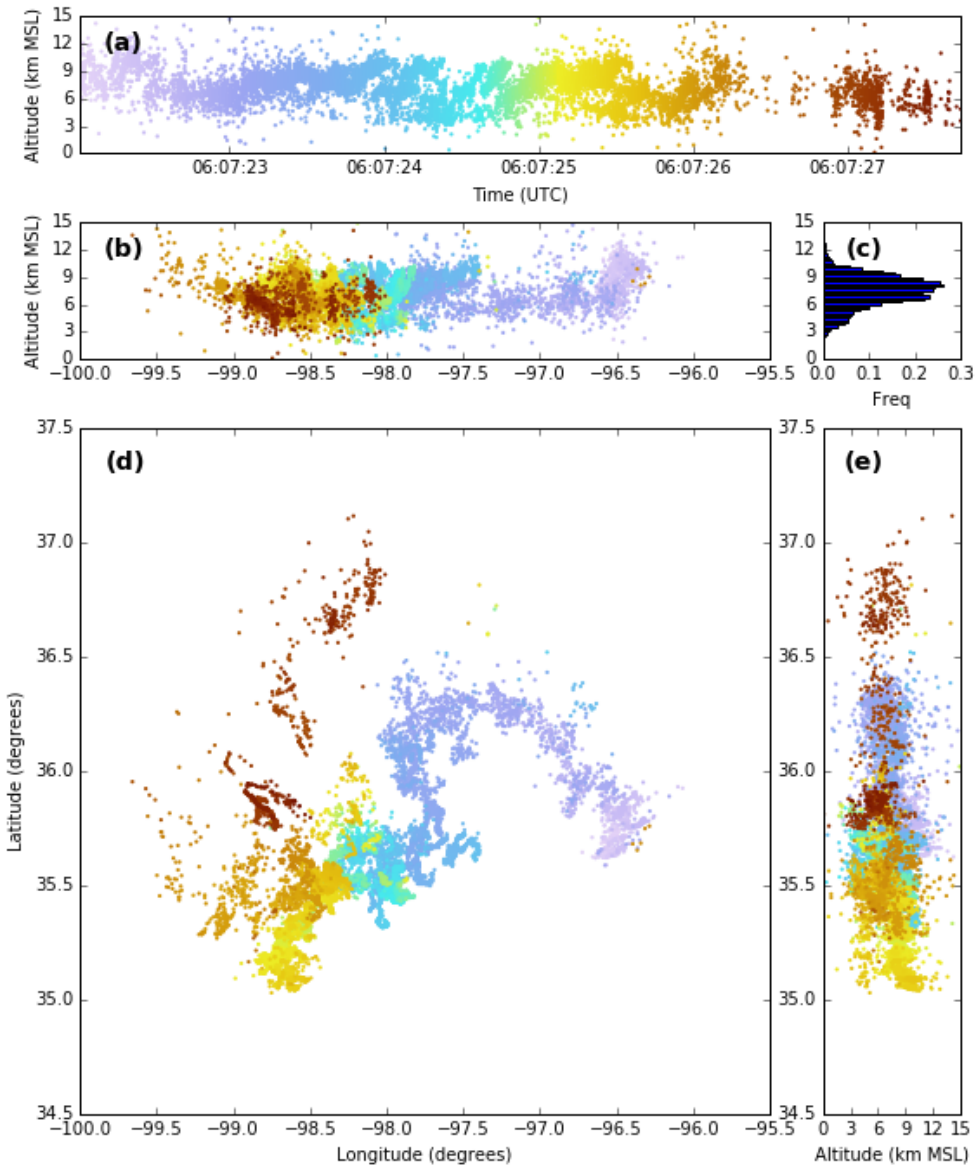
RELAMPAGO Lightning Mapping Array Update

Timothy Lang, NASA MSFC

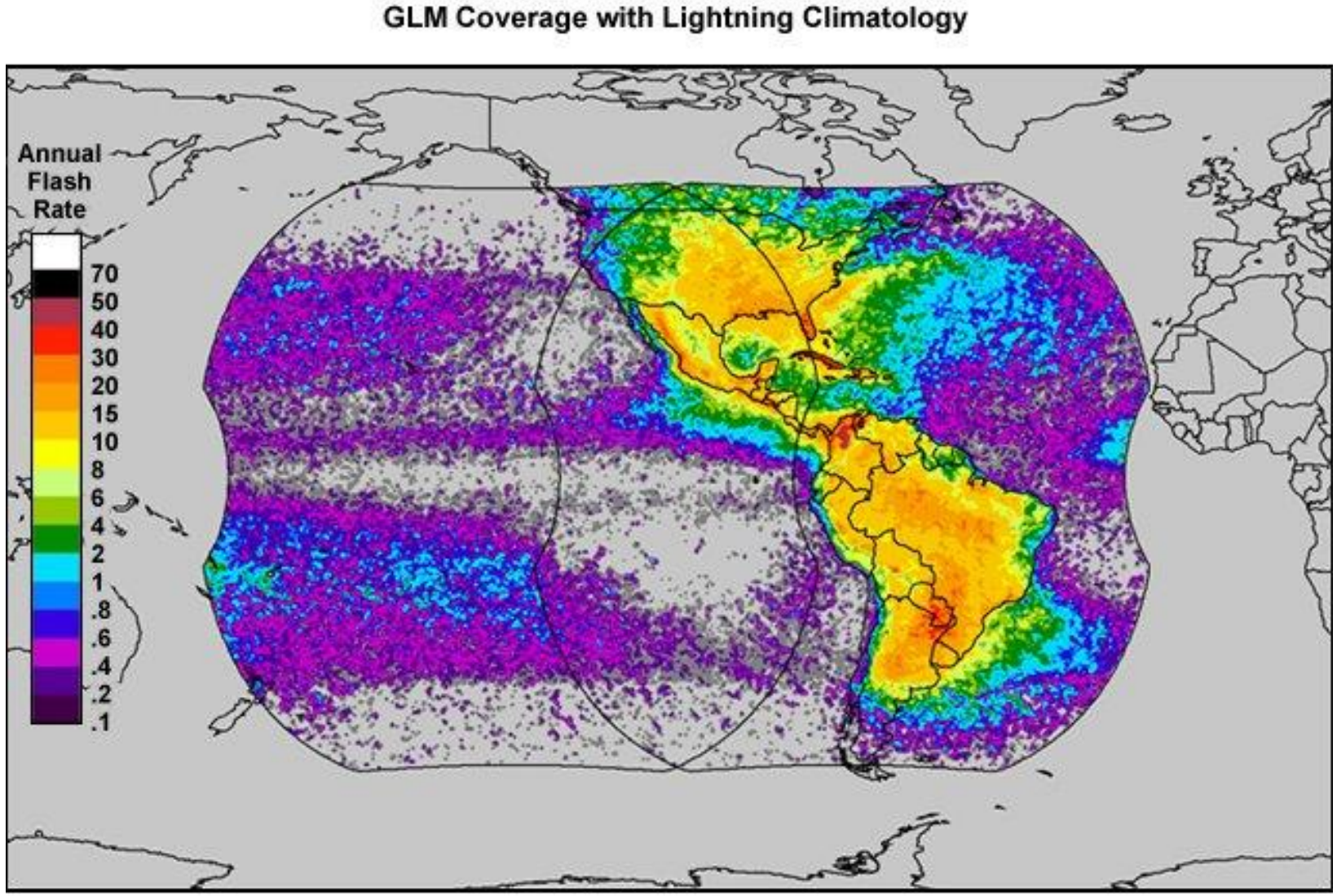
<u>Contributors</u>: Monte Bateman, Rich Blakeslee, Jeff Burchfield, Larry Carey, Nathan Curtis, Bill Koshak, Chris Schultz



Overview

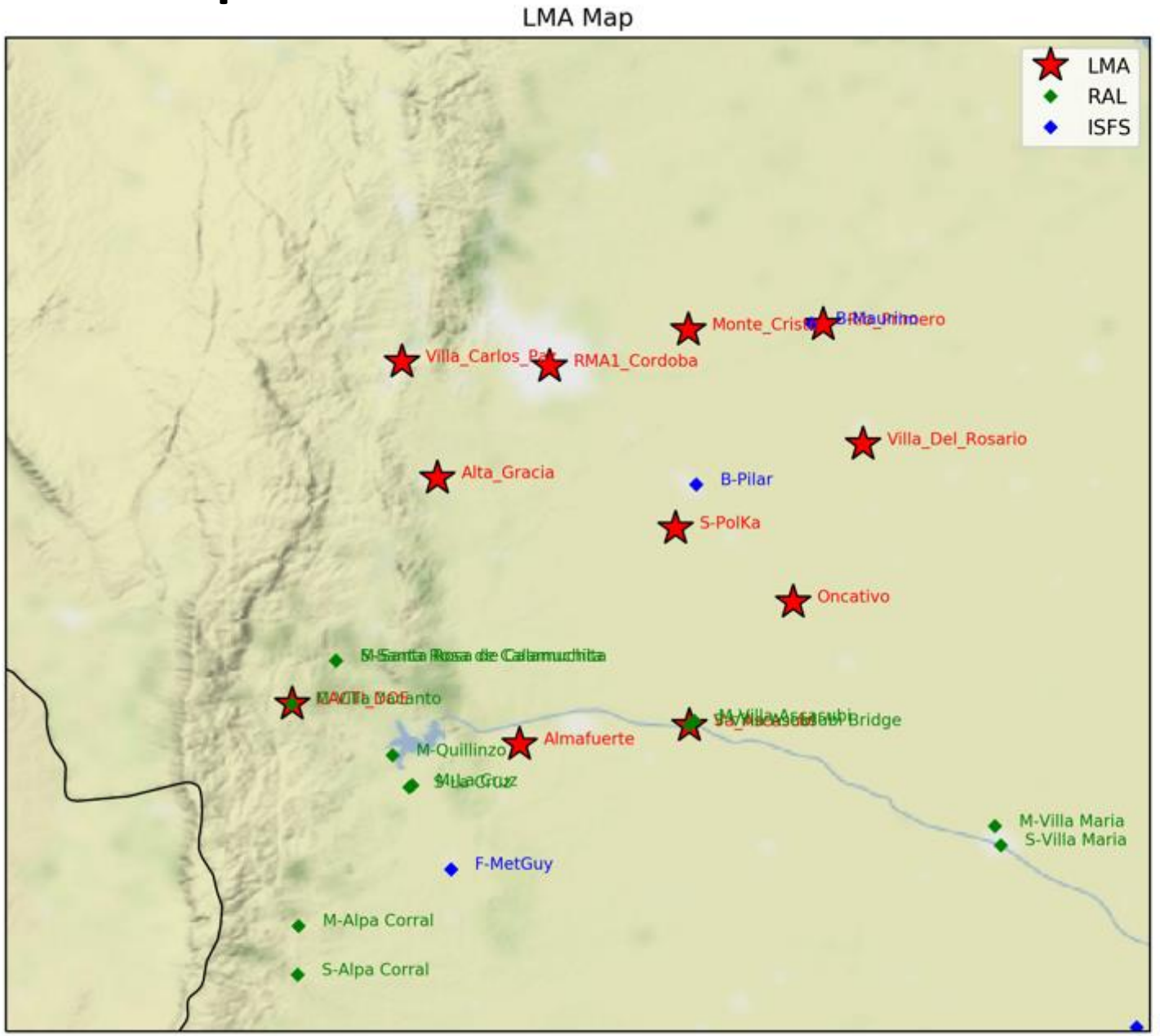
- GOES-R funding deployment of 11 MSFC LMA stations to Cordoba, Argentina in support of RELAMPAGO/CACTI field campaigns
- Nominal deployment Aug 2018 thru Feb 2019 (6 months) – RELAMPAGO is Nov/Dec 2018
- VHF source location data will be posted to GHRC
- Analysis funding requested in FY2019 NASA/NOAA MOU

- GOES-16 has full view of Argentina
- GOES-17 launched 3/1, due to move to West 9/1
- If that move gets delayed, that helps RELAMPAGO LMA



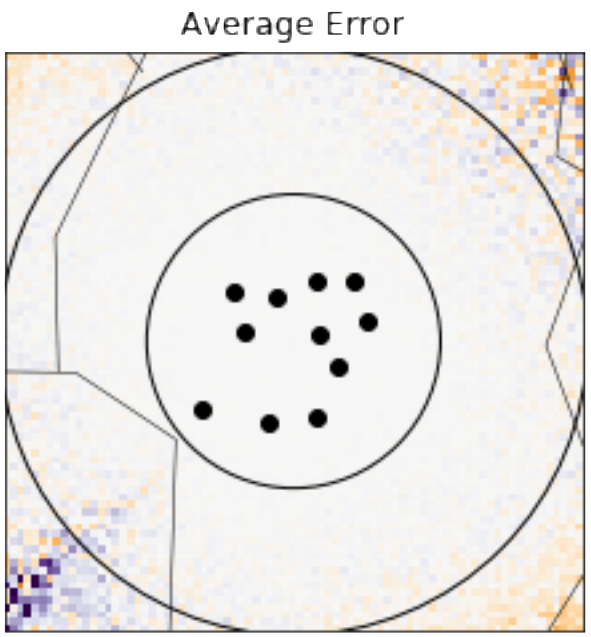
S. J. Goodman et al., The GOES-R Geostationary Lightning Mapper (GLM), Atmospheric Research, Vol. 125–126, 2013, Pages 34-49, ISSN 0169-8095, https://doi.org/10.1016/j.atmosres.2013.01.006.

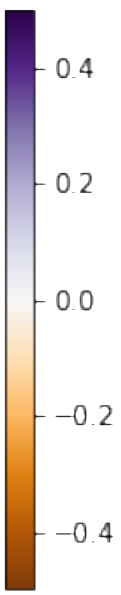
Planned Network Map

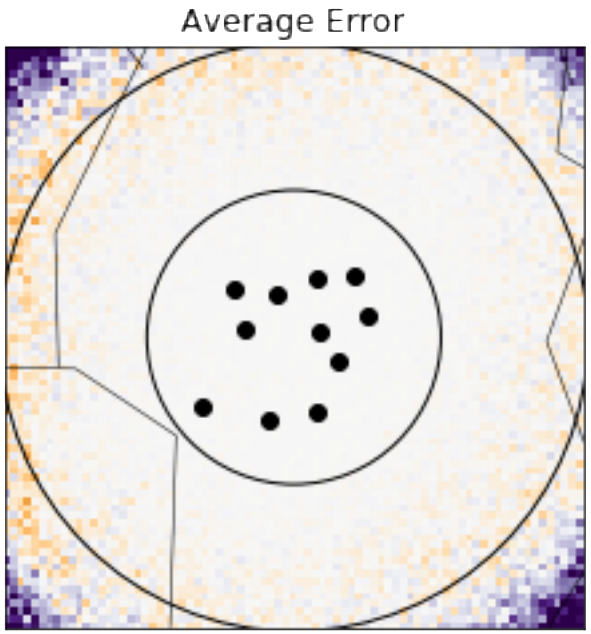


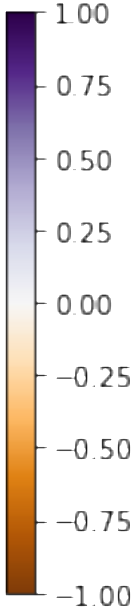
LMA station locations are red stars

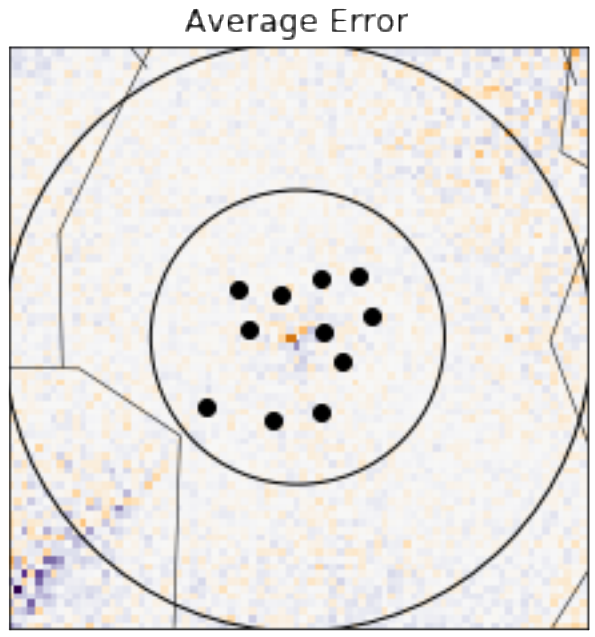
Final network configuration will be driven primarily by logistical concerns

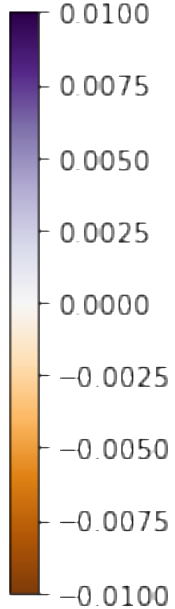


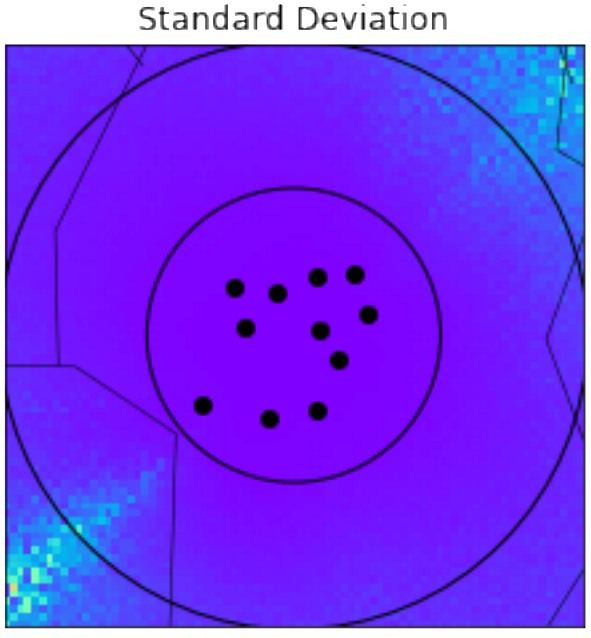


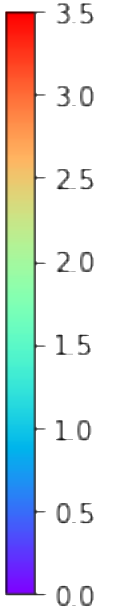


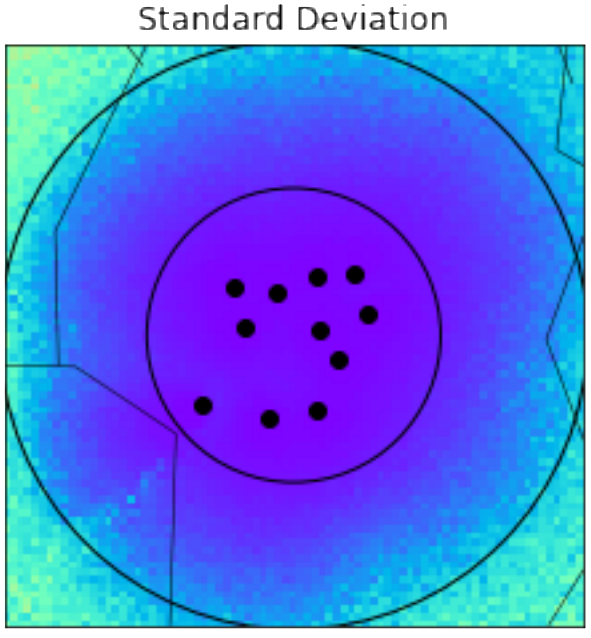


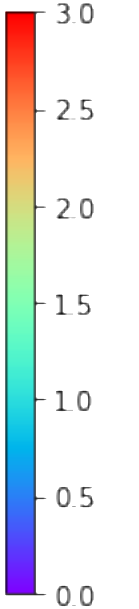


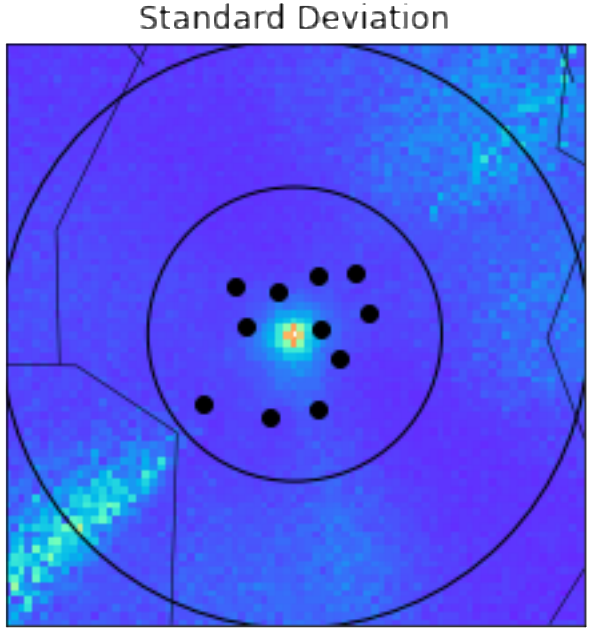


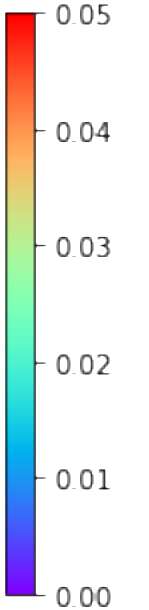








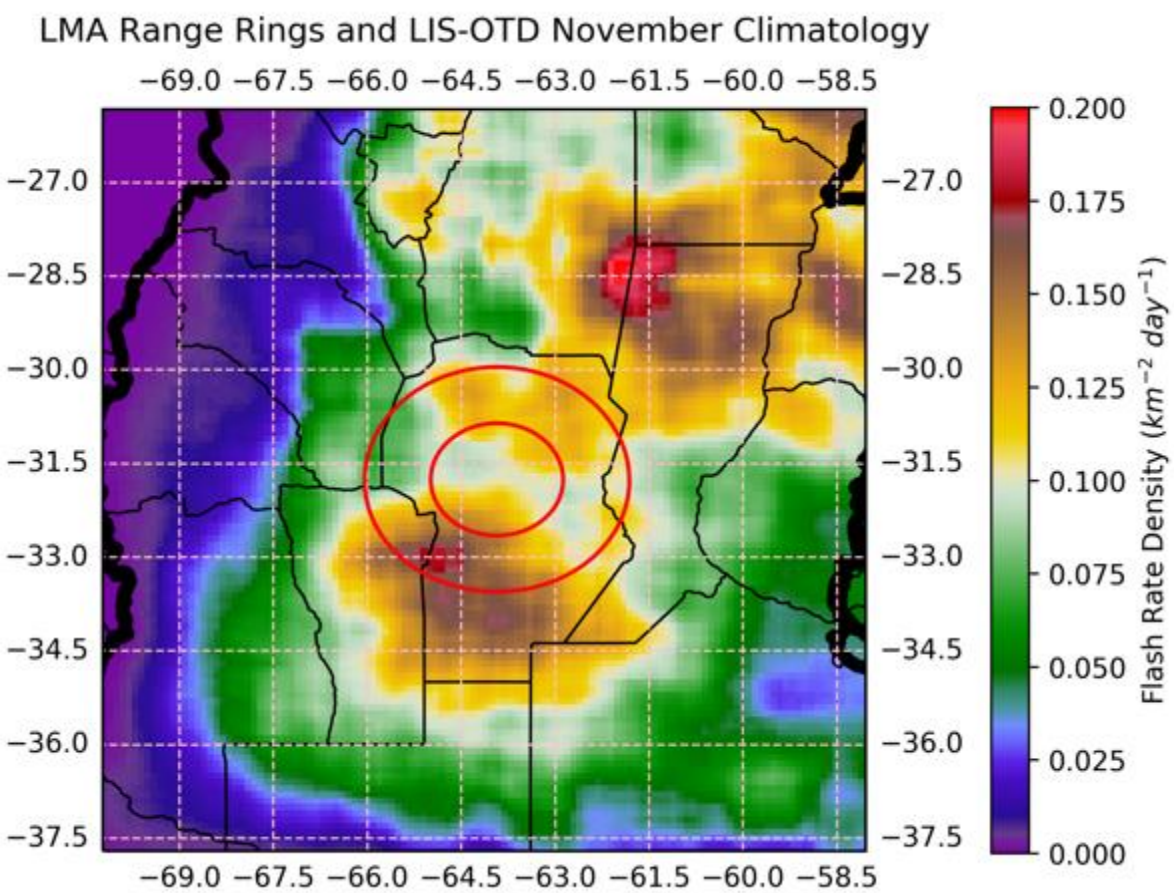


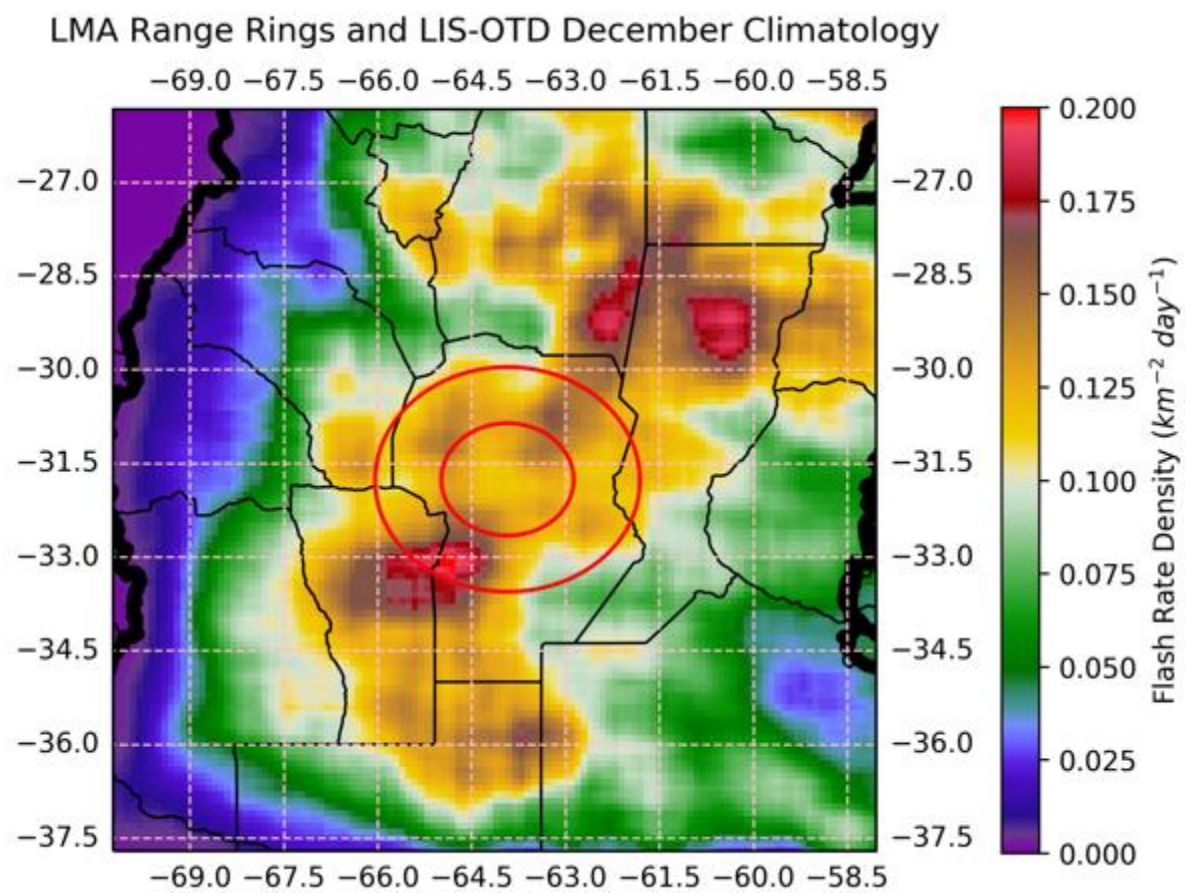


Range

Altitude

Azimuth


LMA Range Rings and LIS-OTD November Climatology
−69.0 −67.5 −66.0 −64.5 −63.0 −61.5 −60.0 −58.5
−27.0
−28.5
−30.0
−31.5
−33.0
−34.5
−36.0
−37.5
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
Flash Rate Density (km^{-2} day^{-1})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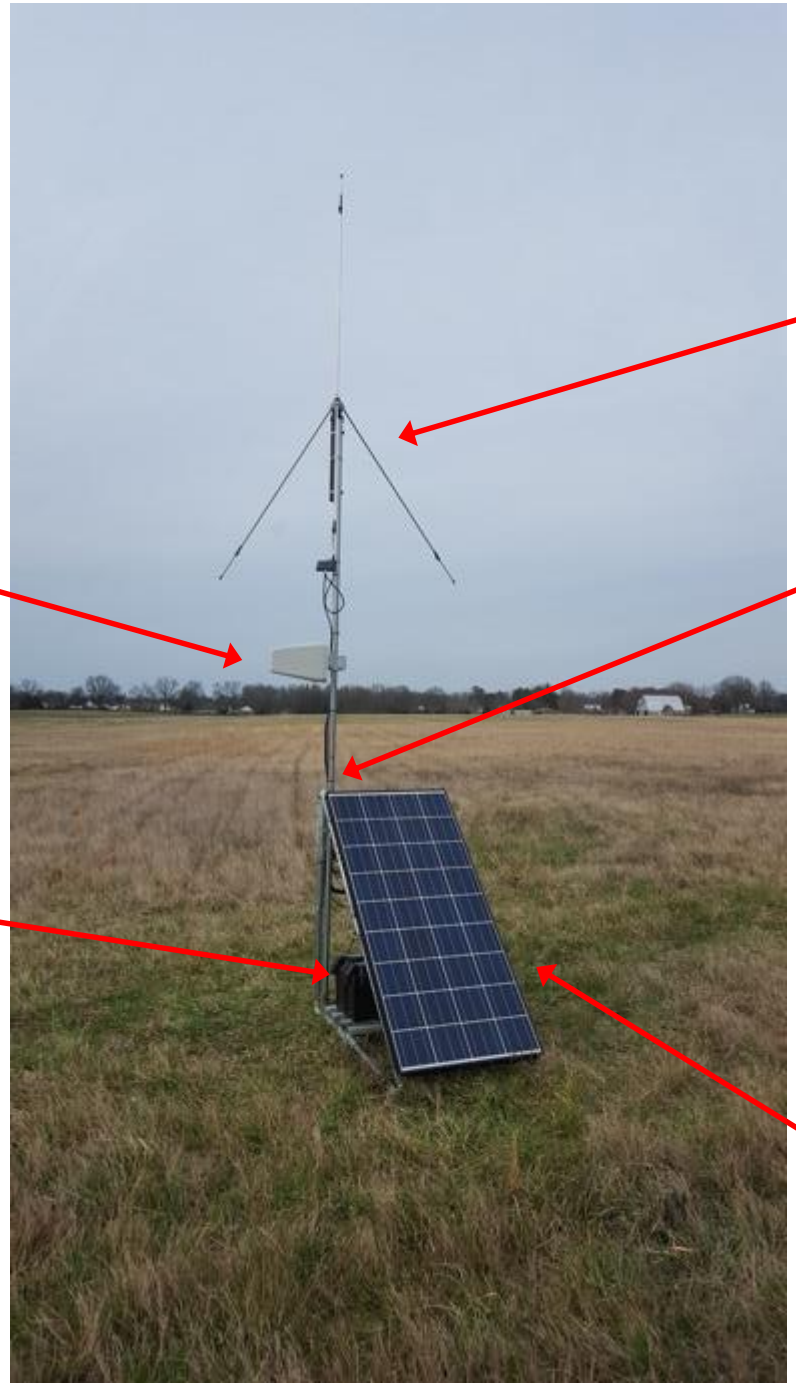
Example LMA Station



VHF antenna

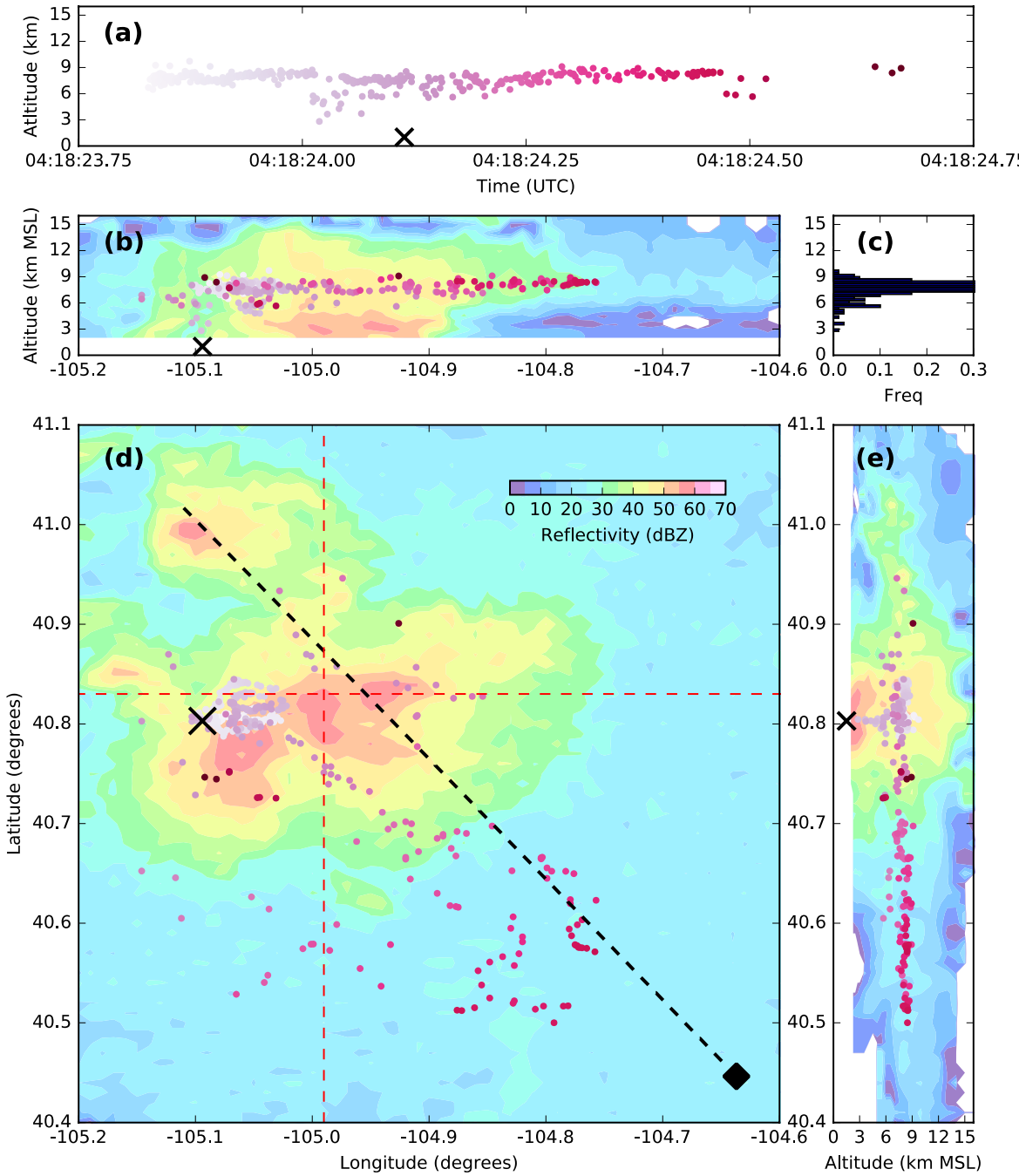
GPS antenna behind pole

Communications antenna

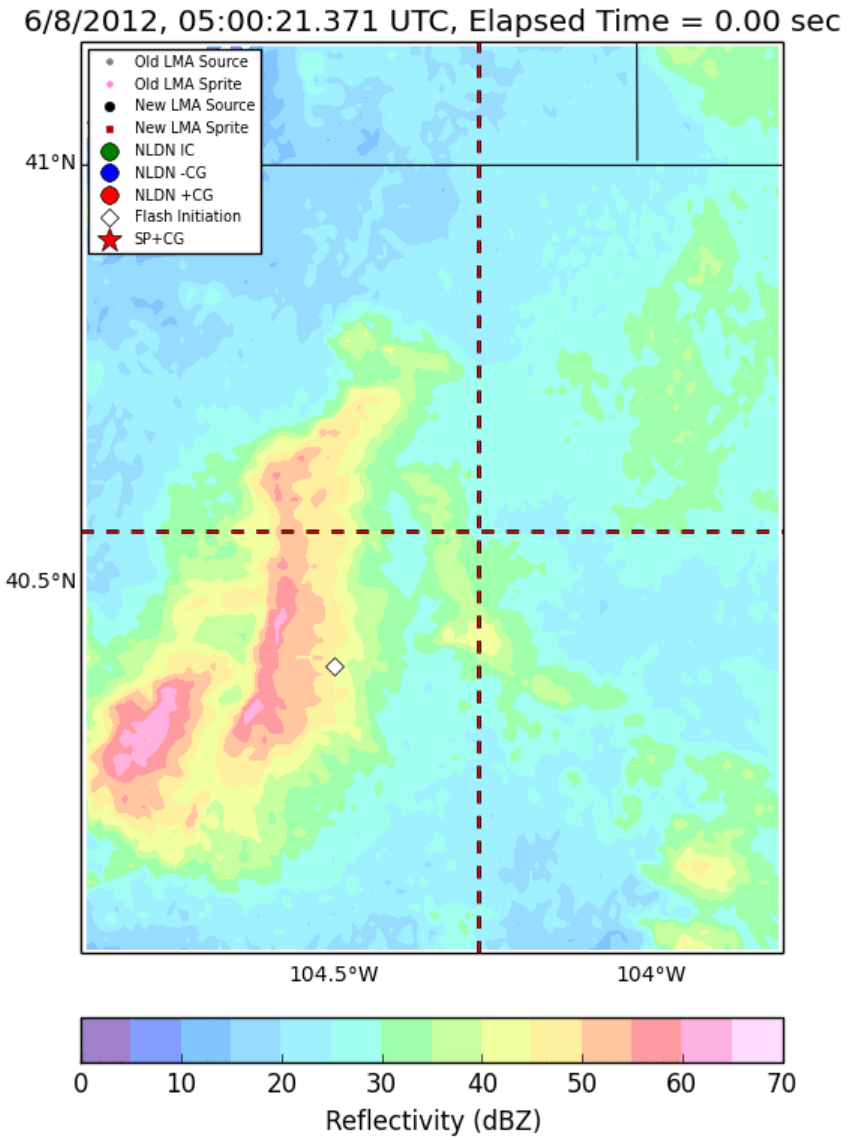
Electronics & batteries behind panel

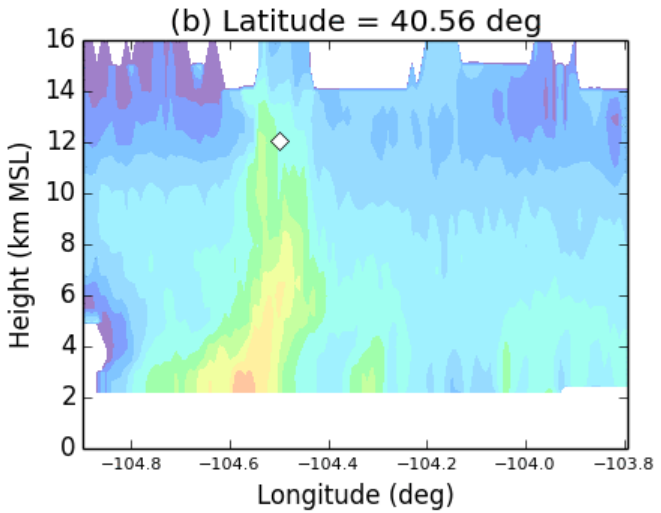
Solar panel

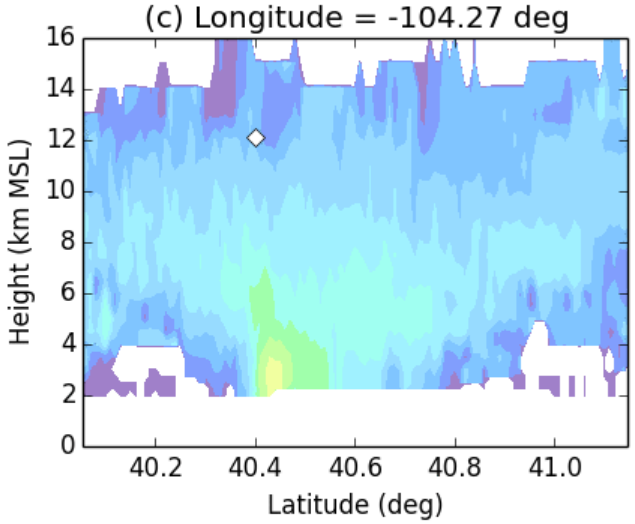
LMA data example



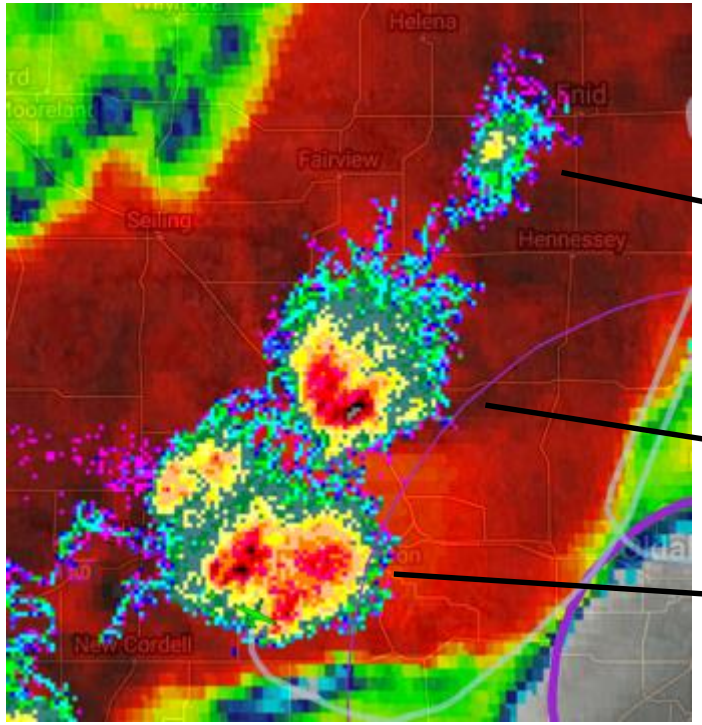
LMA data example



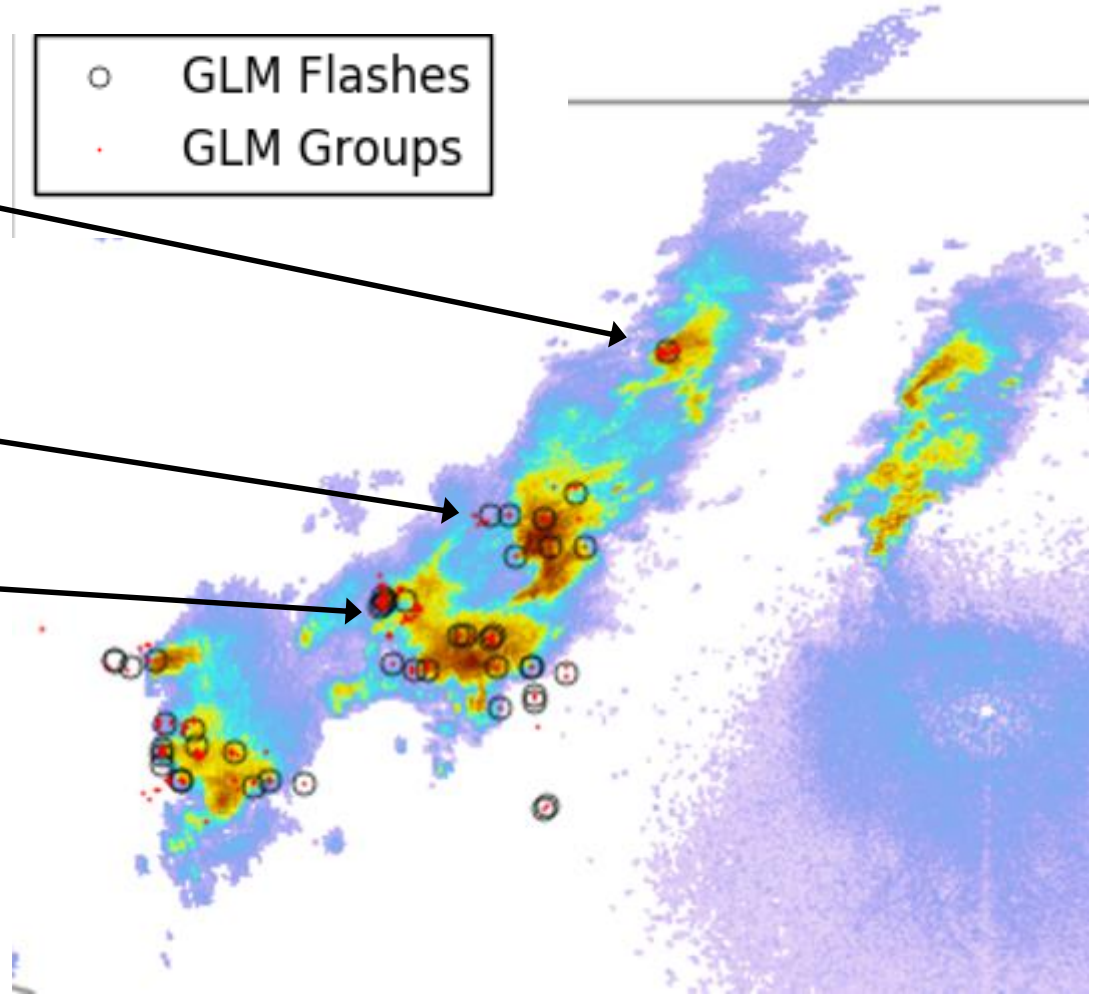




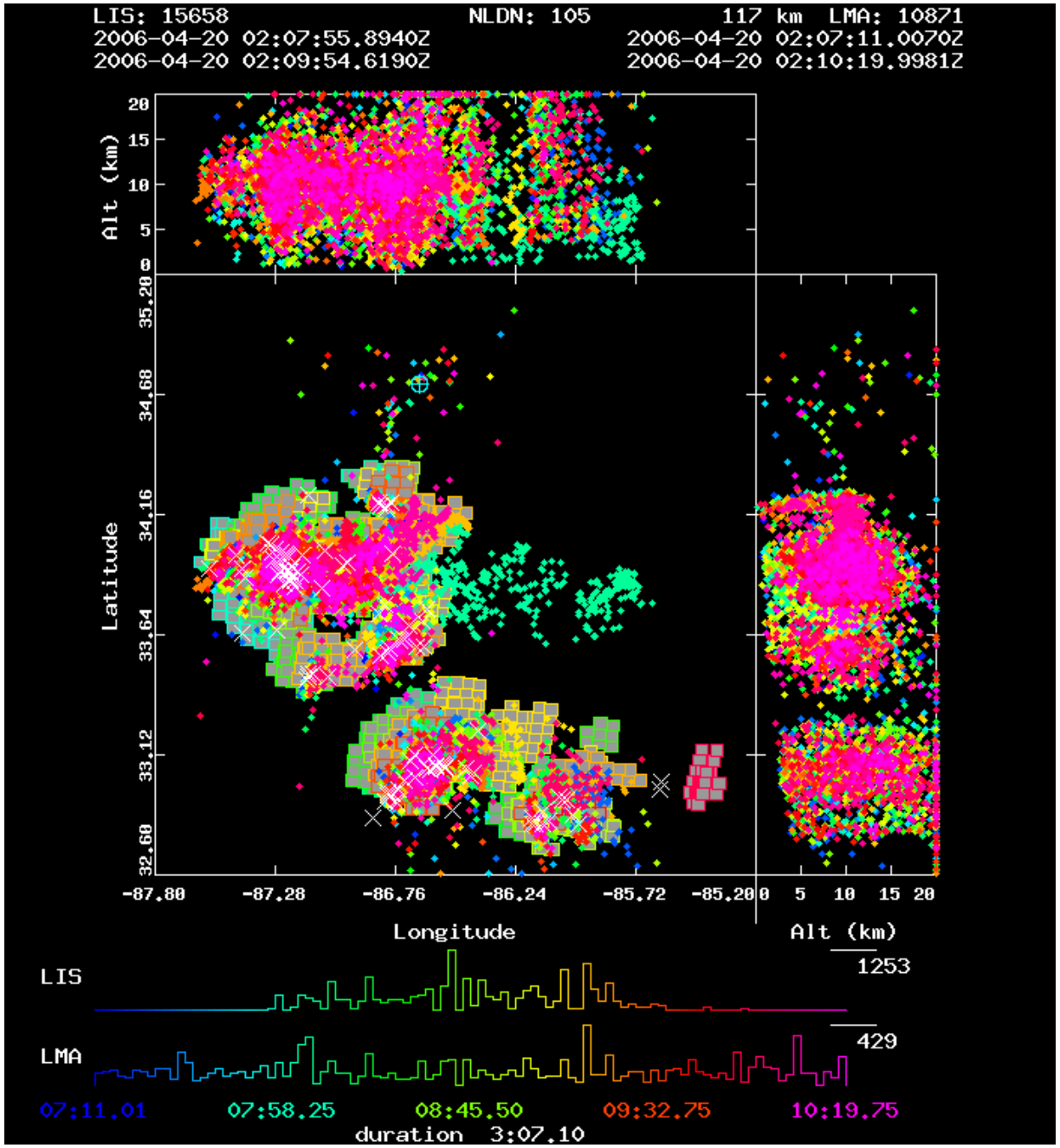
GLM/LMA data examples



LMA source density

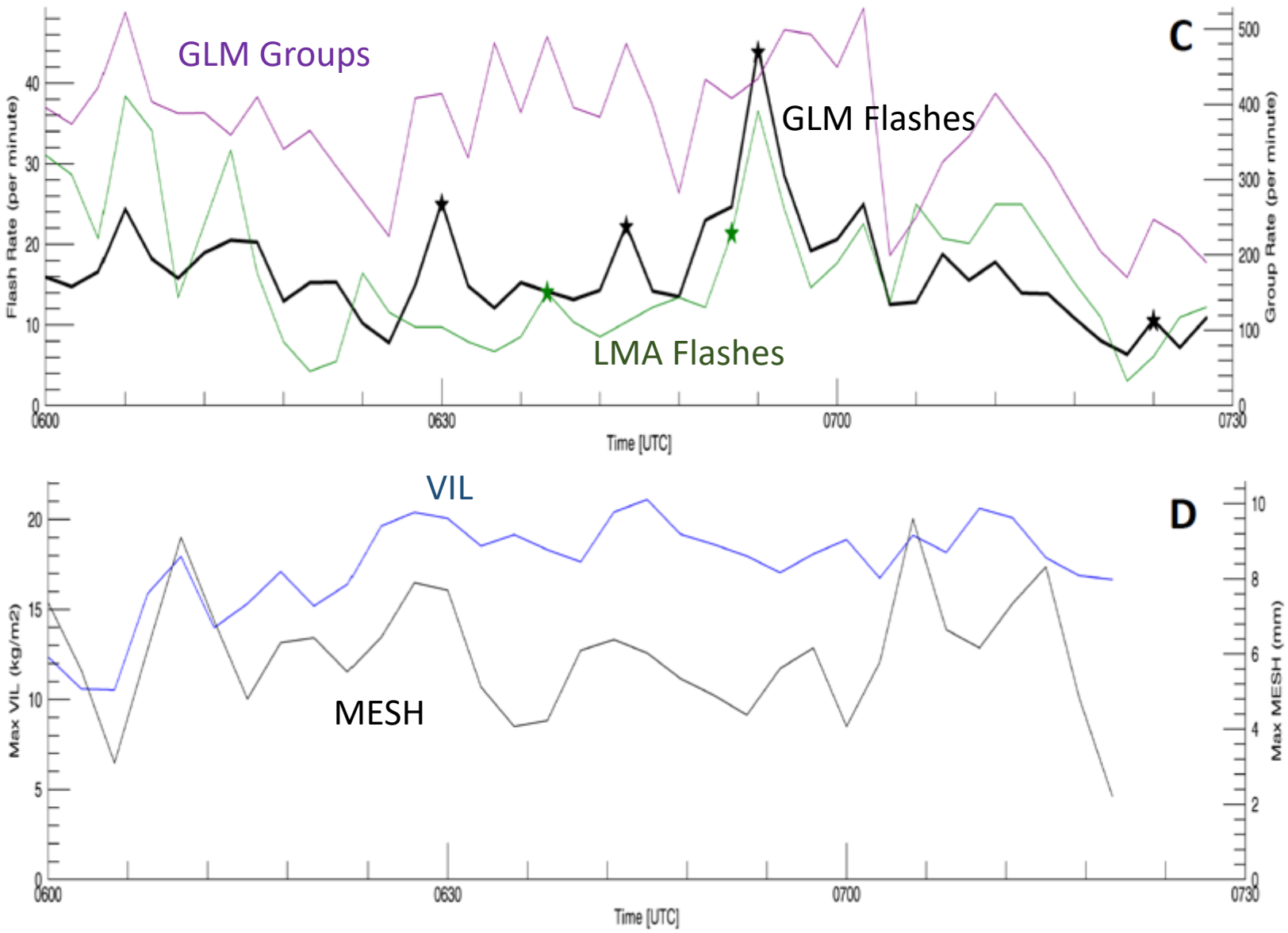


Radar with GLM flashes/groups



Lightning Imaging Sensor (LIS) and LMA Analysis Example

- Dots = LMA sources
- Squares = LIS events
- Xs = NLDN Cloud-to-Ground (CG) flashes

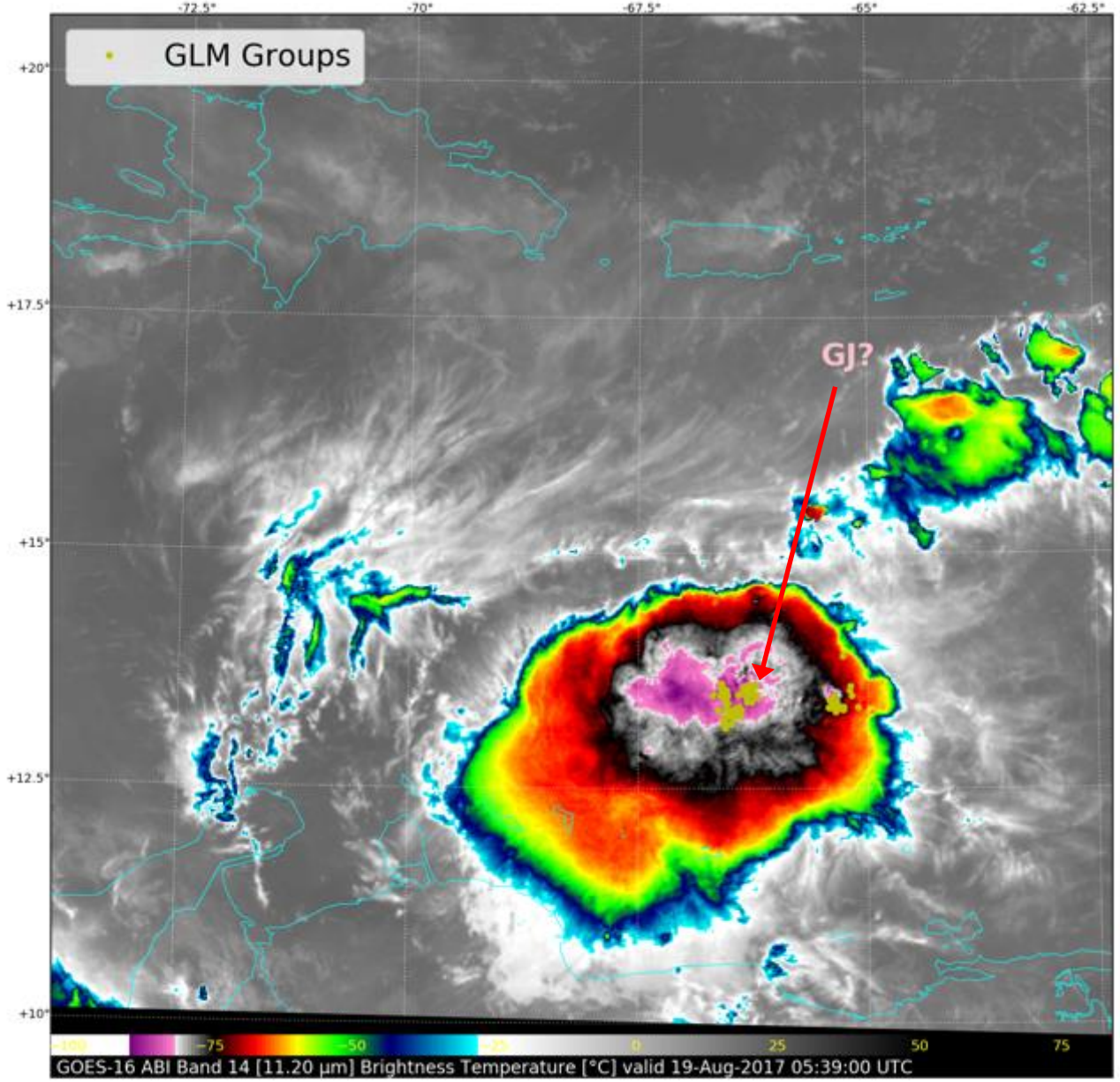


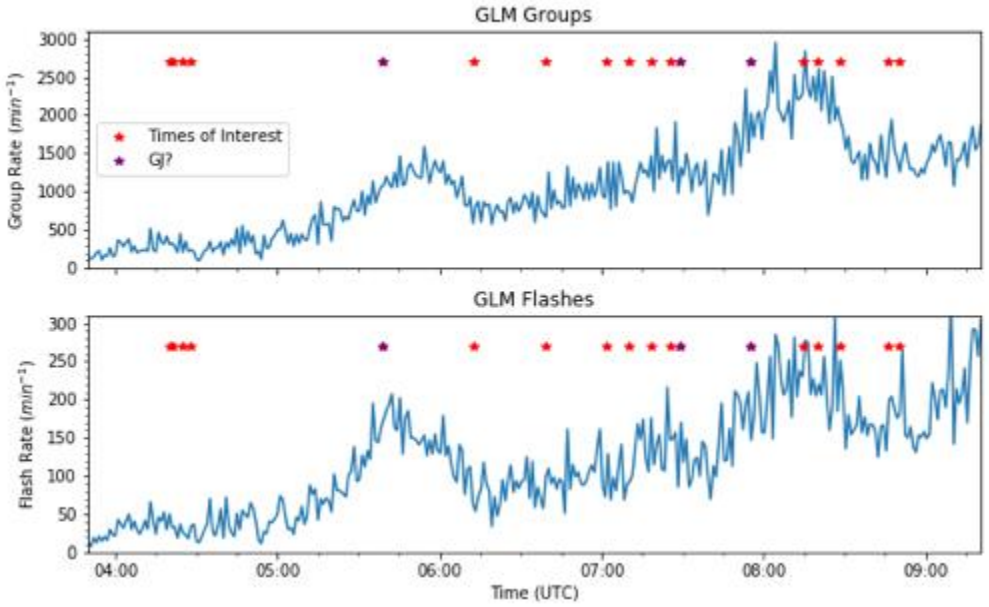
GLM/LMA Analysis Example

- Lightning Jumps in Severe Weather
- 17 May 2017, OK MCS

Curtis et al., 2018: An Analysis of the Lightning Jump Algorithm Using Geostationary Lightning Mapper Flashes, ILDC/ILMC, Fort Lauderdale, FL

GLM/ABI data example





Planning – On Schedule

- Working closely with NSF-funded lightning investigators (Deierling, Carey, Bitzer, Marshall)
- Information Gathering and Documentation – Shipping List, Procurements List, Export Control, Importation Docs
- Site survey completed November 2017 – Also leveraging S-PolKa, DOW, and Hydrometeorology surveys
- Coordination with Argentinian colleagues (esp. Eldo Avila)
- Participation in regular RELAMPAGO calls and in-person meetings

Planning (Continued)

- Currently performing inventory of LMA stations that will be sent to field, identifying items that need purchase. These include: stands, antennas, batteries, and solar panels.

- Evaluating potential CloudGate communications solutions. Near-real-time imagery (2D) may be possible, but is currently TBD. No promises.

- INVAP quote status

- Need US/Argentina agreement specific to RELAMPAGO to export!!!