Using the GLM to assist in Ground-Based Network Differences

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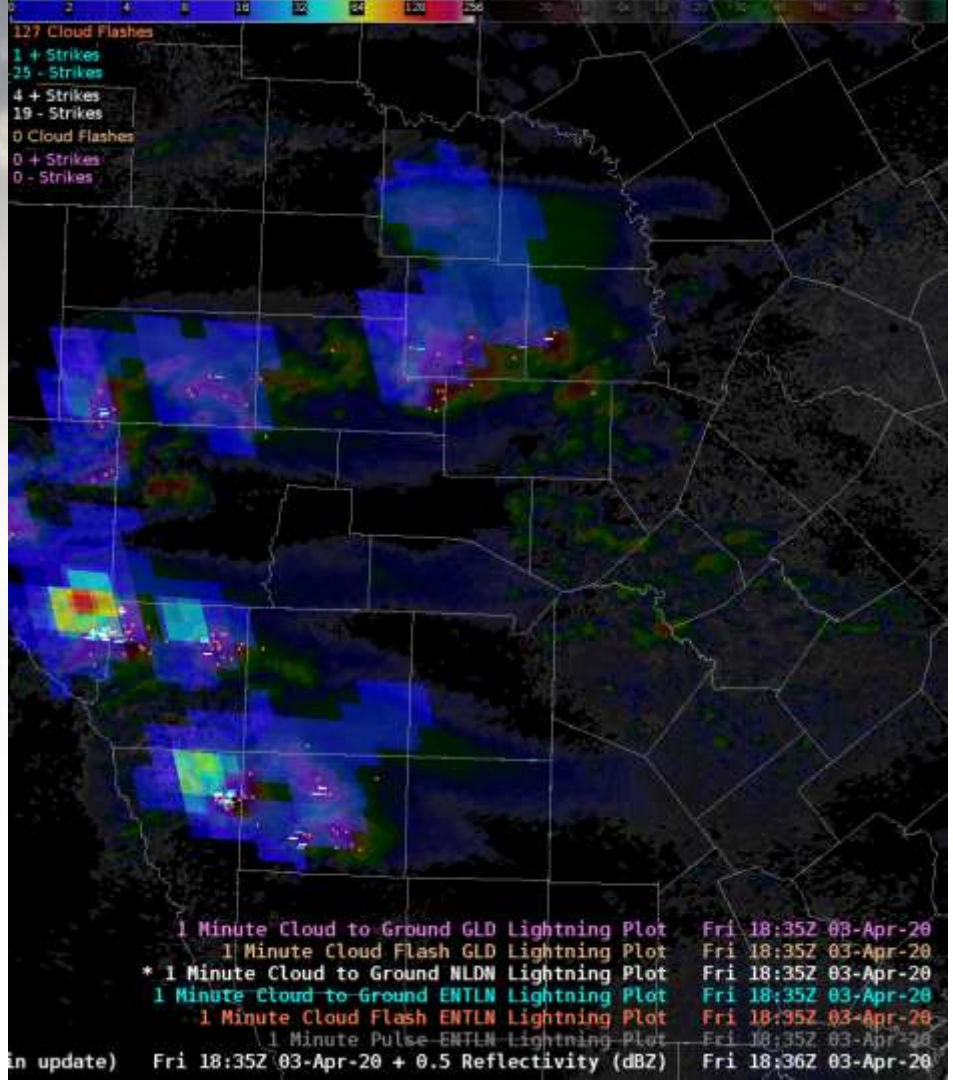
Background

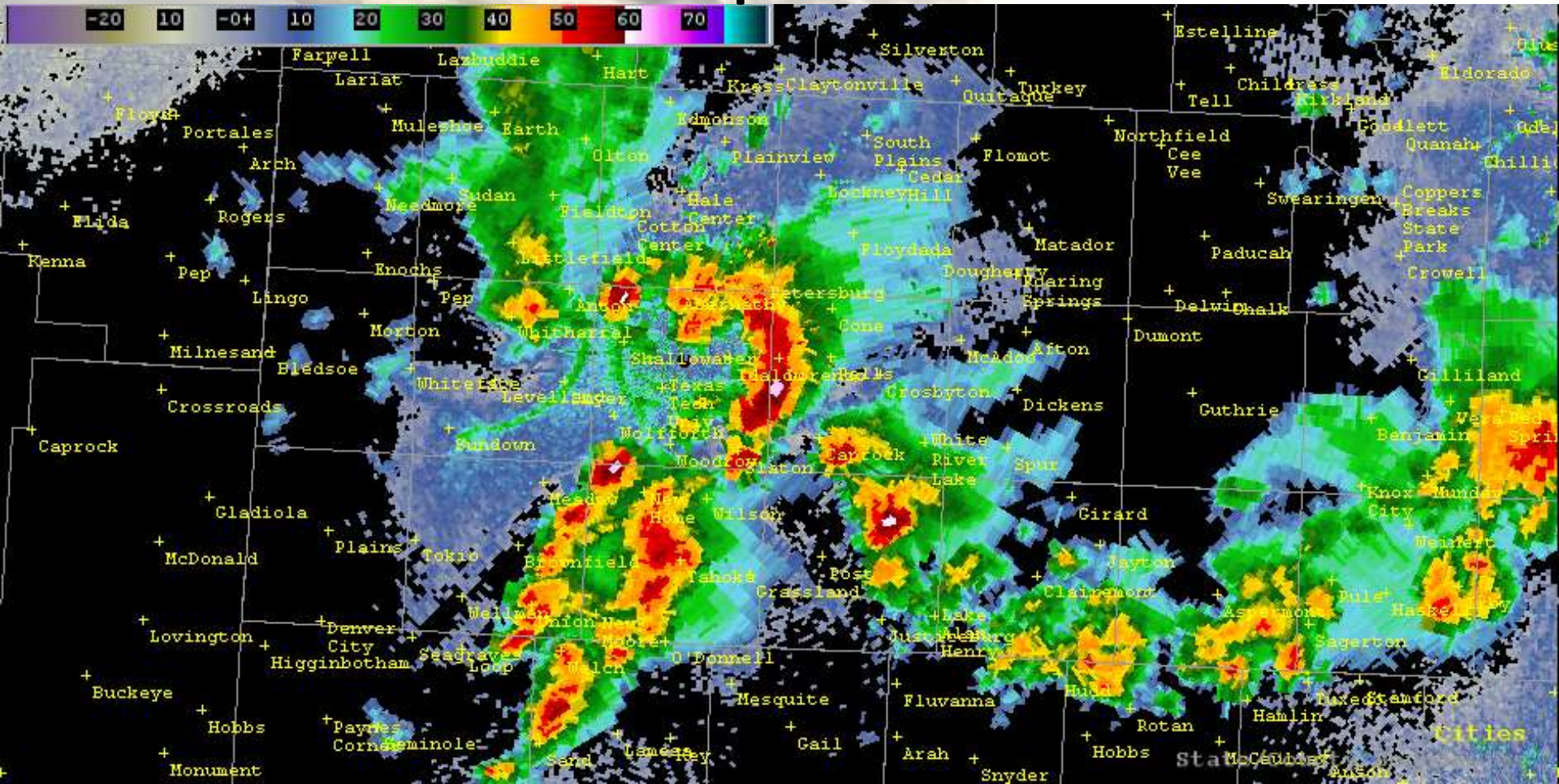
- NWS Meteorologists now have 3 Lightning Data Sources
  - Earth Networks Total Lightning Network
  - Geostationary Lightning Mapper(s)
  - Vaisala NLDN/GLD

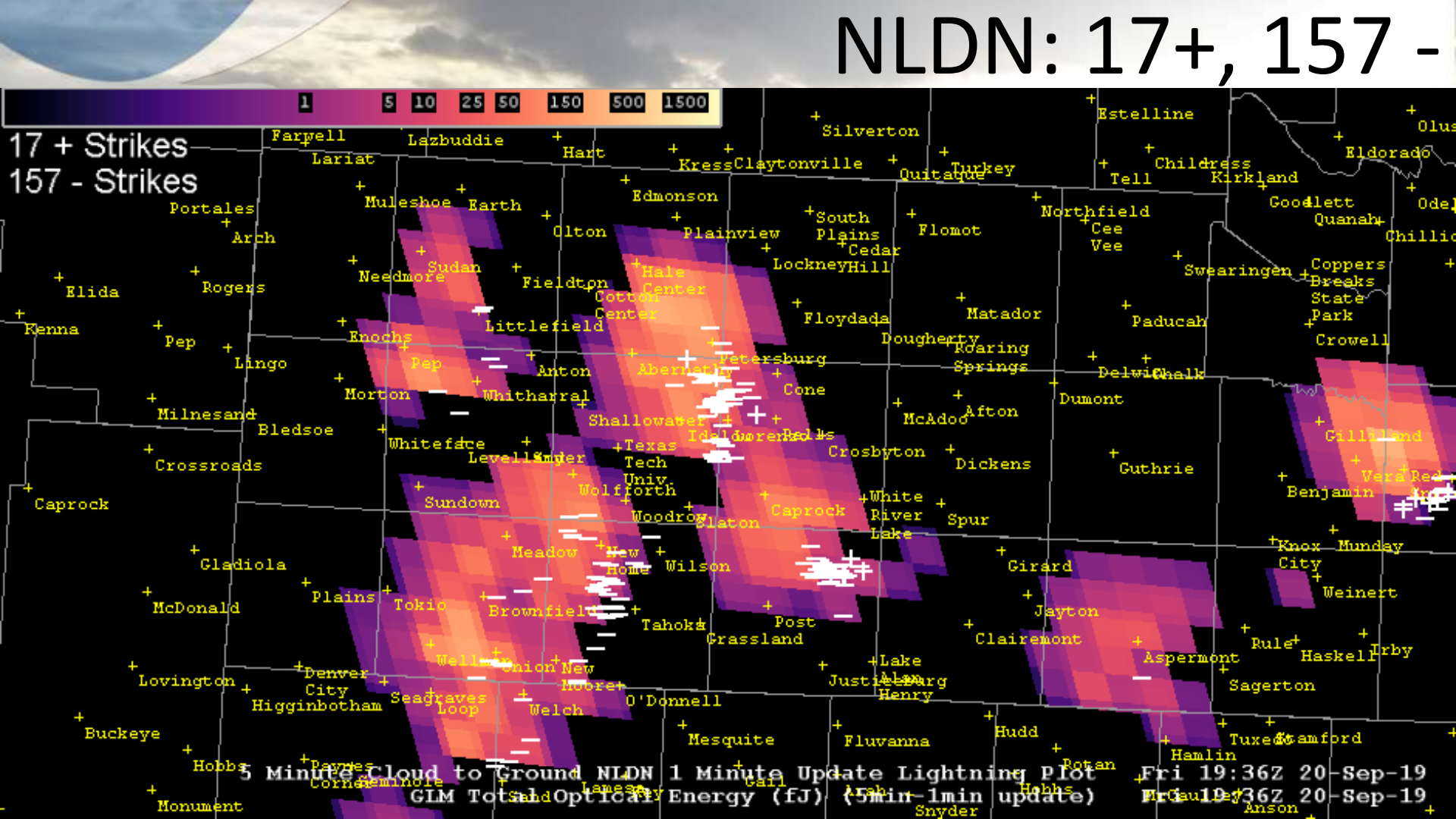
- Now there are questions cropping up:
  - Why are there differences?
  - Which one is right?
  - What can I do to figure these issues out?

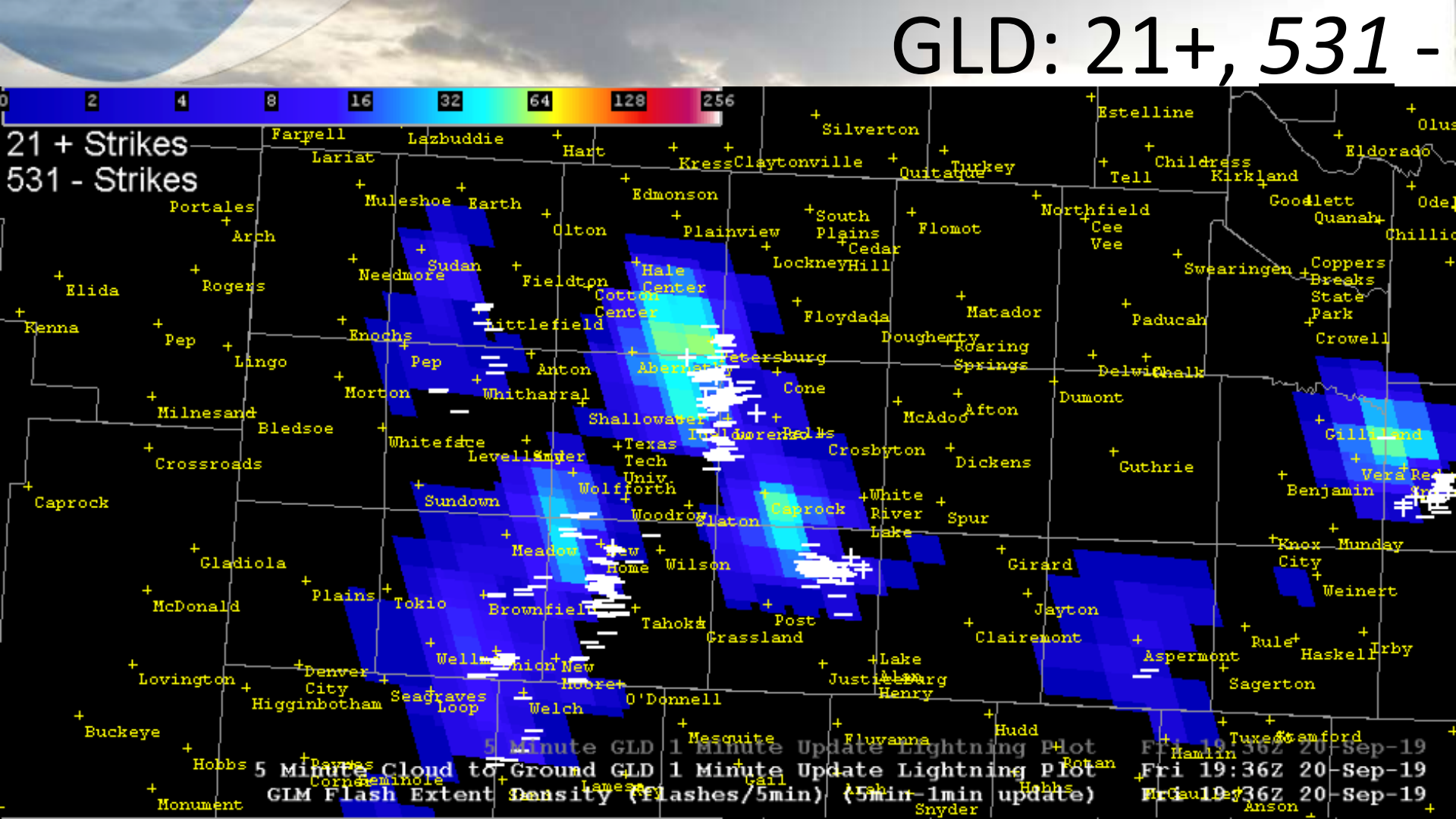
- “Simple” example:
- NLDN (white) and ENTLN (blue and orange) show flashes.
- Where are the GLD(pink and tan)?
- There were flashes according to GLM…



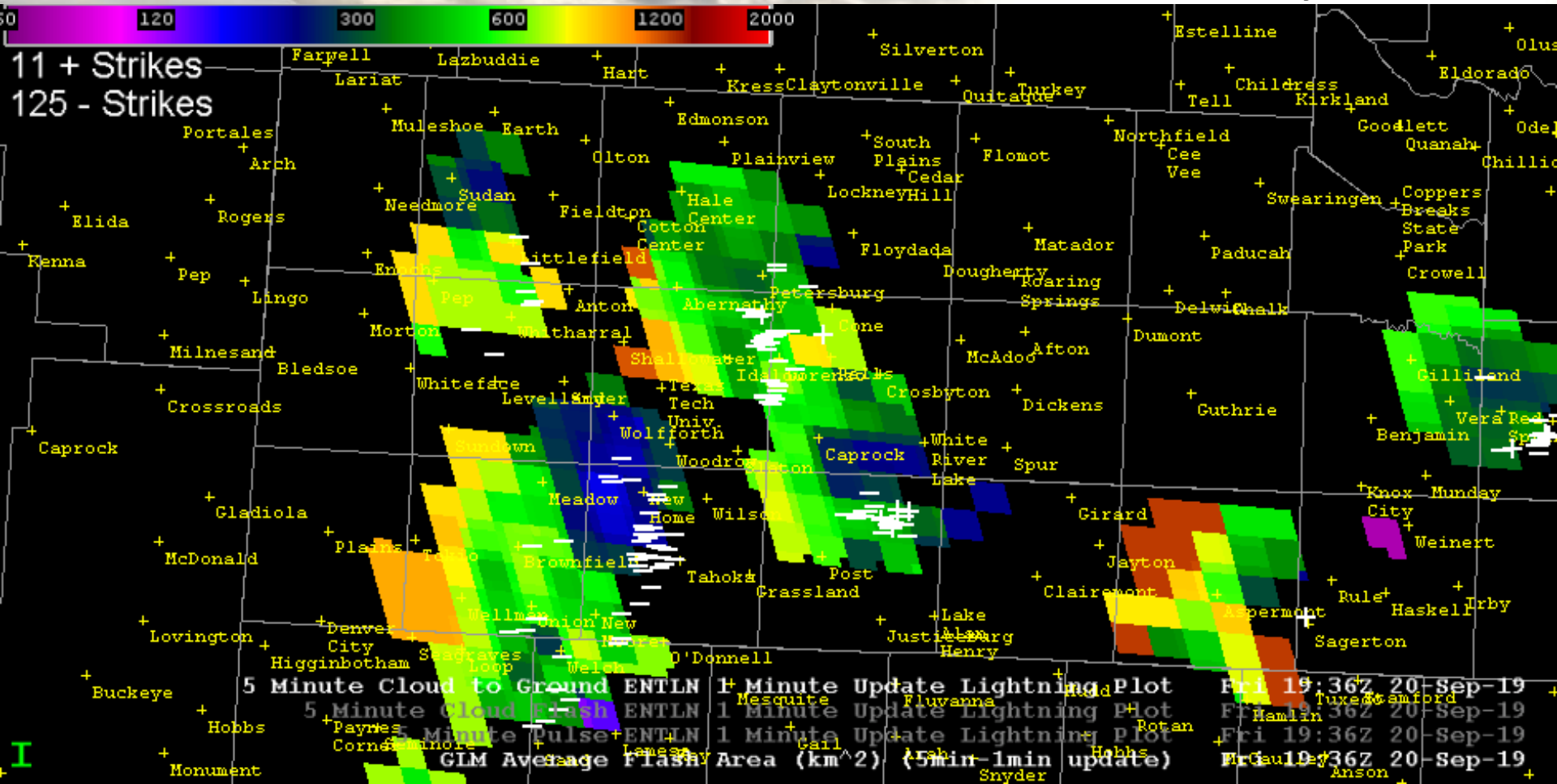
20190919 “Tropical” Convection

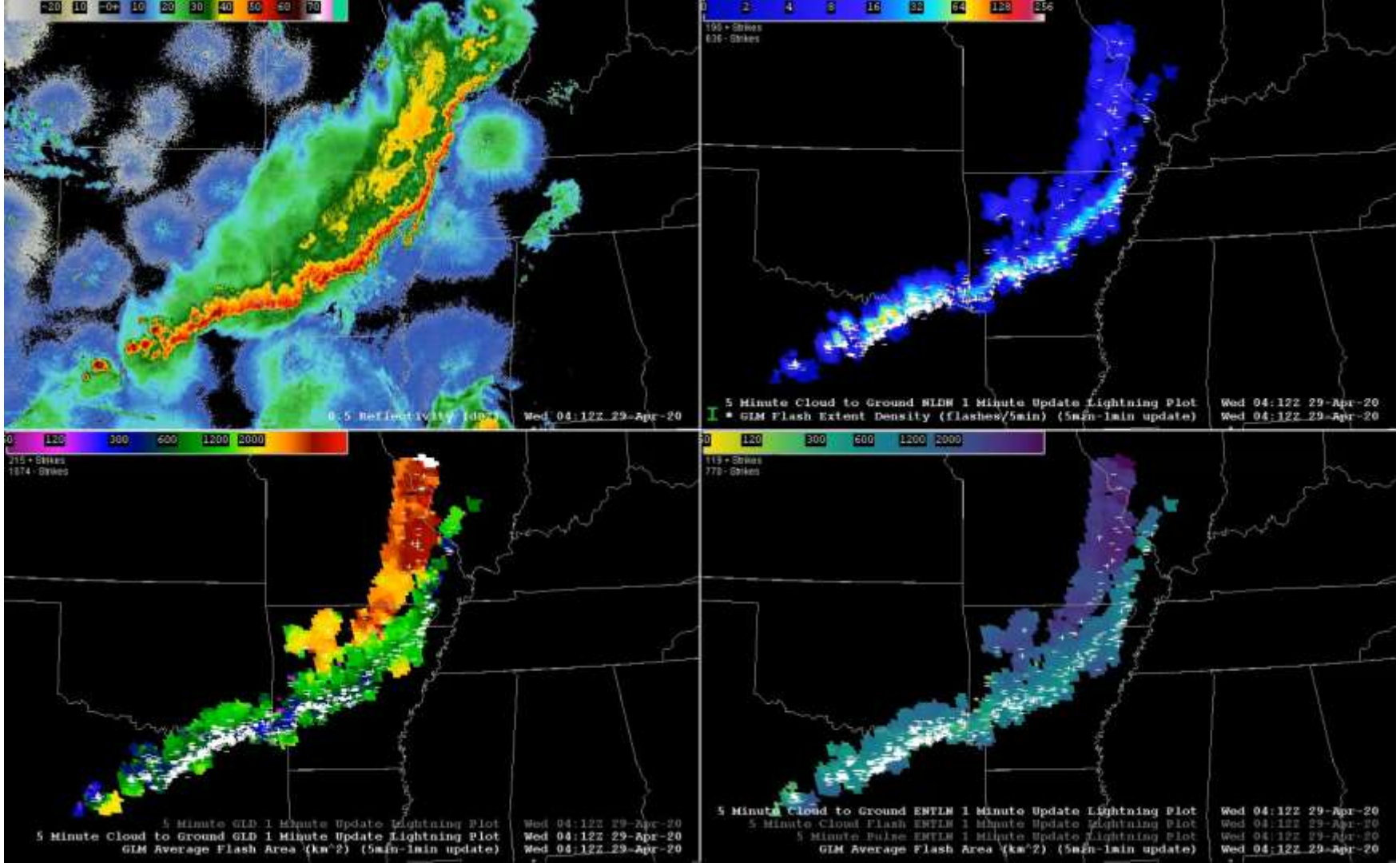



NLDN: 17+, 157 -
1 5 10 25 50 150 500 1500
17 + Strikes
157 - Strikes
5 Minute Cloud to Ground NLDN 1 Minute Update Lightning Plot Fri 19:36Z 20-Sep-19
GLM Total Optical Energy (fJ) (5min-1min update) Fri 19:36Z 20-Sep-19


GLD: 21+, 531 -
0 2 4 8 16 32 64 128 256
21 + Strikes
531 - Strikes
Farwell
Lazbuddie
Hart
Kress
Claytonville
Silverton
Estelline
Childress
Kirkland
Eldorado
Lariat
Quitaque
Turkey
Tell
Muleshoe
Earth
Edmonson
Portales
Arch
Olton
Plainview
South Plains
Cedar Hill
Lockney
Flomot
Northfield
Cee Vee
Goodlett
Quanah
Sudan
Needmore
Fieldton
Hale Center
Cotton Center
Swearingen
Coppers Breaks State Park
Elida
Rogers
Kenna
Pep
Lingo
Knochs
Littlefield
Floydada
Matador
Paducah
Crowell
Dougherty
Roaring Springs
Petersburg
Anton
Abernathy
Cone
Delwin
Chalk
Morton
Whitharral
Dumont
Milnesand
Bledsoe
Shallowater
McAdoo
Afton
Whiteface
Levelland
Texas Tech Univ
Crosbyton
Dickens
Guthrie
Gilliland
Crossroads
Caprock
Sundown
Wolfforth
Woodrow
Slaton
White River Lake
Spur
Benjamin
Vera
Knox City
Munday
Gladiola
Meadow
New Home
Wilson
Girard
Weinert
Plains
Tokio
McDonald
Brownfield
Tahoka
Post
Grassland
Jayton
Clairemont
Rule
Haskell
Aspermont
Lovington
Denver City
Higgins botham
Seagraves
Loop
Welch
O'Donnell
Lake Alan Justiceburg
Henry
Sagerton
Buckeye
Mesquite
Fluvanna
Hudd
Tuxedo
Stamford
Hobbs
Hamlin
Monument
Snyder
Anson
5 Minute GLD 1 Minute Update Lightning Plot Fri 19:36Z 20-Sep-19
5 Minute Cloud to Ground GLD 1 Minute Update Lightning Plot Fri 19:36Z 20-Sep-19
GLM Flash Extent Density (Flashes/5min) (5min-1min update) Fri 19:36Z 20-Sep-19

ENI: 11+, 125 -


120
300
600
1200
2000
11 + Strikes
125 - Strikes
5 Minute Cloud to Ground ENTLN 1 Minute Update Lightning Plot Fri 19:36Z 20-Sep-19
5 Minute Cloud Flash ENTLN 1 Minute Update Lightning Plot Fri 19:36Z 20-Sep-19
5 Minute Pulse ENTLN 1 Minute Update Lightning Plot Fri 19:36Z 20-Sep-19
GLM Average Flash Area (km^2) (5min-1min update) Fri 19:36Z 20-Sep-19


-20 10 -0+ 10 20 30 40 50 60 70
0.5 Reflectivity (dBZ)
Wed 04:12Z 29-Apr-20
2 4 8 16 32 64 128 256
196 + Strikes
636 - Strikes
5 Minute Cloud to Ground NLDN 1 Minute Update Lightning Plot
GLM Flash Extent Density (flashes/5min) (5min-1min update)
Wed 04:12Z 29-Apr-20
Wed 04:12Z 29-Apr-20
60 120 300 600 1200 2000
215 + Strikes
1874 - Strikes
5 Minute GLD 1 Minute Update Lightning Plot
5 Minute Cloud to Ground GLD 1 Minute Update Lightning Plot
GLM Average Flash Area (km^2) (5min-1min update)
Wed 04:12Z 29-Apr-20
Wed 04:12Z 29-Apr-20
Wed 04:12Z 29-Apr-20
60 120 300 600 1200 2000
113 + Strikes
770 - Strikes
5 Minute Cloud to Ground ENTLN 1 Minute Update Lightning Plot
5 Minute Cloud Flash ENTLN 1 Minute Update Lightning Plot
5 Minute Pulse ENTLN 1 Minute Update Lightning Plot
GLM Average Flash Area (km^2) (5min-1min update)
Wed 04:12Z 29-Apr-20
Wed 04:12Z 29-Apr-20
Wed 04:12Z 29-Apr-20
Wed 04:12Z 29-Apr-20

So Where Does That Leave Us?

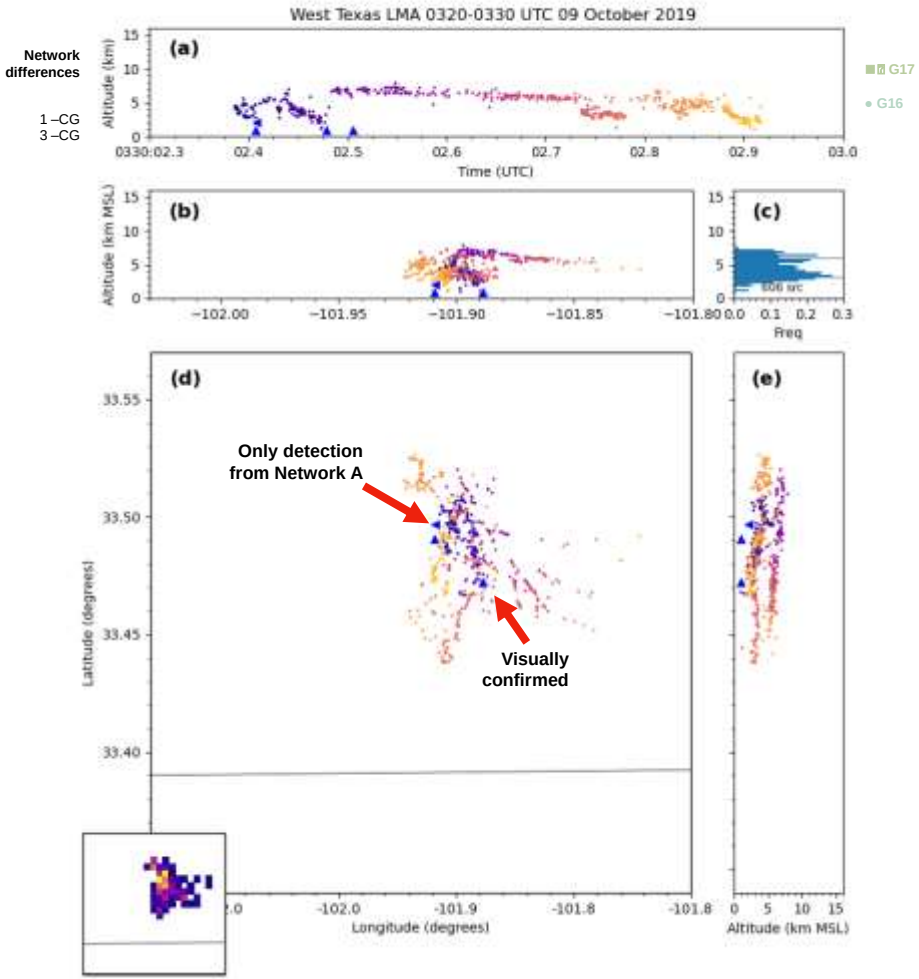
- Can the GLM be used to see if there are issues with ground networks?
  - It isn't a binary "Yes/No" decision; it's nuanced
  - Does it jive with "outside" information?
  - We don't (yet) have complete data!

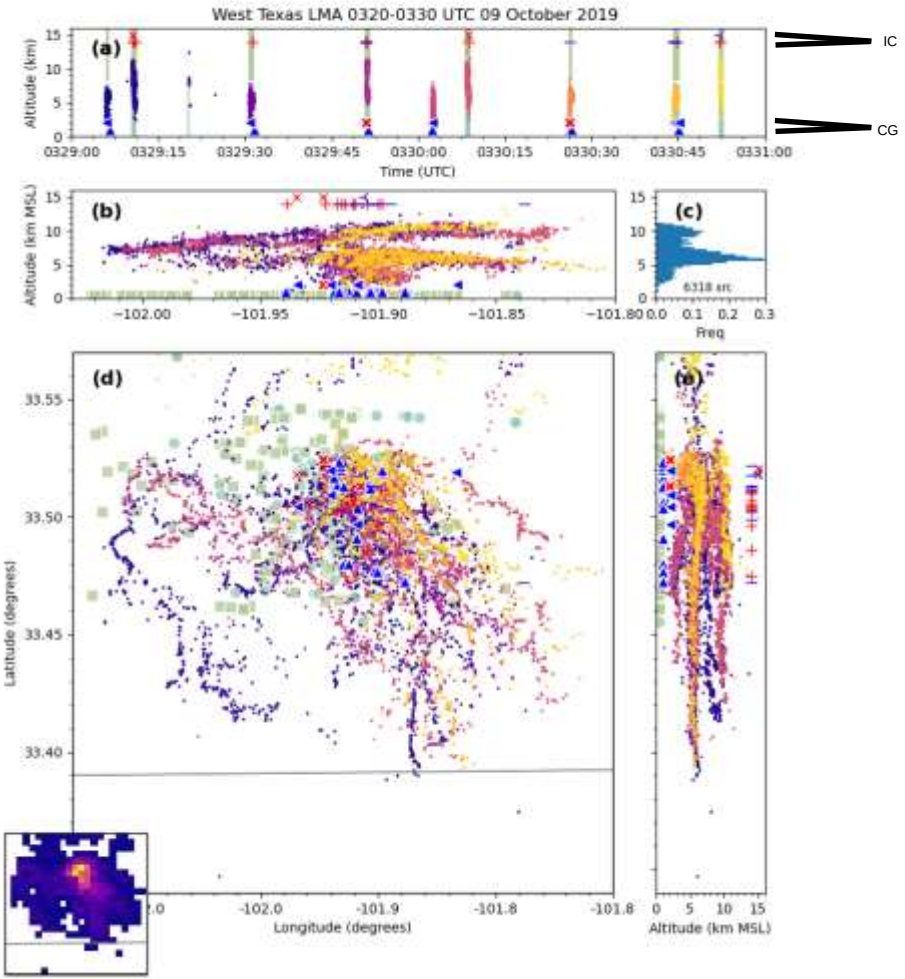
- Quantitatively – YES. Qualitatively – mostly NO.
  - There may still be a misconception this is the other way around.


03:32:42.148
03:32:42.390
03:32:42.497
03:28:41.970
03:32:42.374
03:28:41.859
03:32:42.591
03:32:42.232
03:37:33.500
03:32:42.041
ENI CG
03:31:50.987
GLD CC
GLD CG
NLDN/GLD CGs
03:32:42.076
03:32:42.041
88D Location
03:33:13.711

CG close to Jason Jordan's house

No GLM detections from 16 or 17





So Where Does That Leave Us?

- Most, if not all, efforts are post-event.
  - See CG, CG hits something, data doesn't "jive"
  - Collect data from all sources (AWIPS, GLM, LMA, etc.)
  - Results…but 6 months to a year after event! Not Real-time.

- Why is this important? Decision Support Services.
  - Ground says here OR there, GLM says yes, no, or maybe.
  - Everything lines up, high confidence.

Questions?

@kc5knd