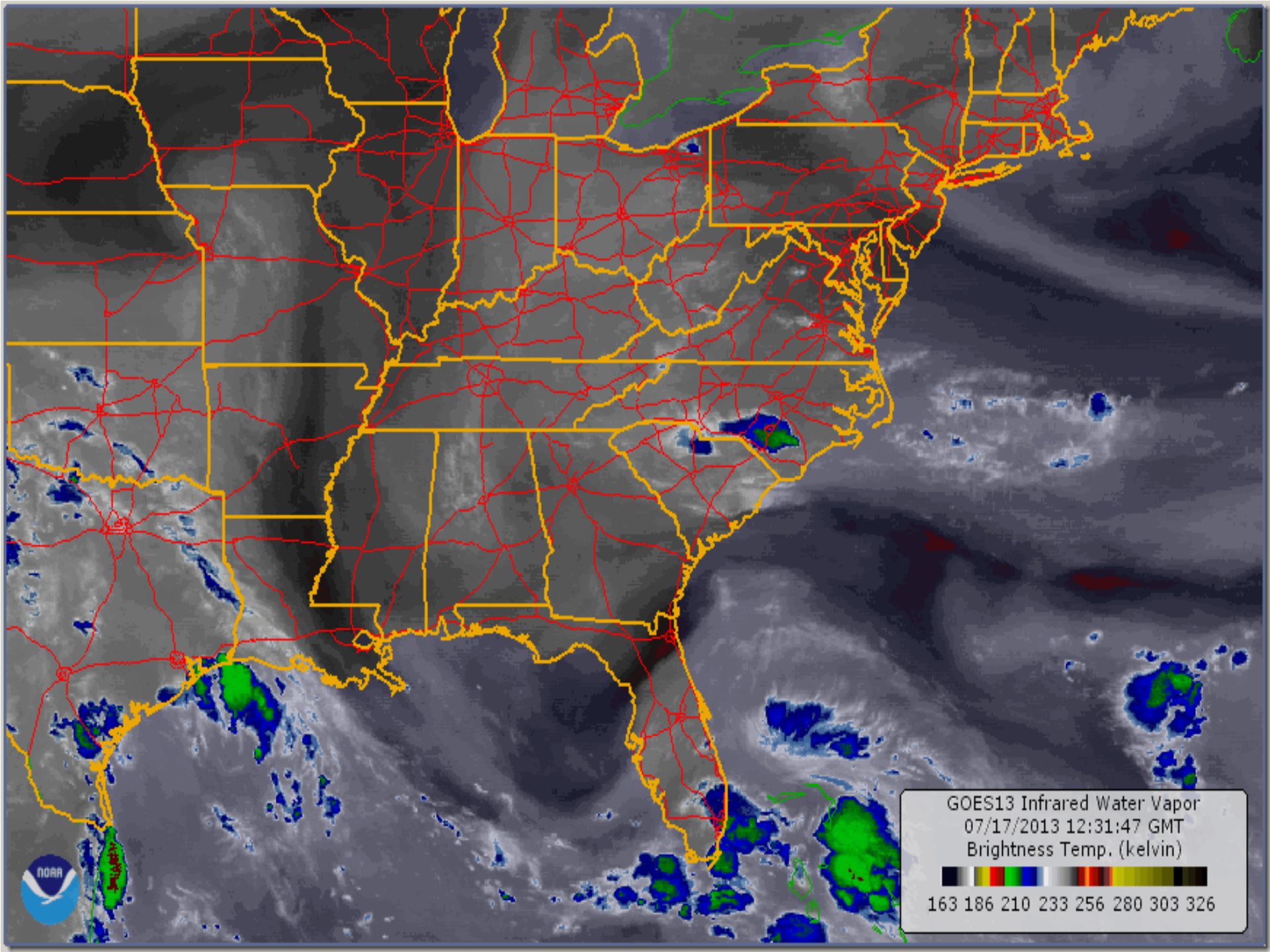
| SUPERCELL | | | SGFNT HAIL | |
|---|---|---|---|---|
| 03080122.MIE | WEAK | | 95050800.LCH | 2.50 |
| 03050218.MSL | NON | | 90070500.LCH | 1.75 |
| | | | 89061400.GGG | 1.75 |
| | | | 89061200.JAN | 1.00 |
| (6 loose matches) | | | (69 loose matches) | |
| SARS: 33% TOR | | | SARS: 20% SIG | |

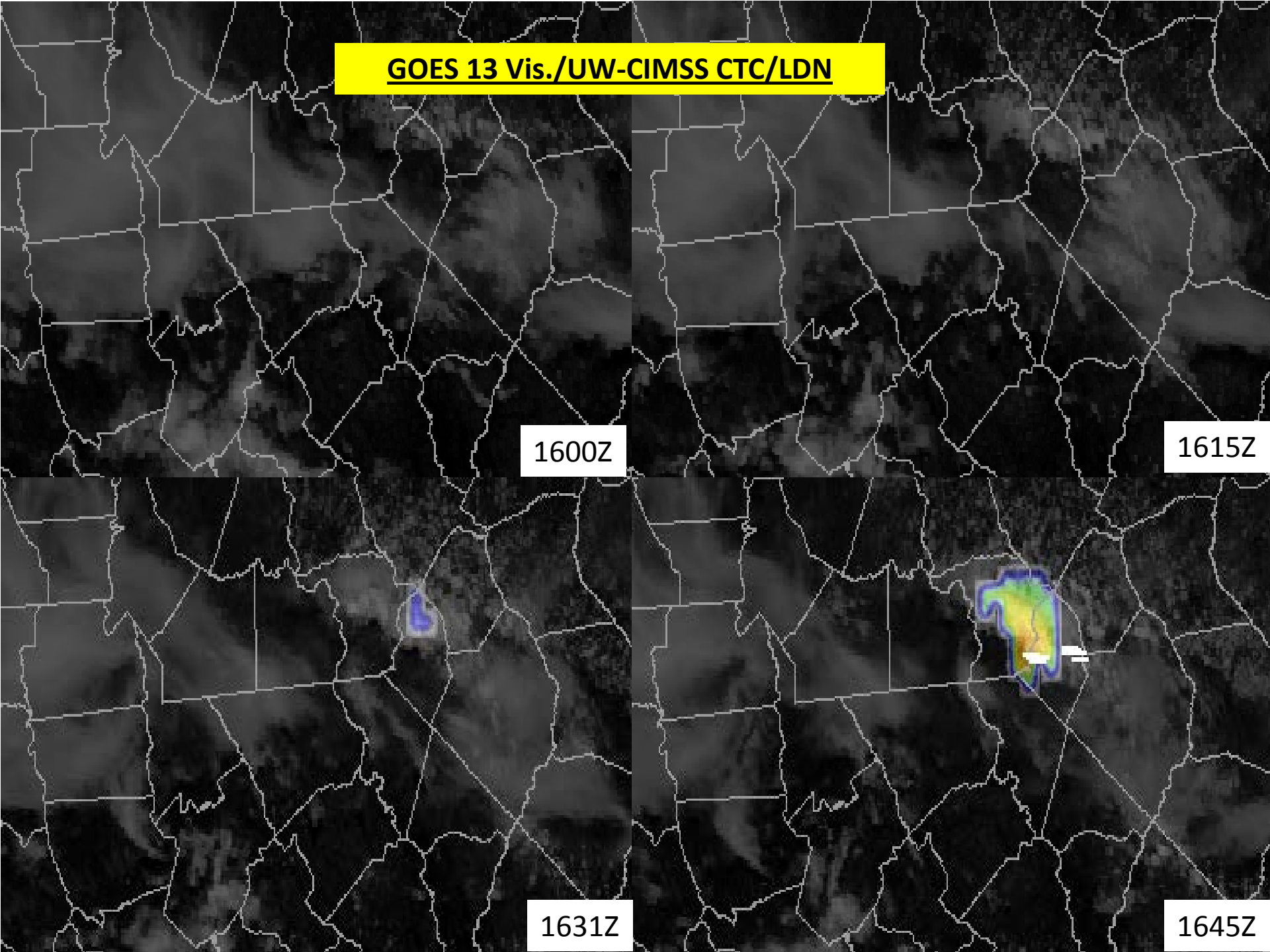

SLGT
SLGT
SEE TEXT
SEE TEXT
SPC DAY 1 CATEGORICAL OUTLOOK
ISSUED: 1254Z
VALID: 17/1300Z-18/1200Z
FORECASTER: EDWARDS/SMITH
NOAA/NWS Storm Prediction Center, Norman, Oklahoma
Categorical Outlook Legend:
TSTM SLGT MDT HIGH

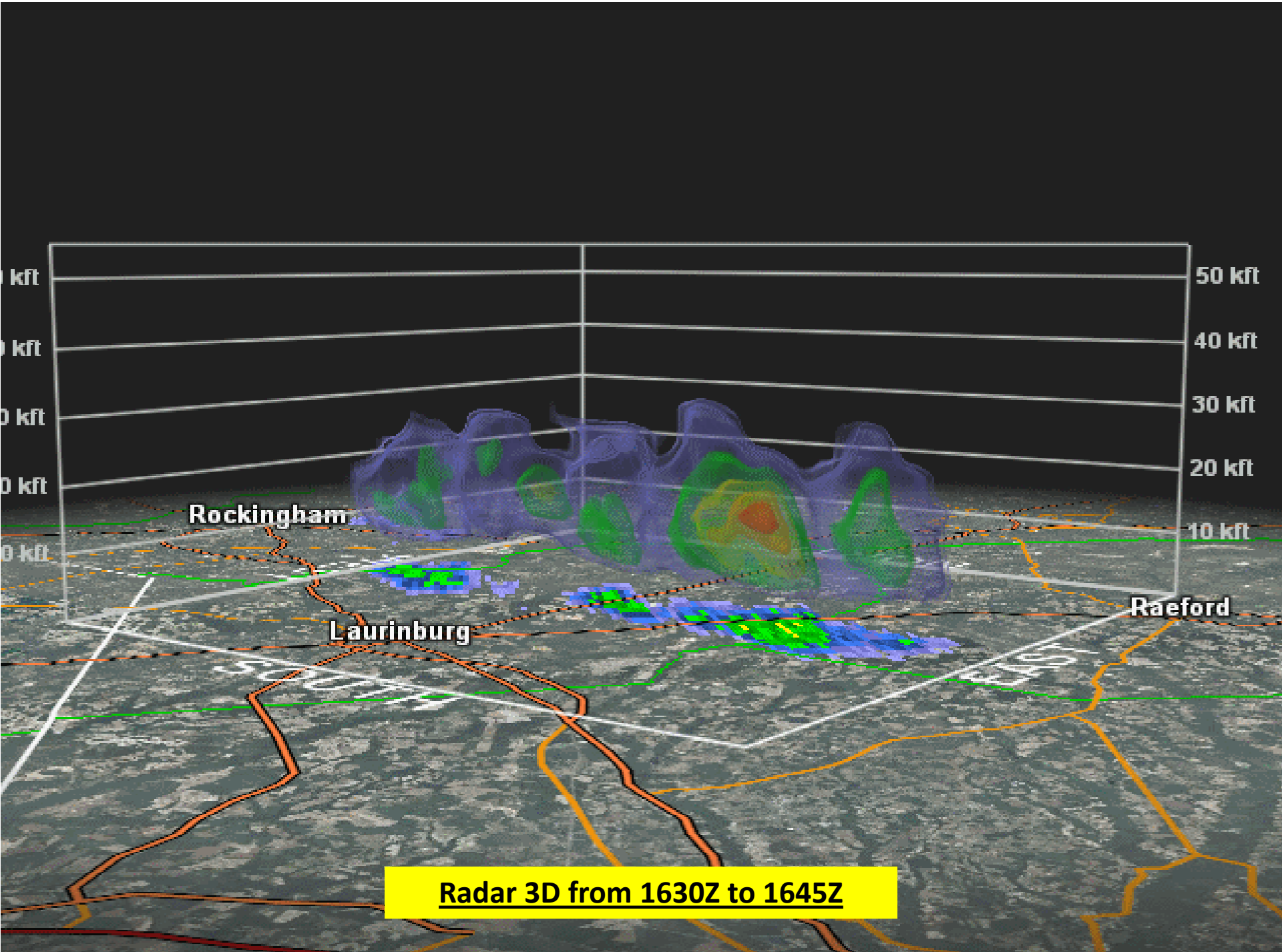

2%
SPC DAY 1 TORNADO OUTLOOK
ISSUED: 1254Z
VALID: 17/1300Z-18/1200Z
FORECASTER: EDWARDS
NOAA/NWS Storm Prediction Center, Norman, Oklahoma
Tornado Probability Legend (in %):
2 5 10 15 30 45 60 Sig


15%
5%
15%
5%
5%
SPC DAY 1 WIND OUTLOOK
ISSUED: 1254Z
VALID: 17/1300Z-18/1200Z
FORECASTER: EDWARDS
NOAA/NWS Storm Prediction Center, Norman, Oklahoma
Wind Probability Legend (in %):
5 15 30 45 60 Sig

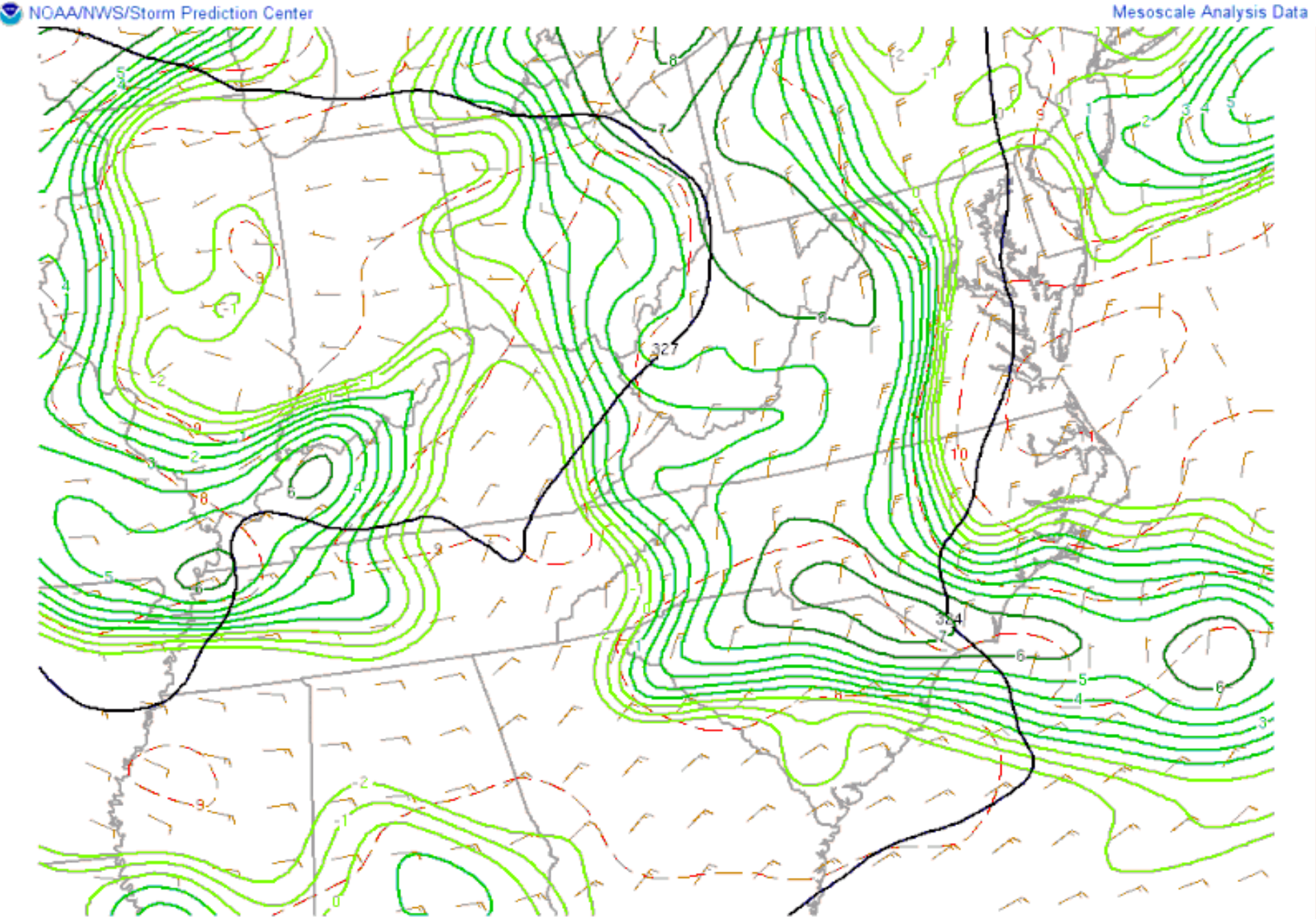

15%
5%
15%
5%
5%
SPC DAY 1 HAIL OUTLOOK
ISSUED: 1254Z
VALID: 17/1300Z-18/1200Z
FORECASTER: EDWARDS
NOAA/NWS Storm Prediction Center, Norman, Oklahoma
Hail Probability Legend (in %):
5 15 30 45 60 Sig

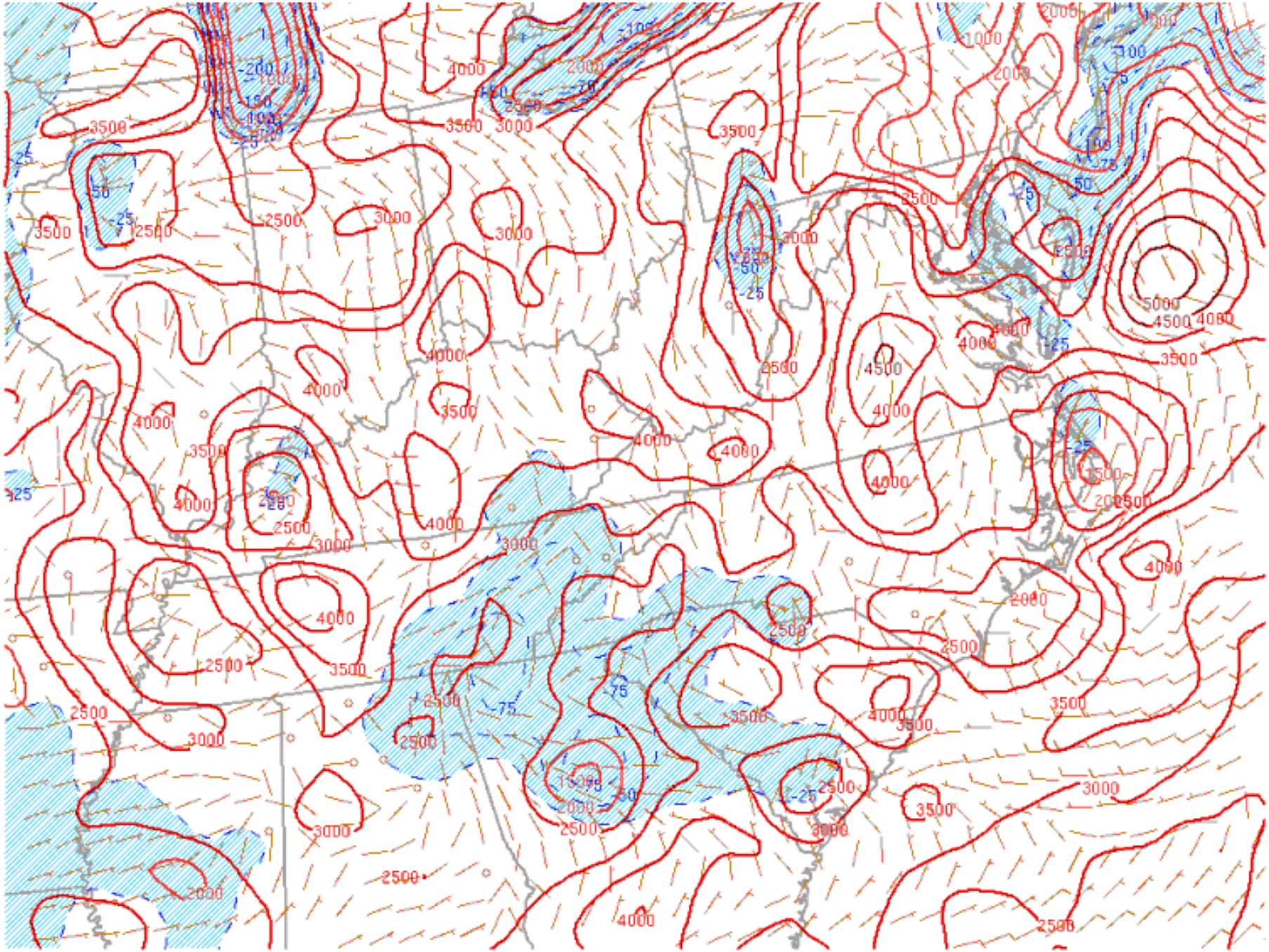

GOES13 Infrared Water Vapor
07/17/2013 12:31:47 GMT
Brightness Temp. (kelvin)
163 186 210 233 256 280 303 326


GOES 13 Vis./UW-CIMSS CTC/LDN
1600Z
1615Z
1631Z
1645Z



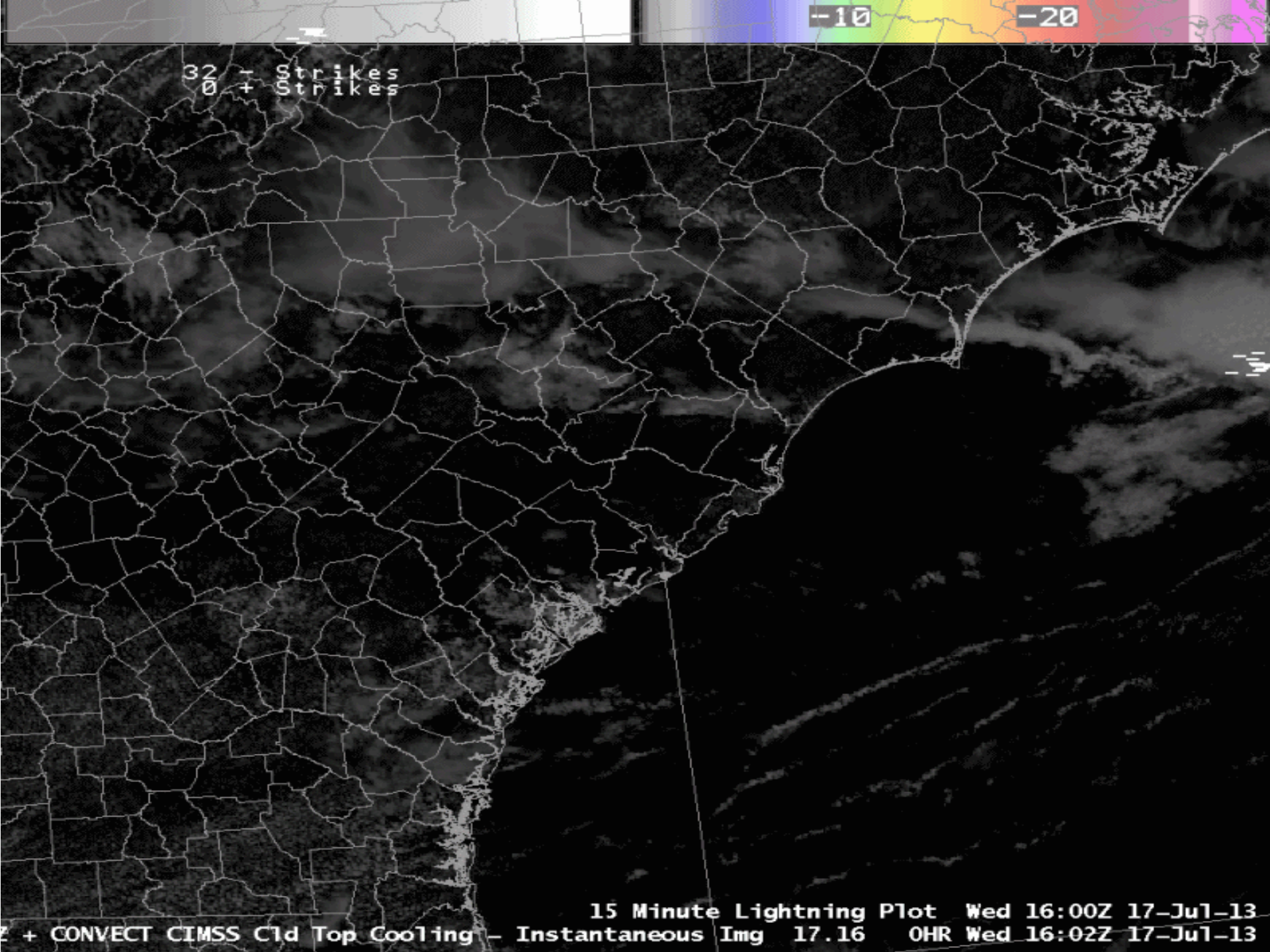

**Radar 3D from 1630Z to 1645Z**


NOAA/NWS/Storm Prediction Center
Mesoscale Analysis Data
130717/1400V001 700mb hght/temp/dwpt/wind

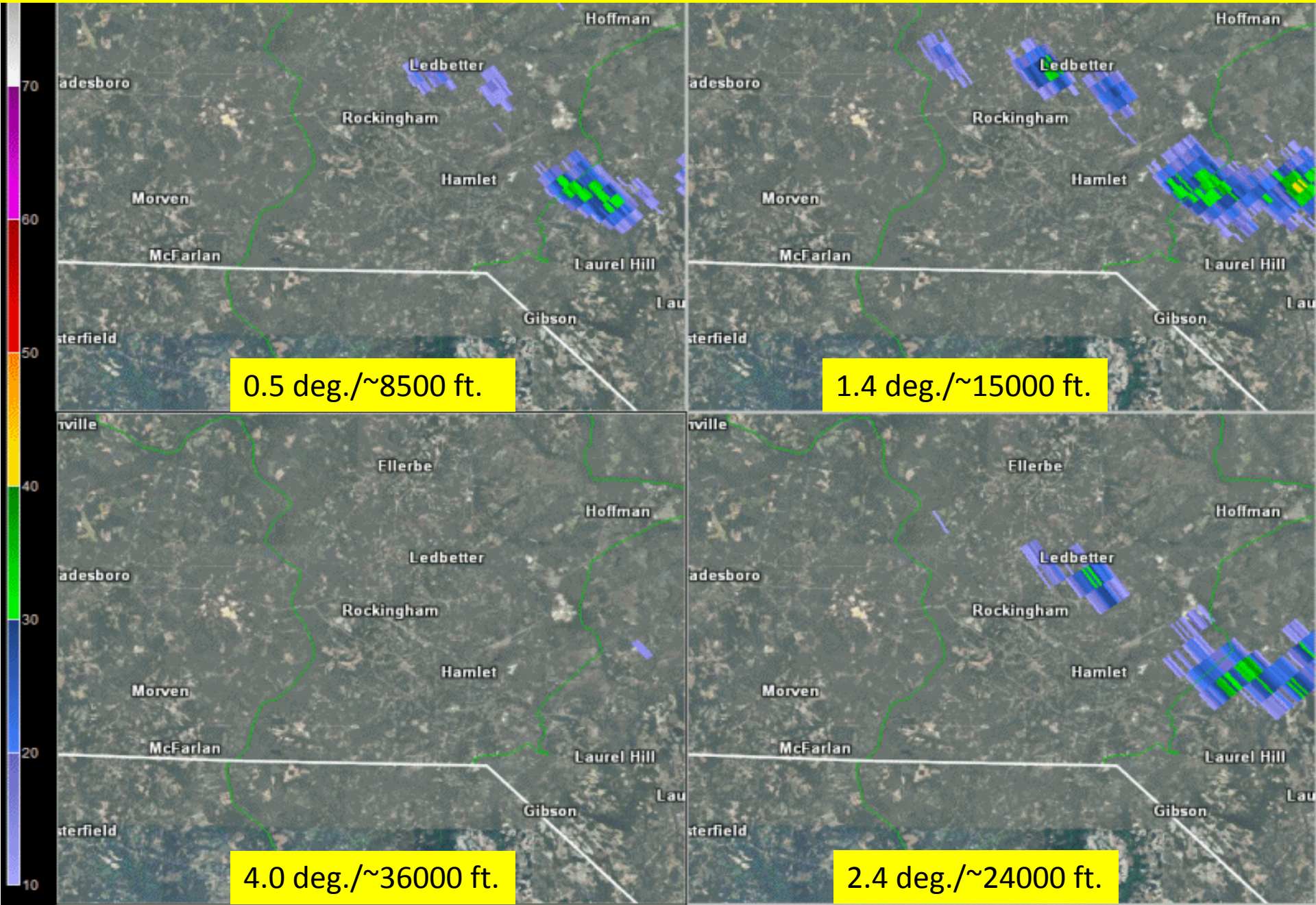


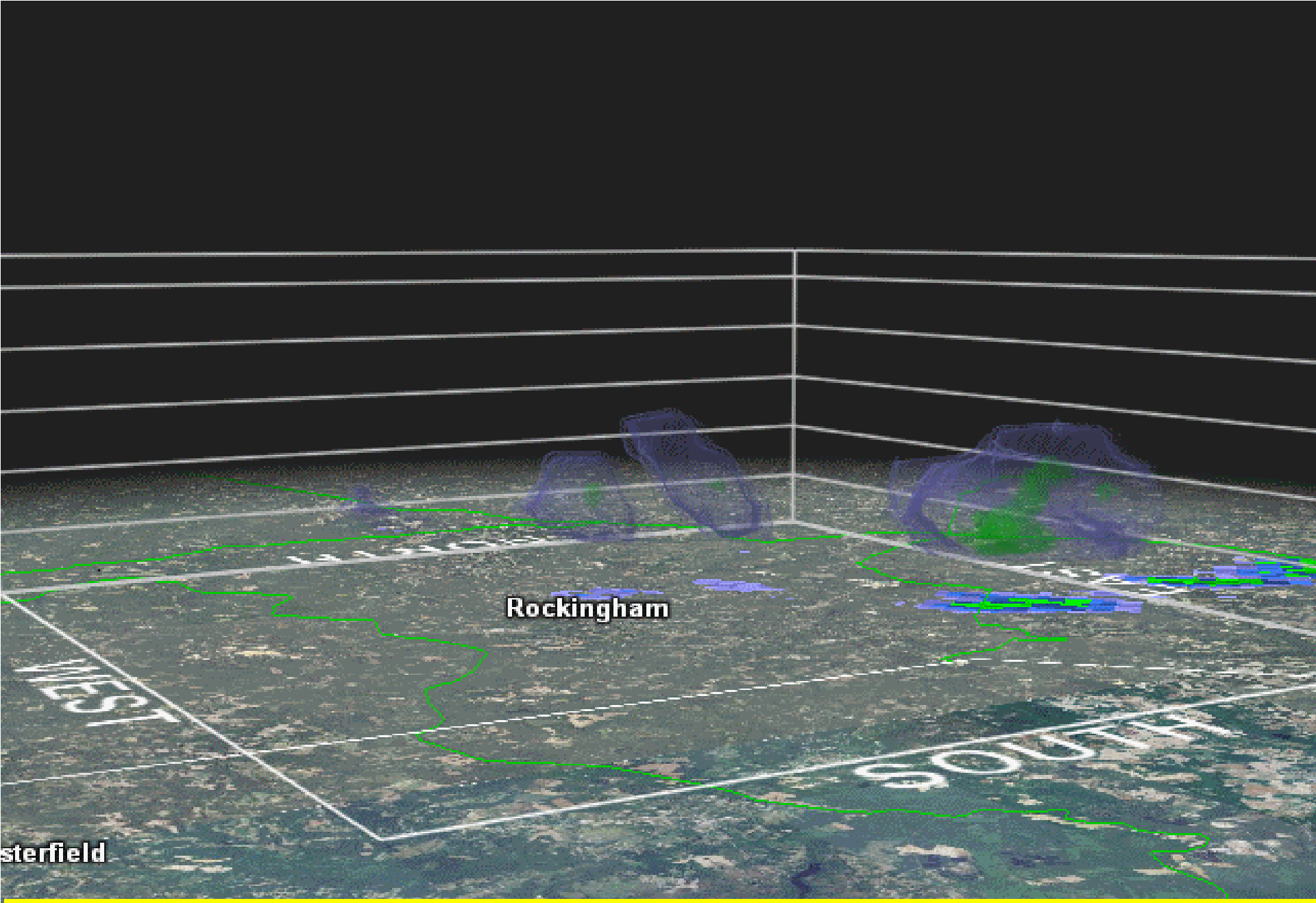
25 100

130717/1400 SBCAPE (contour) and SBCIN (J/kg, shaded)

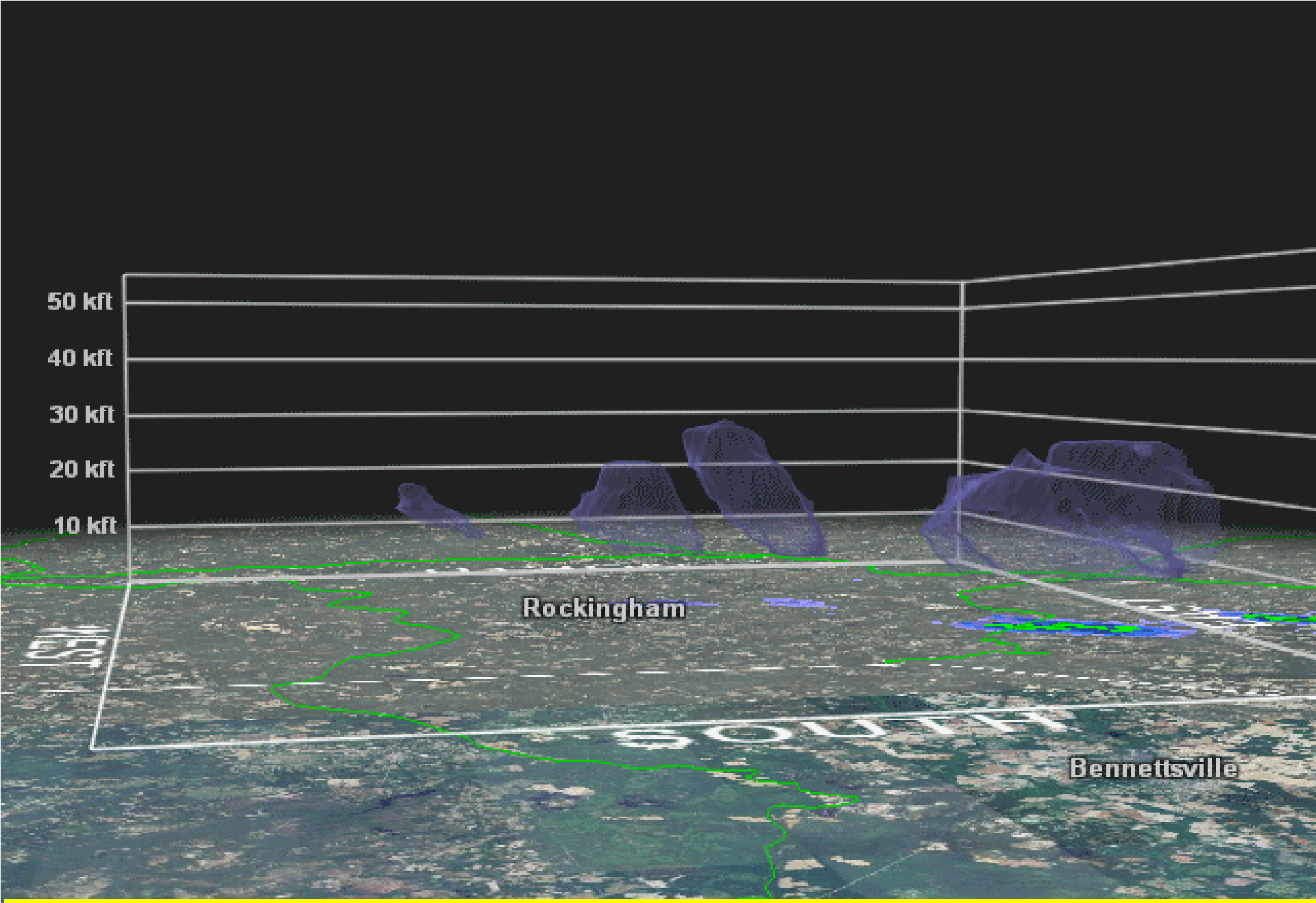

-10
-20
32 - Strikes
0 + Strikes
15 Minute Lightning Plot Wed 16:00Z 17-Jul-13
Z + CONVECT CIMSS Cld Top Cooling - Instantaneous Img 17.16 0HR Wed 16:02Z 17-Jul-13

# KRLX 1630Z-1727Z

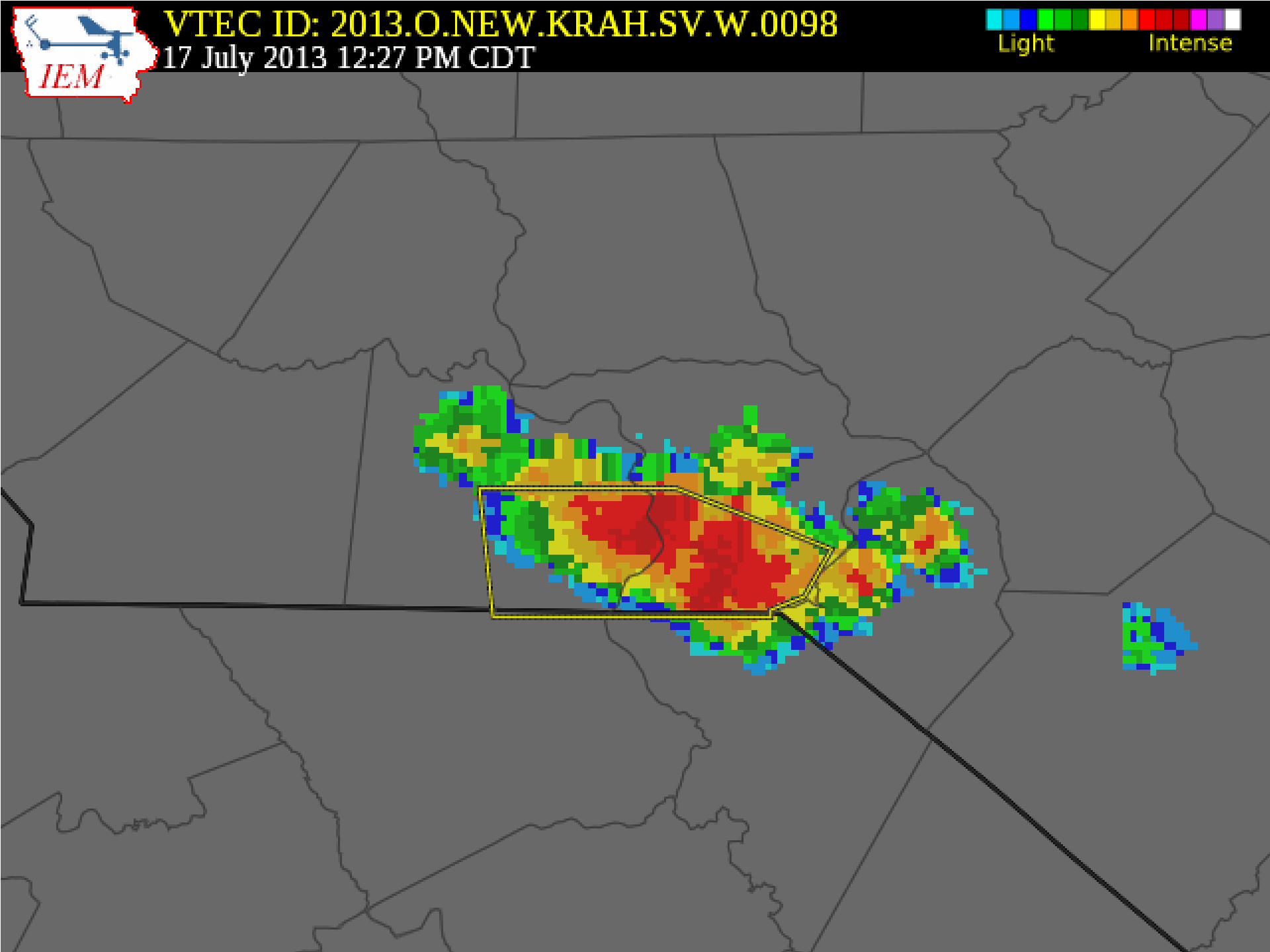


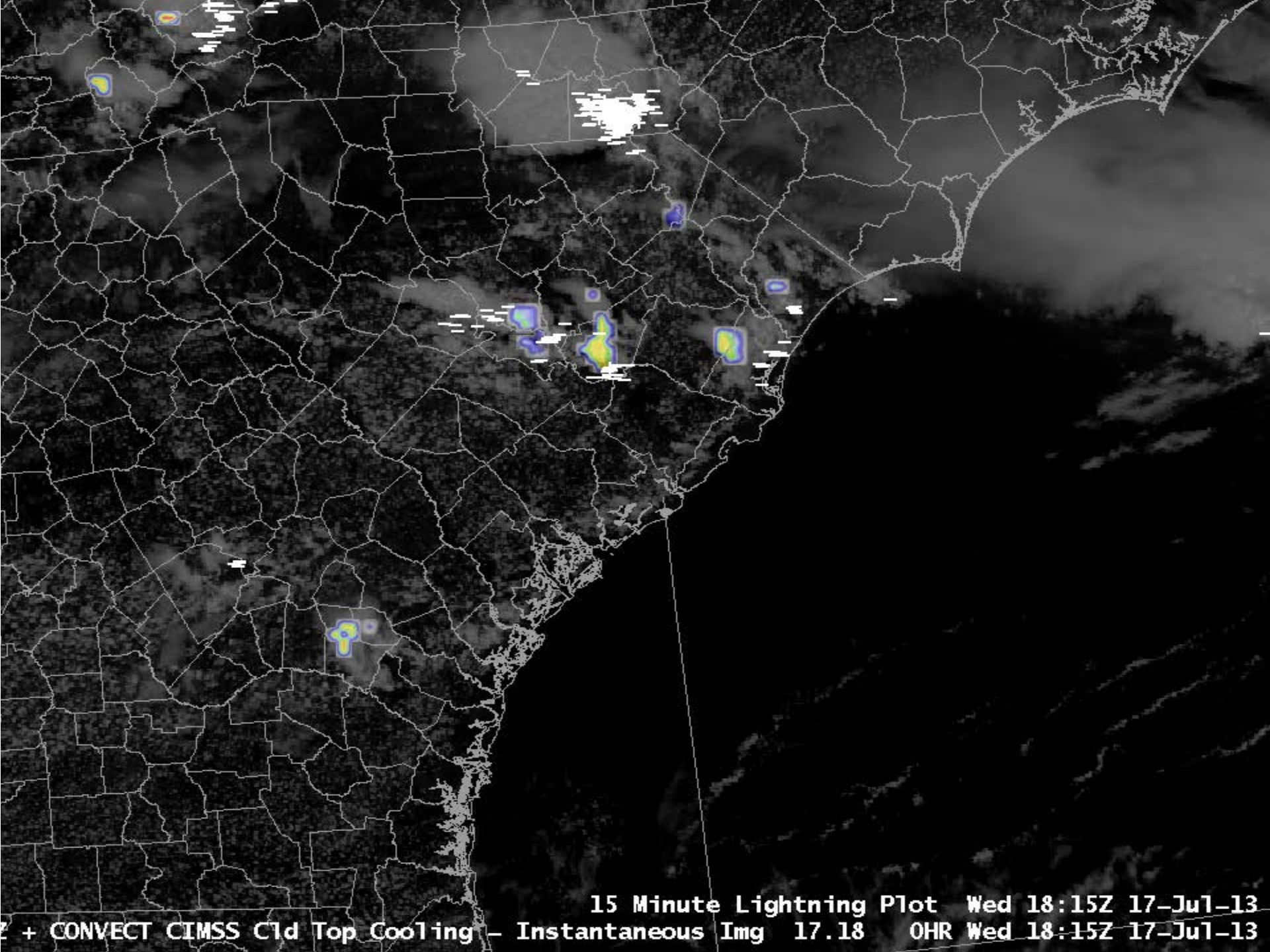


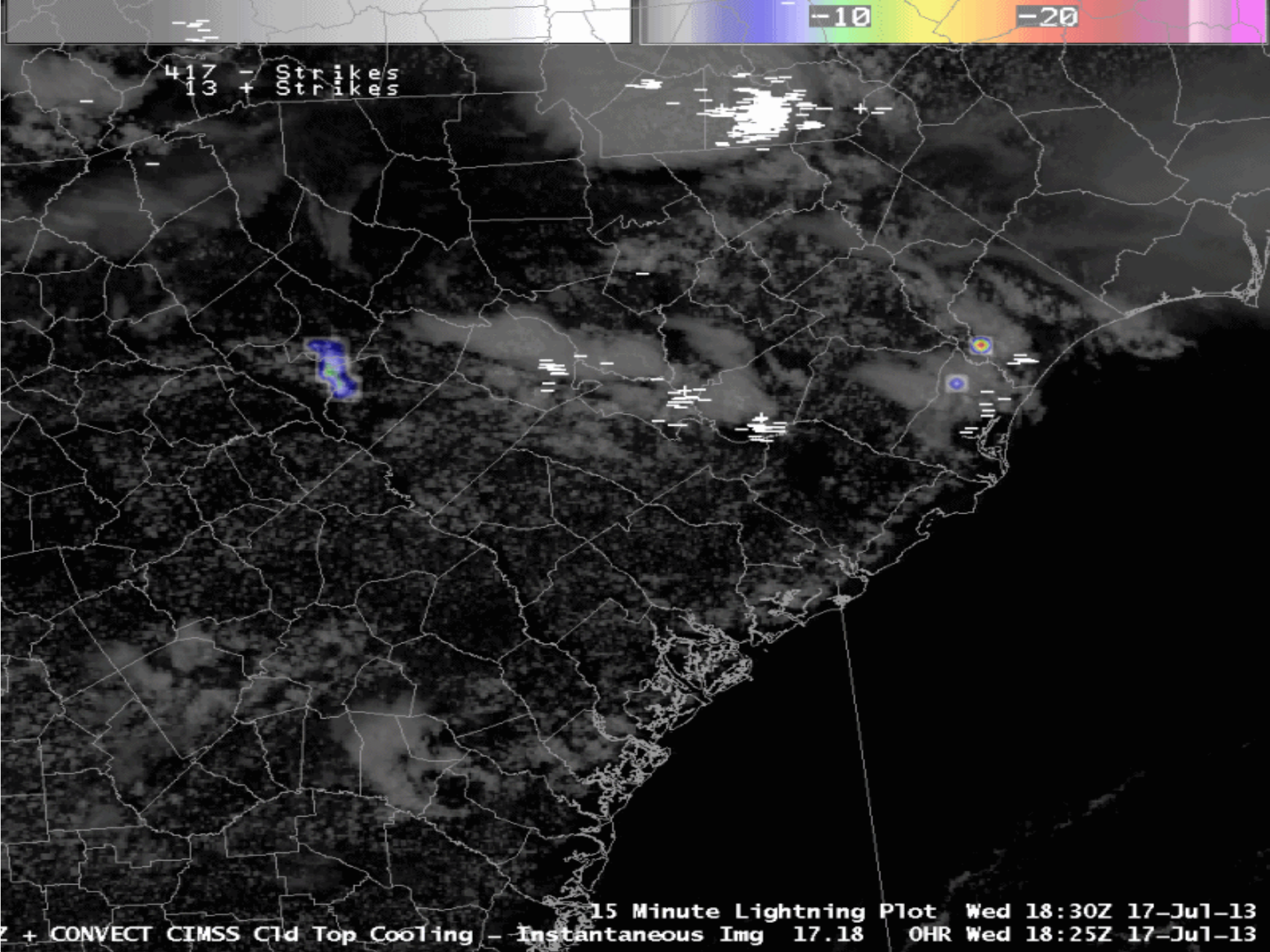

KRLX 1630Z-1727Z

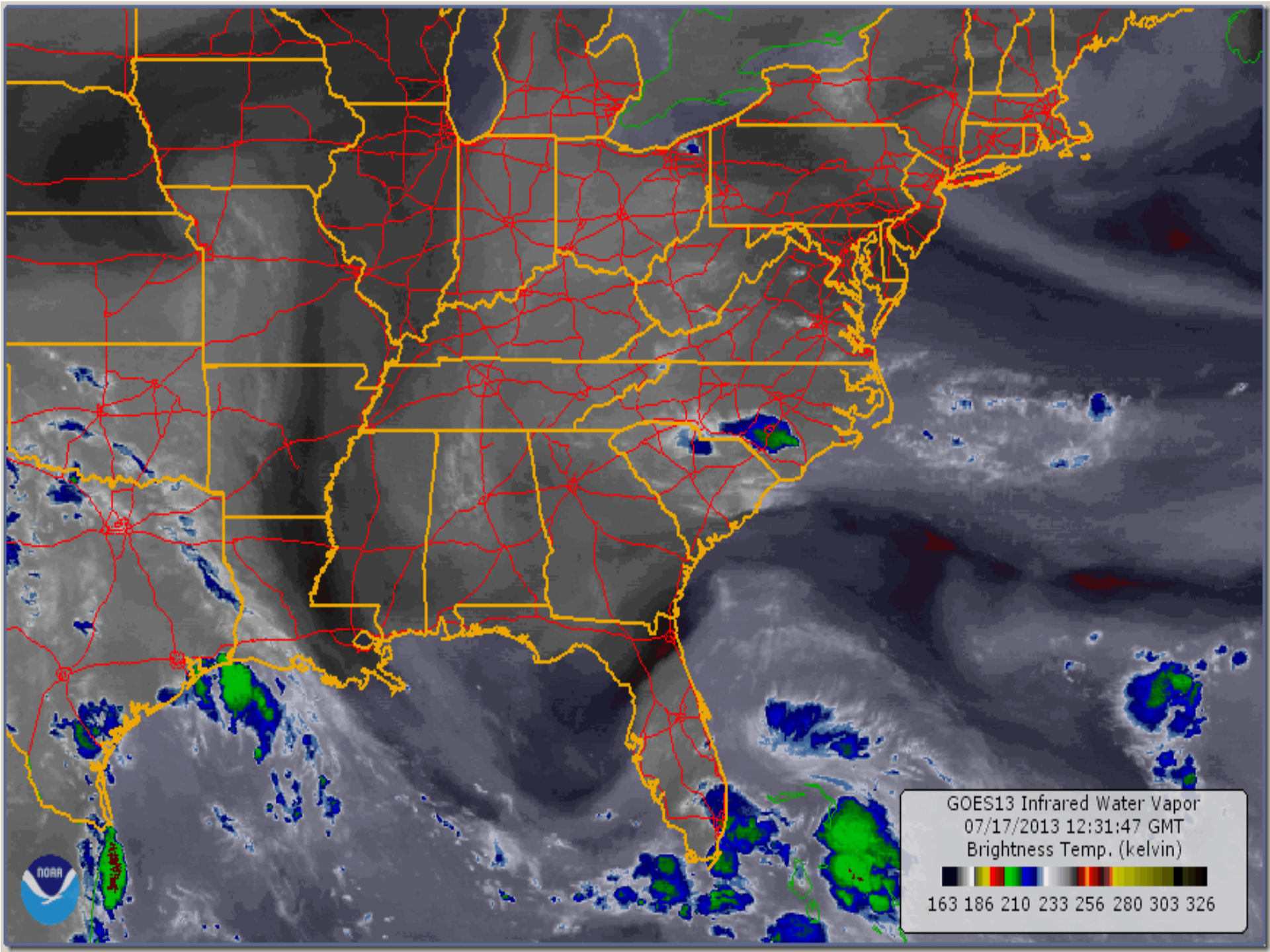



KRLX 1630Z-1727Z


VTEC ID: 2013.O.NEW.KRAH.SV.W.0098
17 July 2013 12:27 PM CDT
Light
Intense
IEM


15 Minute Lightning Plot Wed 18:15Z 17-Jul-13
Z + CONVECT CIMSS Cld Top Cooling - Instantaneous Img 17.18 0HR Wed 18:15Z 17-Jul-13


-10
-20
417 - Strikes
13 + Strikes
15 Minute Lightning Plot Wed 18:30Z 17-Jul-13
Z + CONVECT CIMSS Cld Top Cooling - Instantaneous Img 17.18 0HR Wed 18:25Z 17-Jul-13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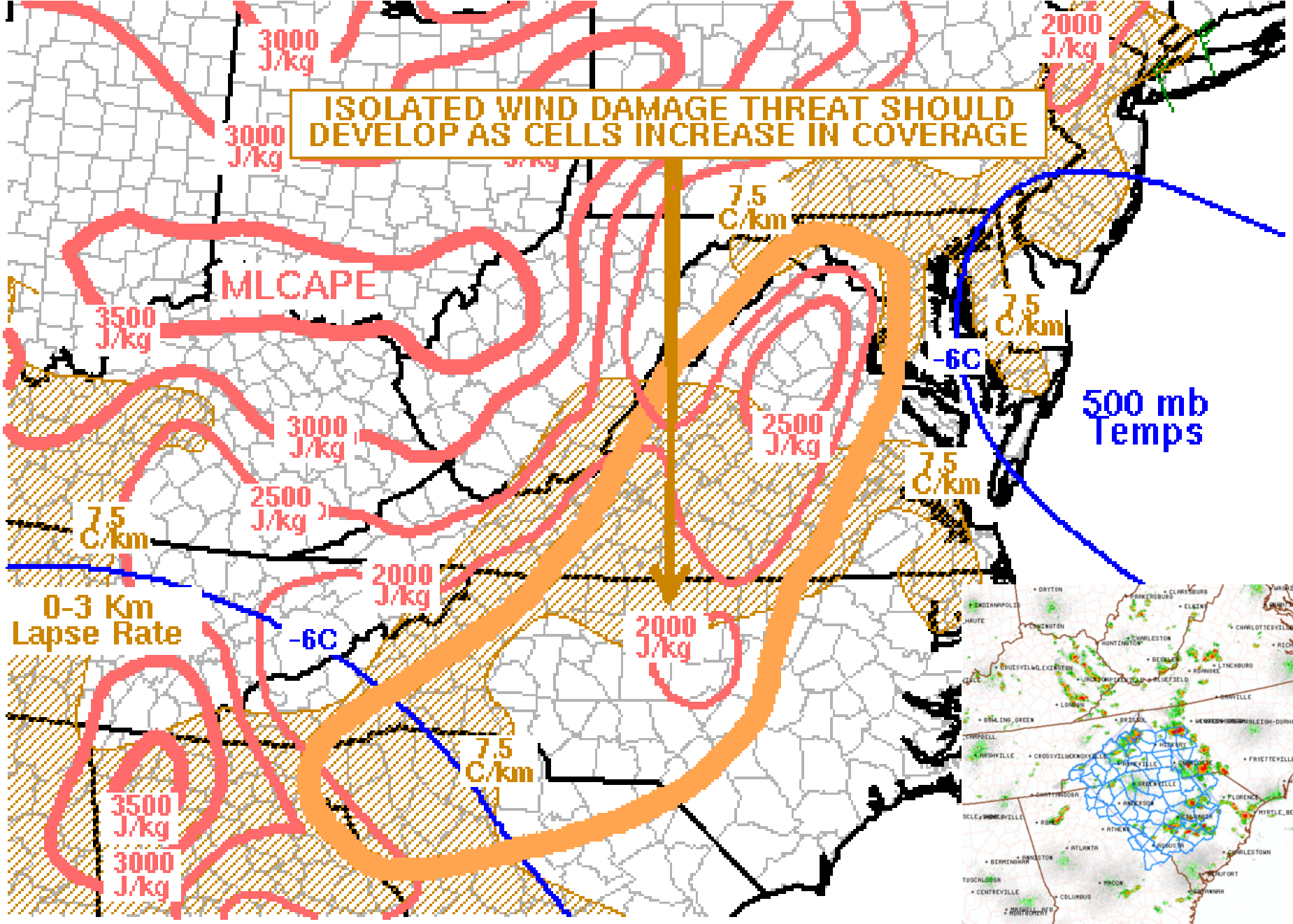
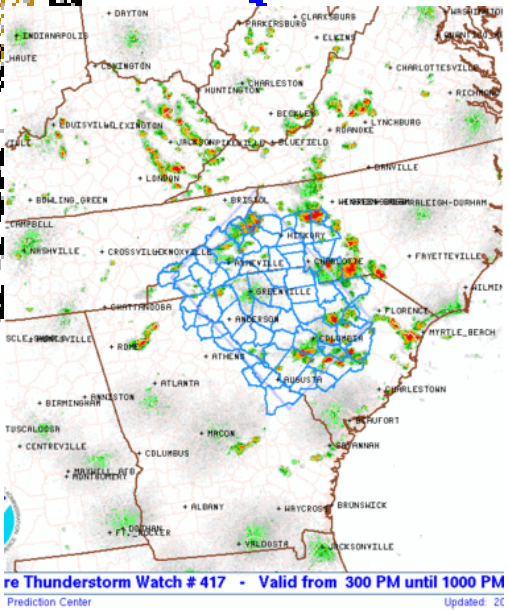
163 186 210 233 256 280 303 326

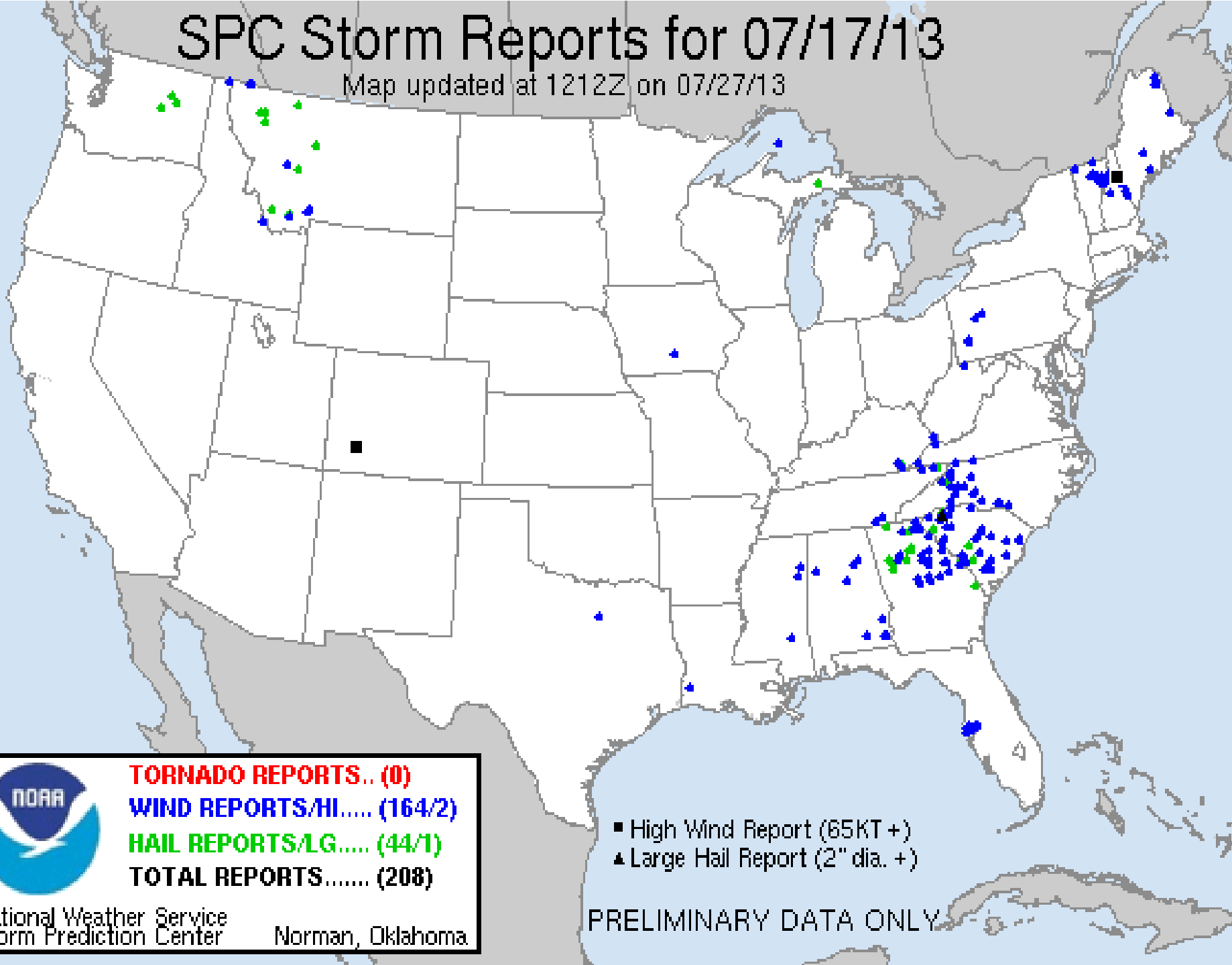


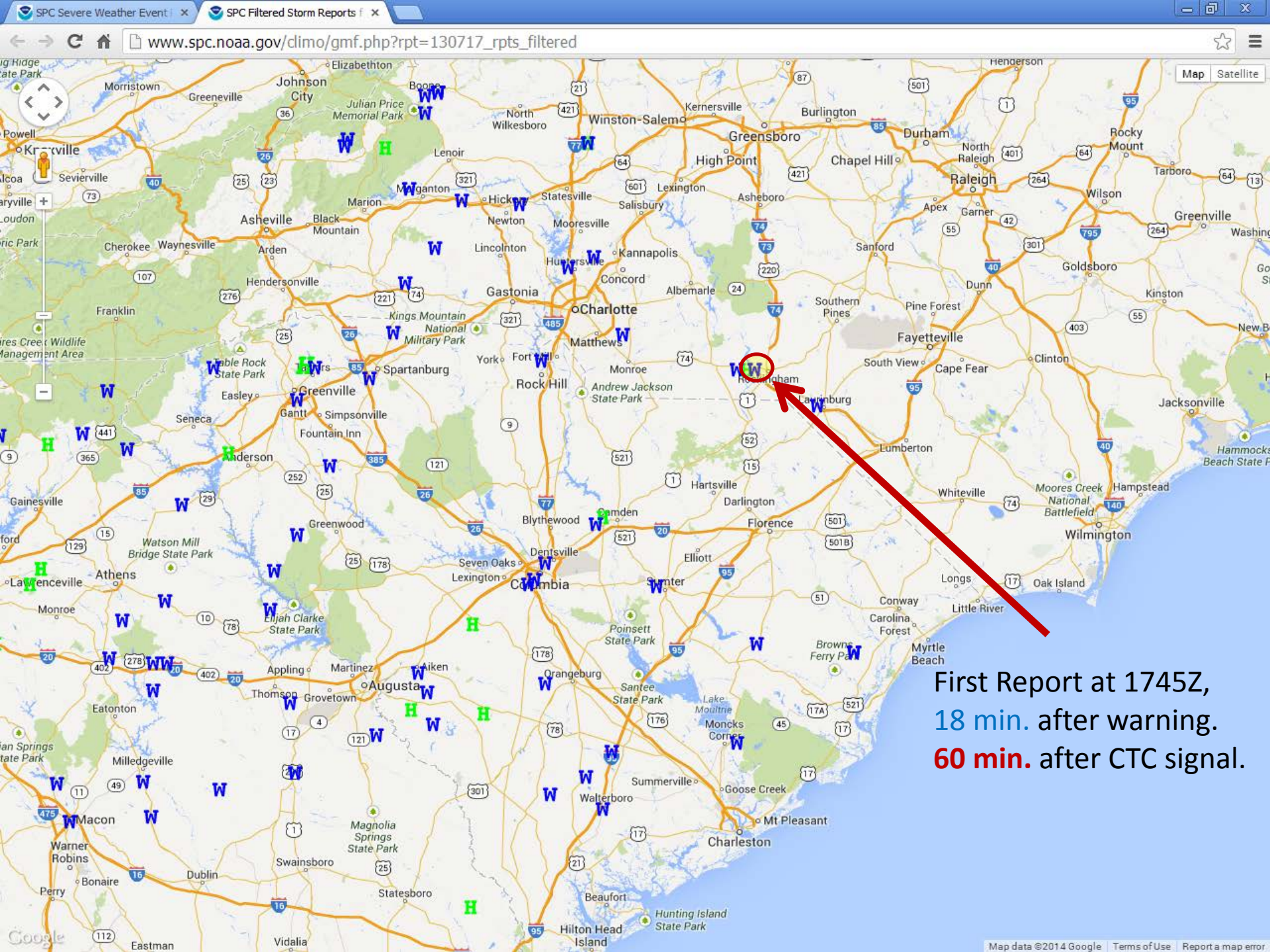

**MCD issued at 1822Z (40%), Tstorm Watch issued at 1900Z**



# SPC Storm Reports for 07/17/13

Map updated at 1212Z on 07/27/13






First Report at 1745Z,
18 min. after warning.
**60 min.** after CTC signal.