Early Assessment of Geostationary Lightning Mapper Observations

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A Short Outline

- Role with the GOES-R Proving Ground
- Status of the Geostationary Lightning Mapper (GLM) to operations
- Goals of an operational assessment
- Early, potential uses (examples)
- Future Work

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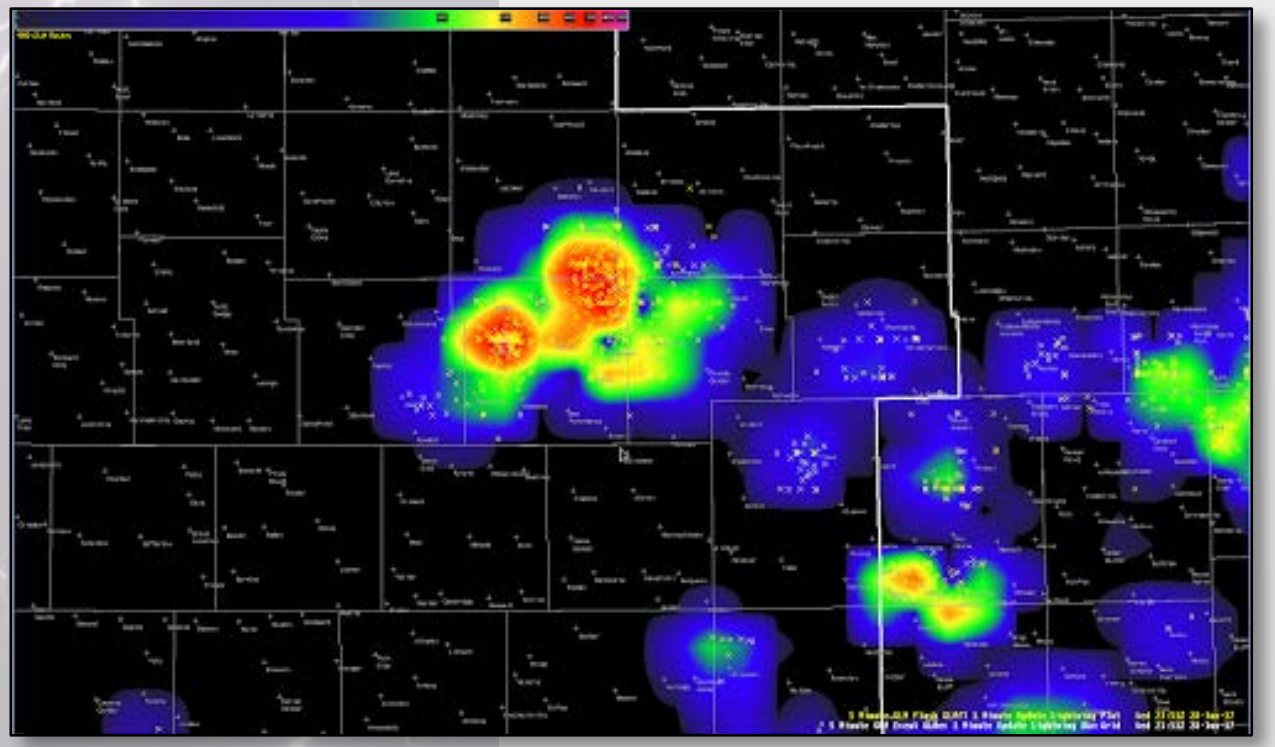
Role With the GOES-R Proving Ground



Sample of GLM event density with flash centroid points. (Preliminary, non-operational)

- Liaison to the U.S. National Weather Service for NASA SPoRT
  - Work with multiple operational partners
- Serve as GLM liaison for GOES-R
  - Focus on training
  - Focus on operational applications
- Work to advocate for operational needs
- Greatly supported by co-authors in developing quality training material

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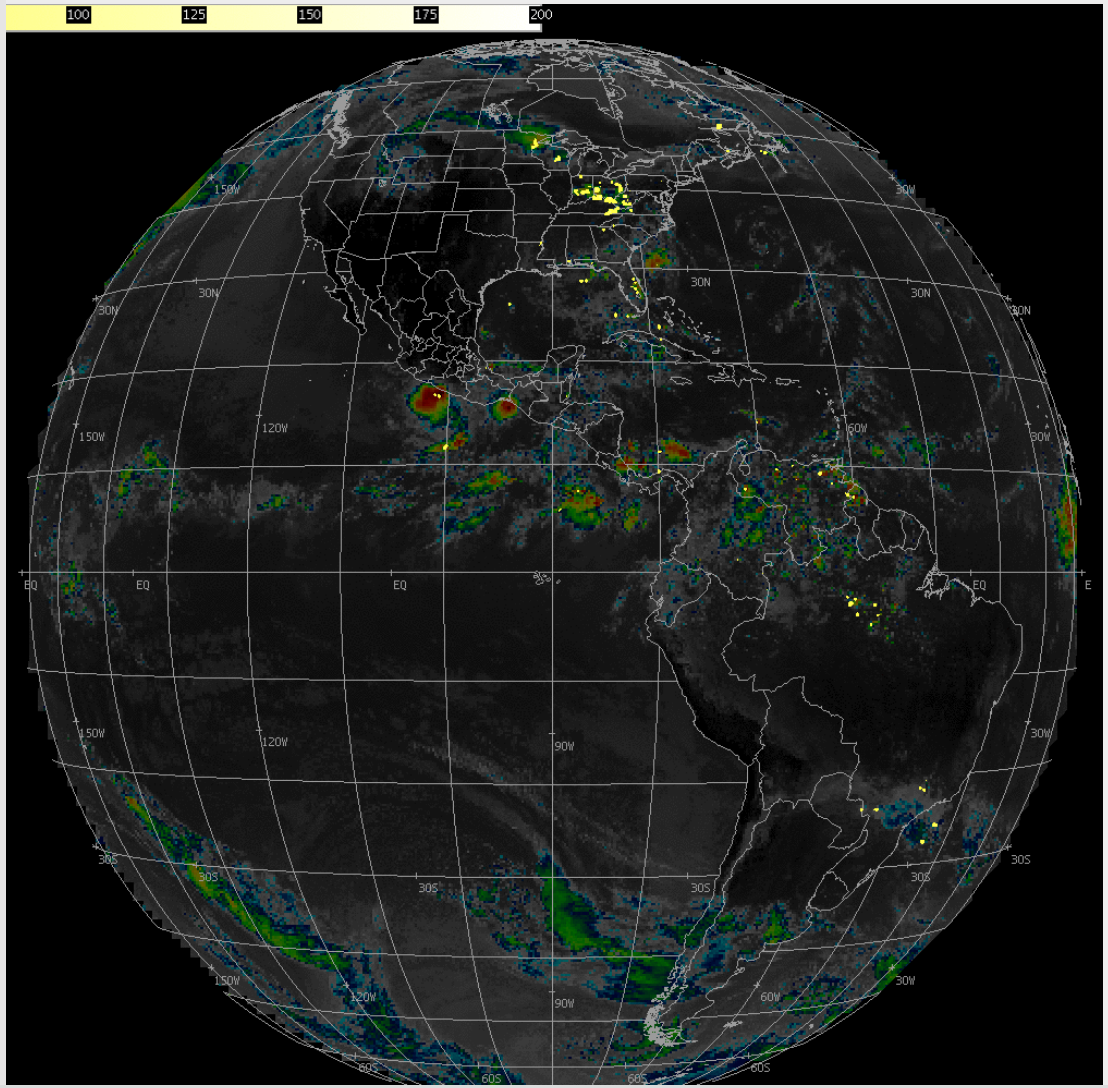
Status of the GLM to Operations

- Primary concerns include:
  - Geolocation error
  - Corrections to the United States' National Weather Service viewing system (AWIPS)
- Fixes to be applied!
- Main result is that operational users are not yet receiving these data
- Have been able to speak with forecasters post-event in case-by-case style



13 June 2017 from 1719-1819 UTC (Preliminary, non-operational)

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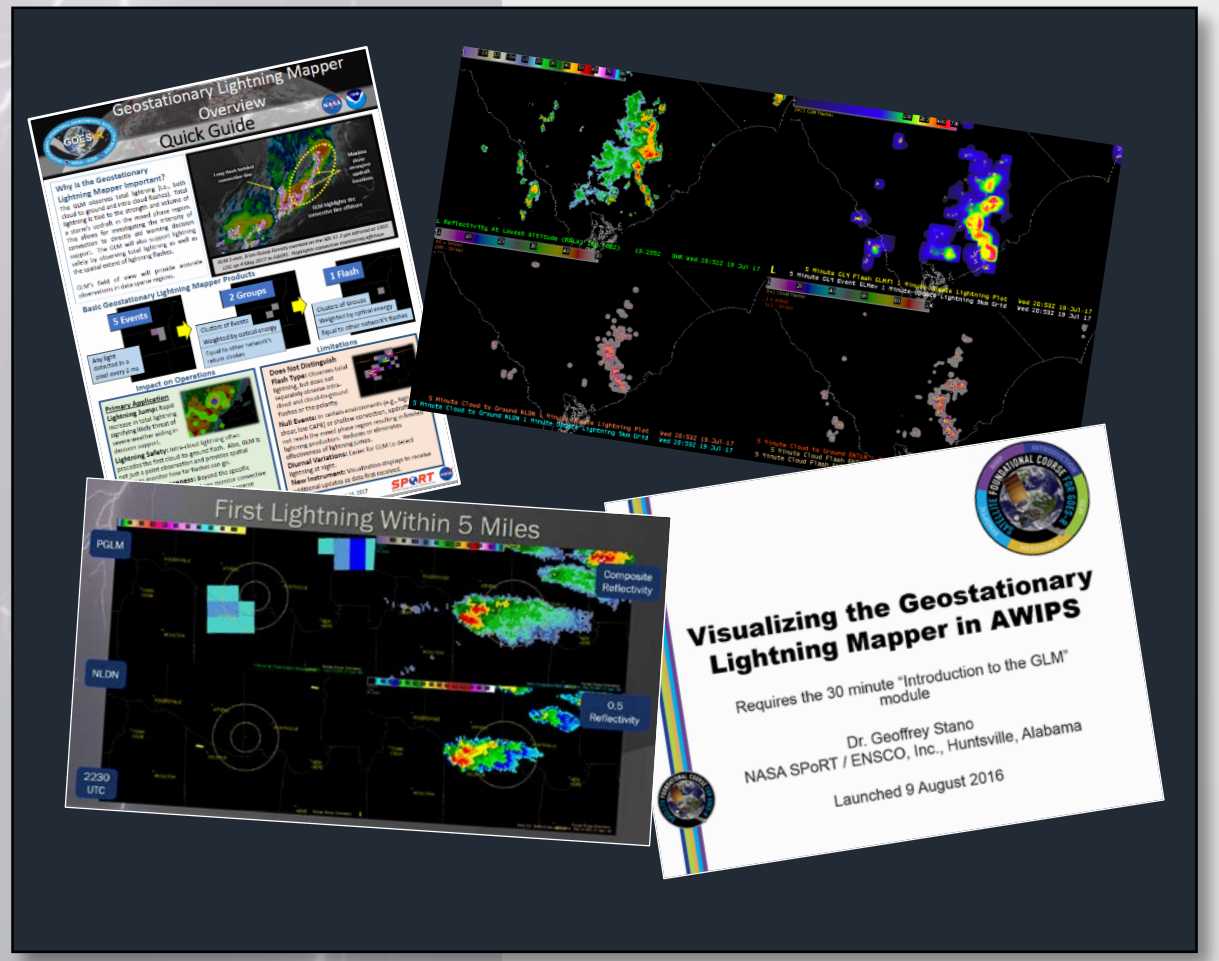
Goals of the Operational Assessment



Examples of initial training material.

- Provide initial training
- Variety of geographic and forecast needs
- Evaluate GLM in day-to-day operations
- Compliment other Proving Ground work
- Identify uses (more than just severe weather)
- Identify forecaster-requested training
- Identify forecaster-requested "products"
- Incorporate forecaster examples into an applications library for training

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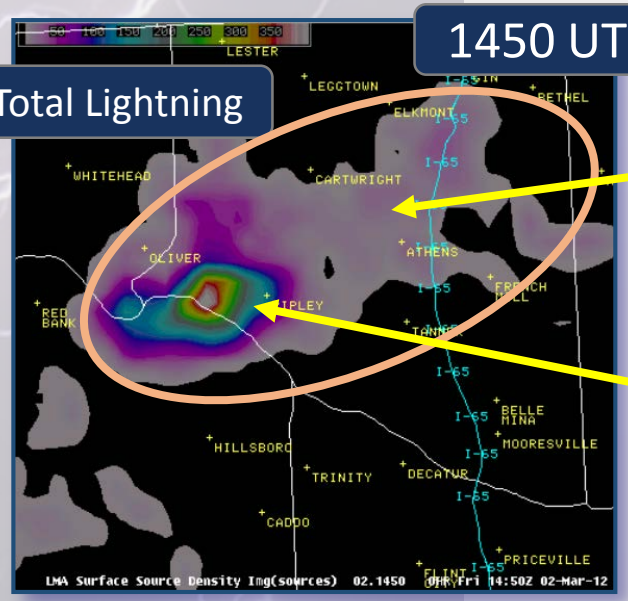
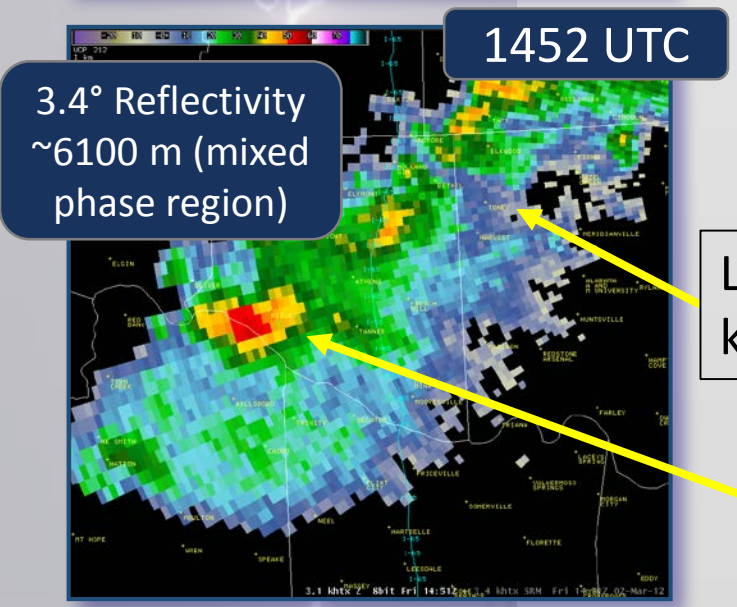
Key to Success: Show GLM's Relevance





- Physical reasoning for total lightning
  - If in the mixed phase region …
  - Stronger updrafts = more total lightning
- Build on work with lightning mapping arrays
  - Reinforce physical reasoning
  - Examples for safety, aviation, severe weather
- Connect GLM with radar observations
  - Creates "trust" in data
  - Allows for use in data sparse locations

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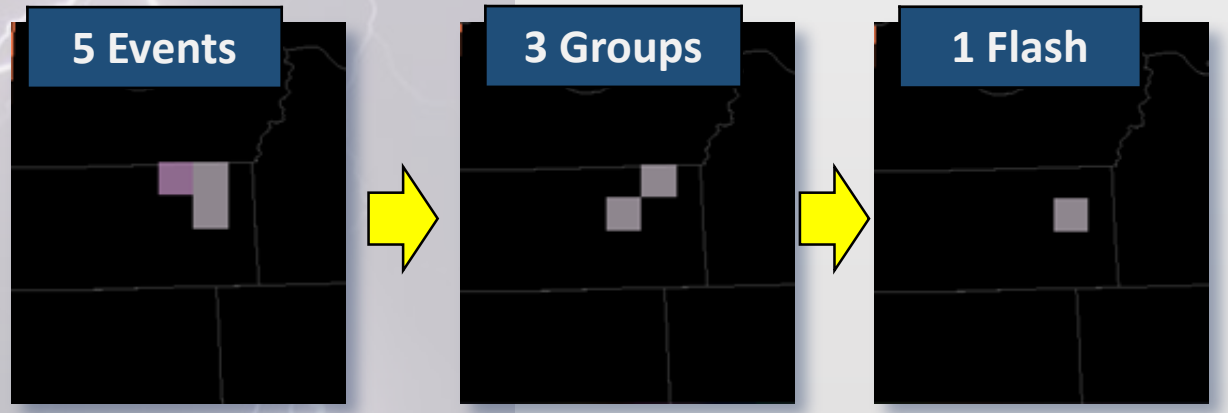
Early GLM Display

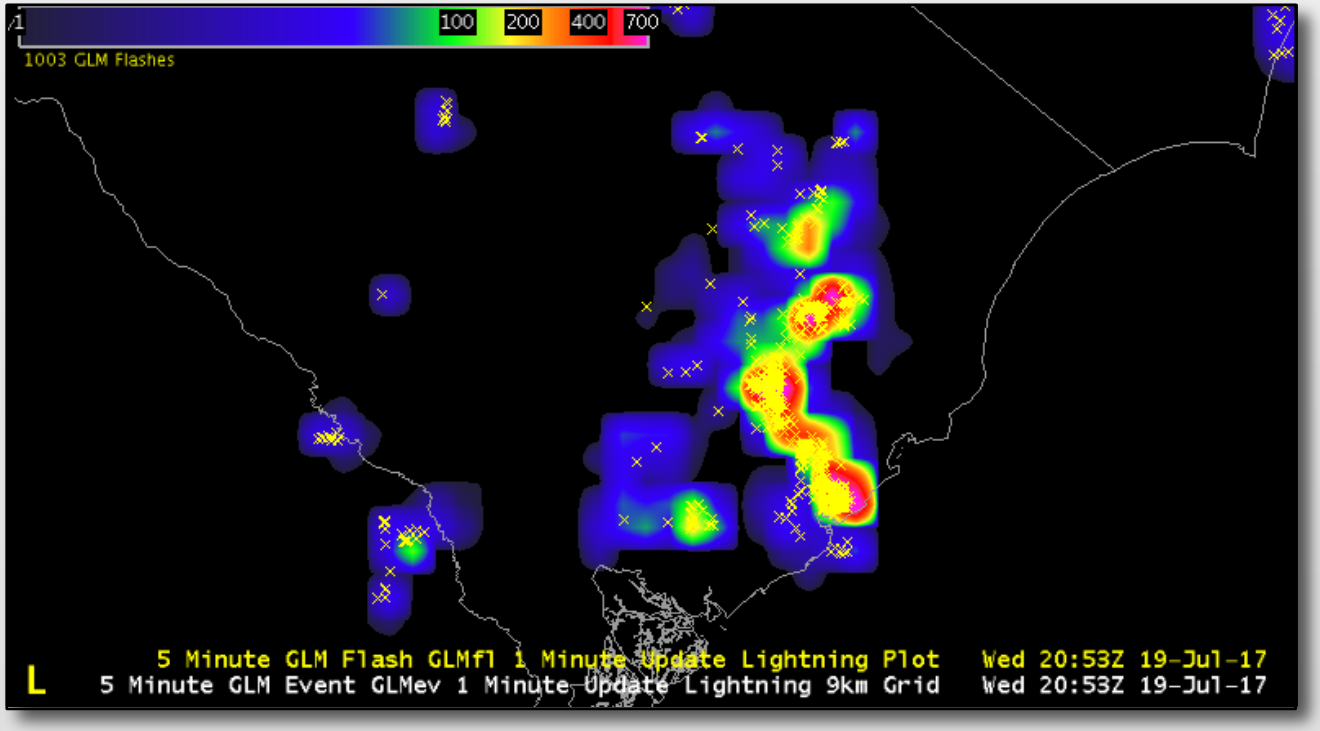


Event: Any illuminated pixel in 2 µs period.

Group Centroid: Optically weighted cluster of events in time and space. Equivalent to return strokes.

Flash Centroid: Optically weighted cluster of groups (based on events) in time and space.

(Preliminary, non-operational)



- Identify lightning location / extent (events)
- Color highlights intensification
- Flash centroids allow for total counts

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Comparison With Available Ground Networks

Radar

Courtesy of Hazardous Weather Testbed

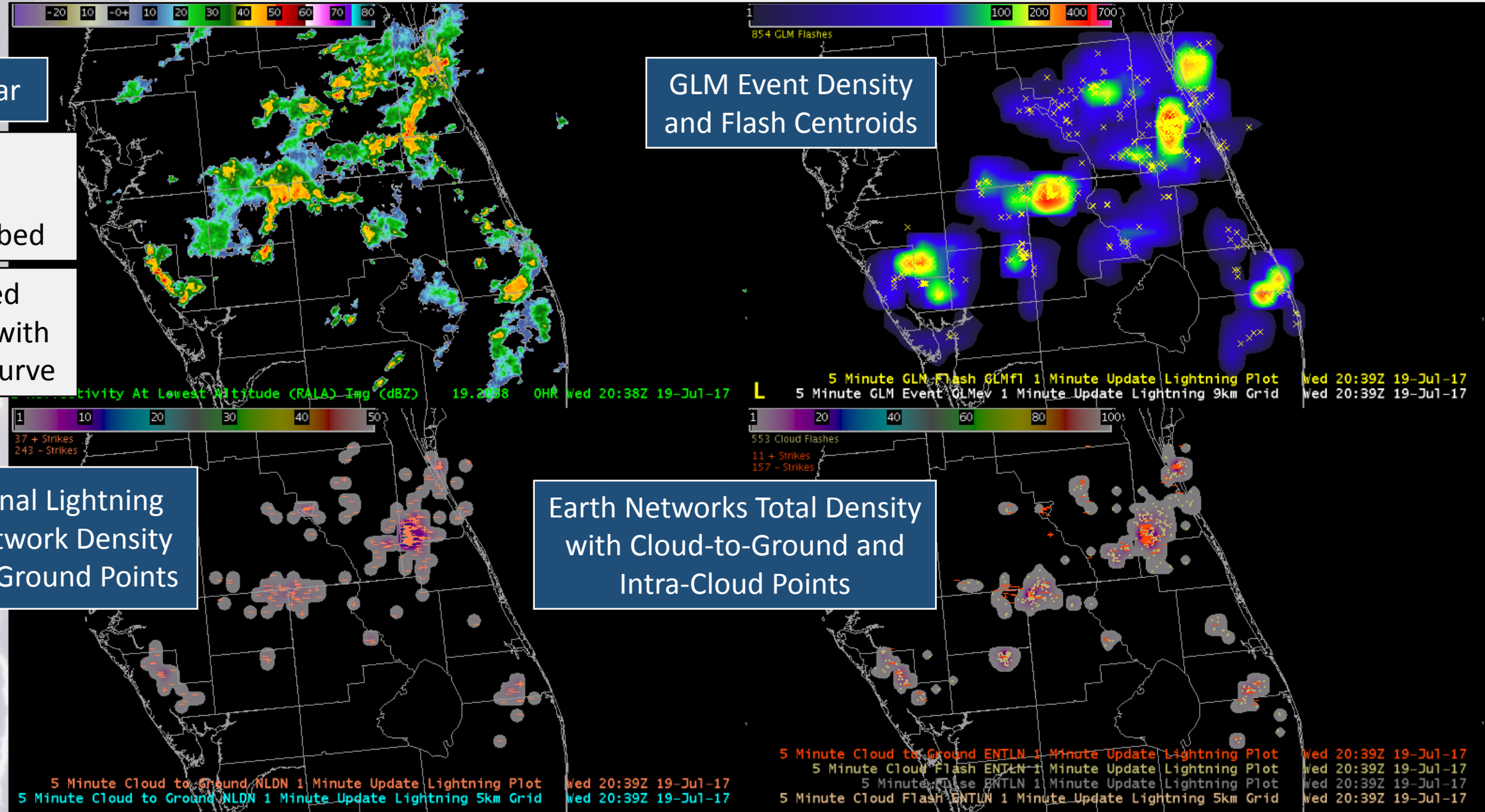
Recommended HWT display with SPoRT color curve

GLM Event Density and Flash Centroids

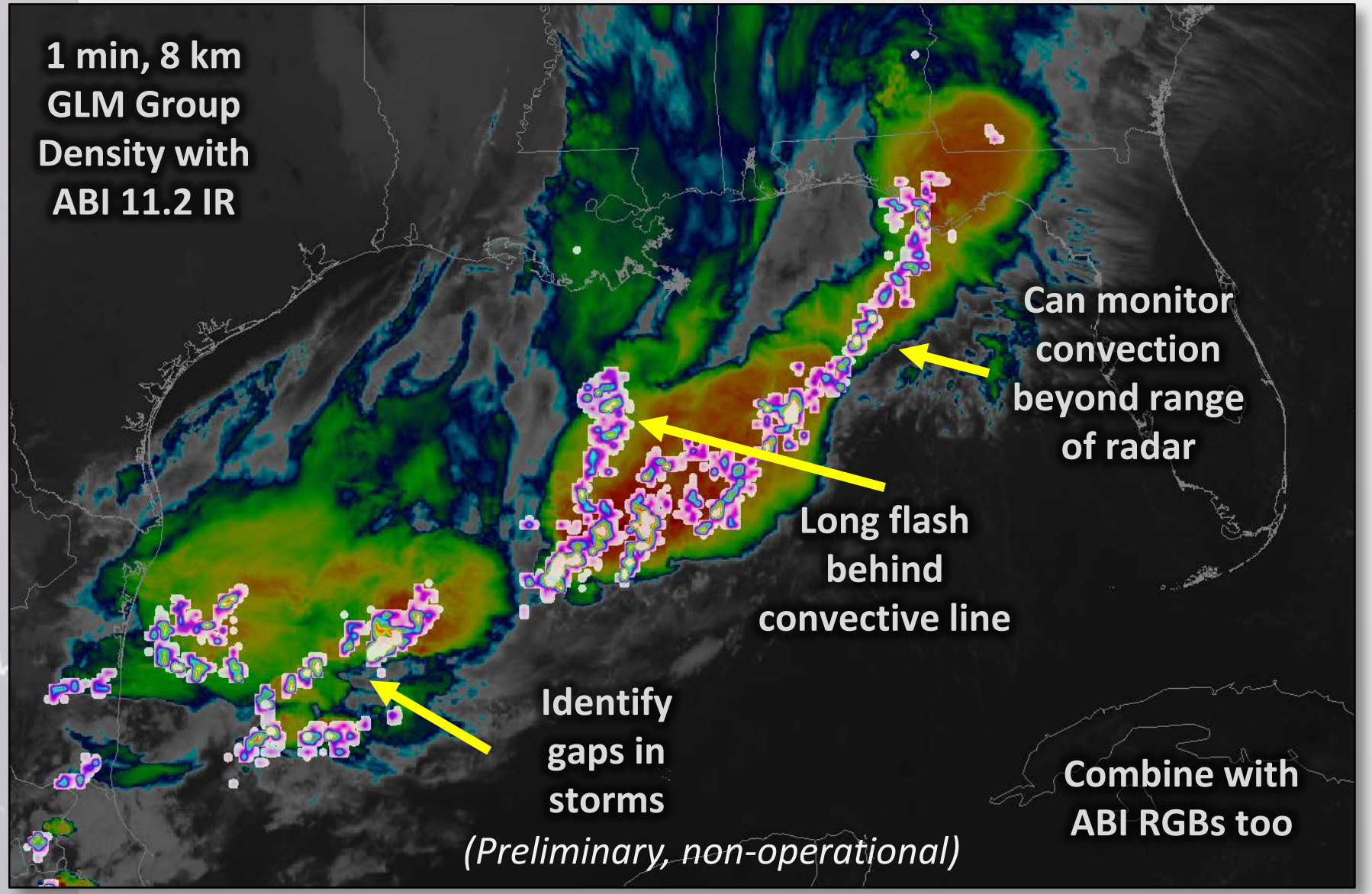
Vaisala National Lightning Detection Network Density and Cloud-to-Ground Points

(Preliminary, non-operational)

Earth Networks Total Density with Cloud-to-Ground and Intra-Cloud Points



Data Sparse Region (Gulf of Mexico)



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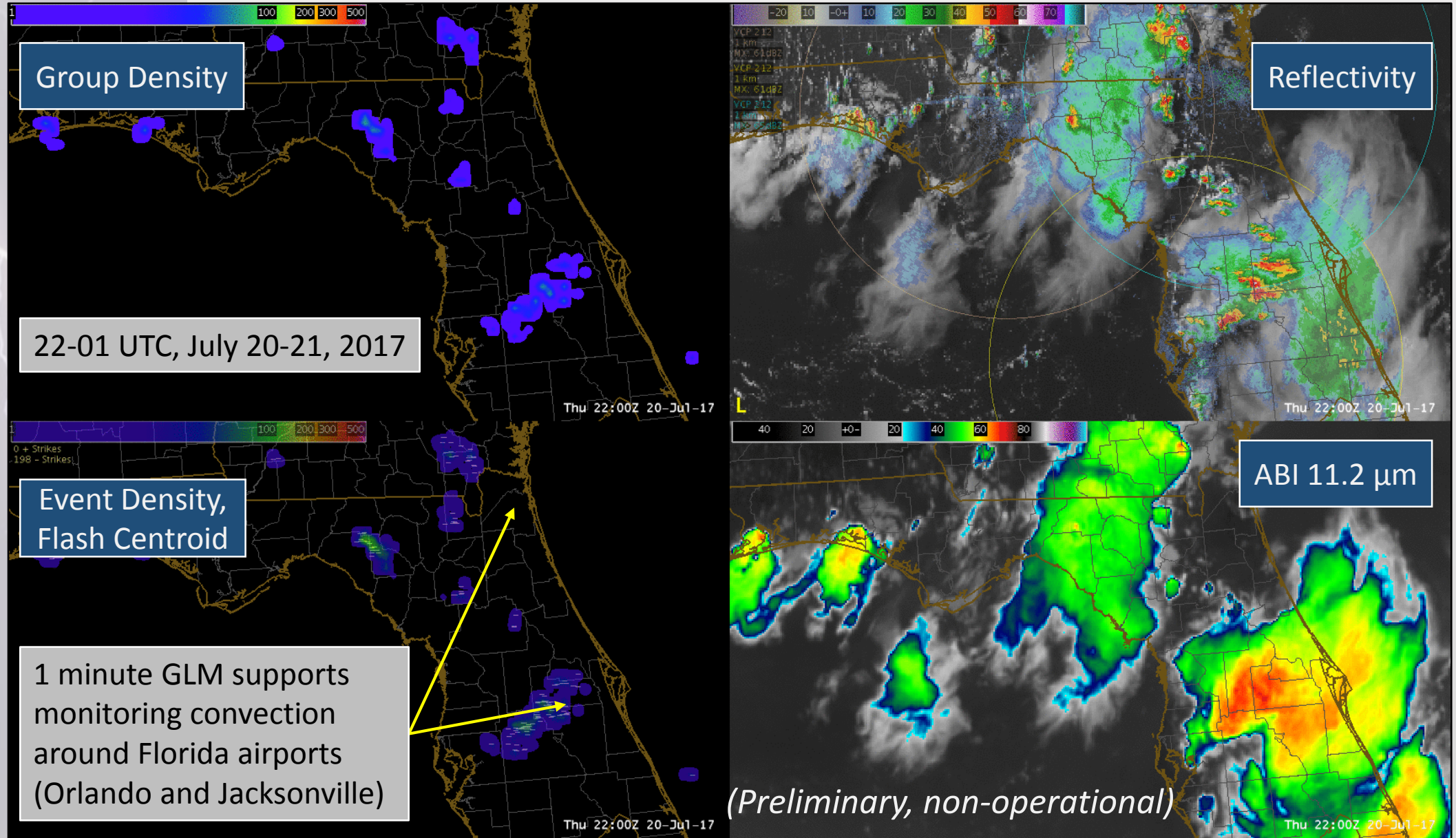
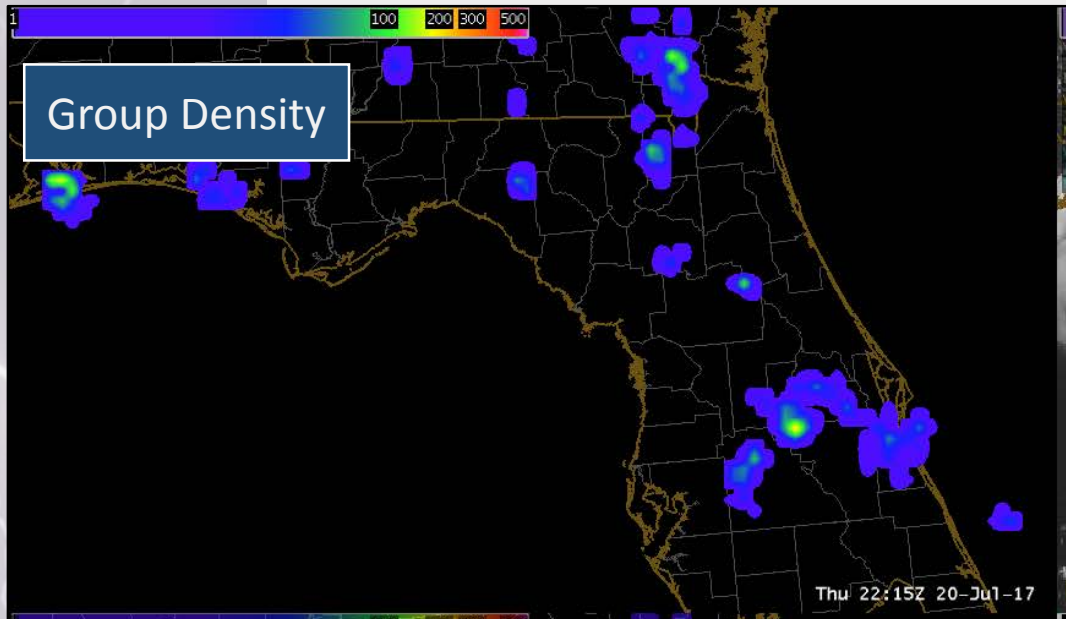
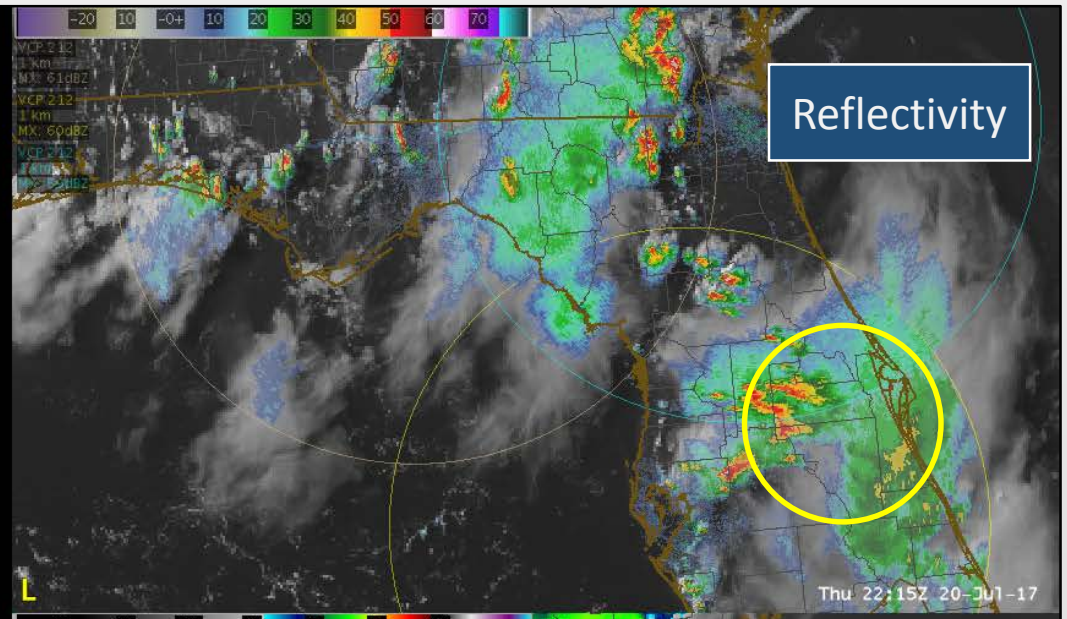
Convective Monitoring (Animation)

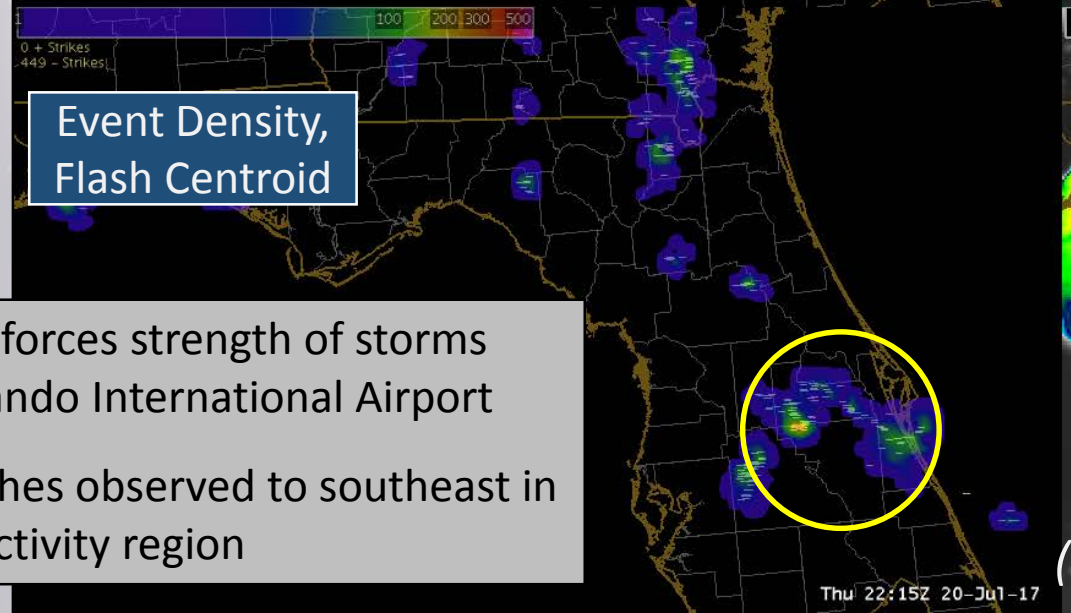


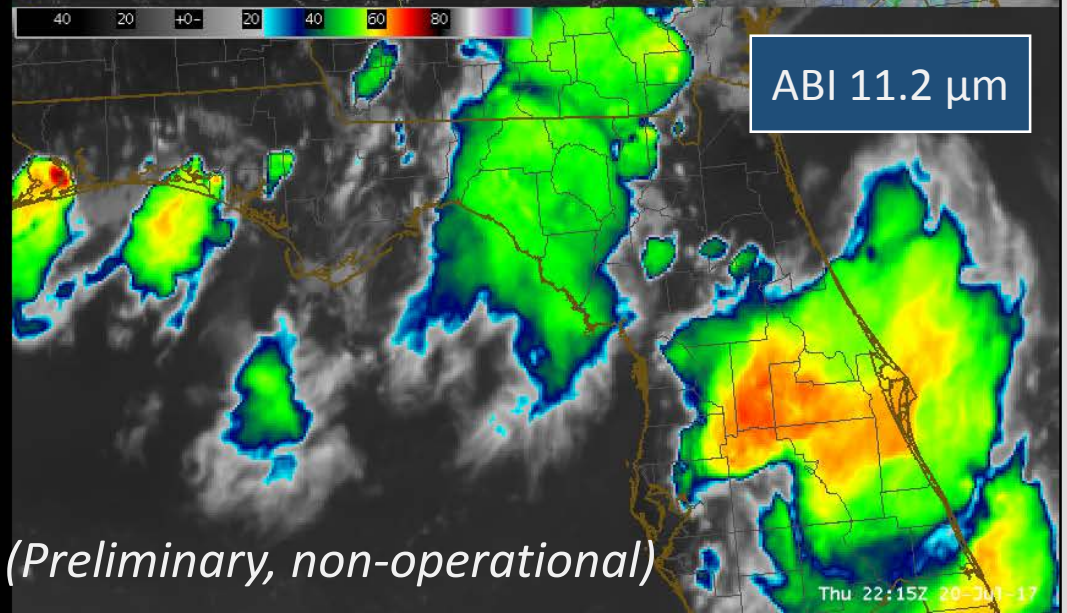
(Preliminary, non-operational)

Convective Monitoring (Still Image)







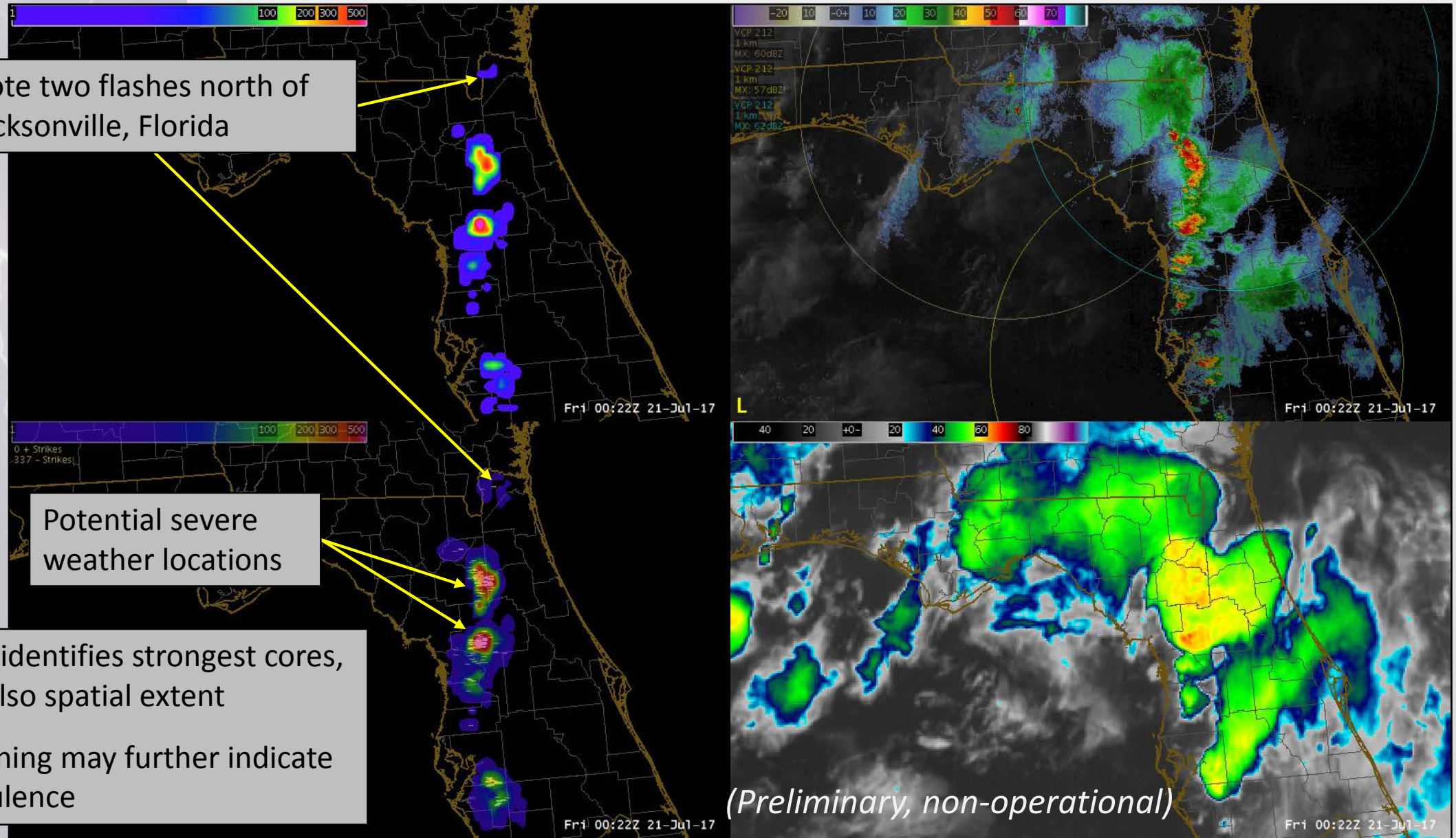


GLM reinforces strength of storms near Orlando International Airport

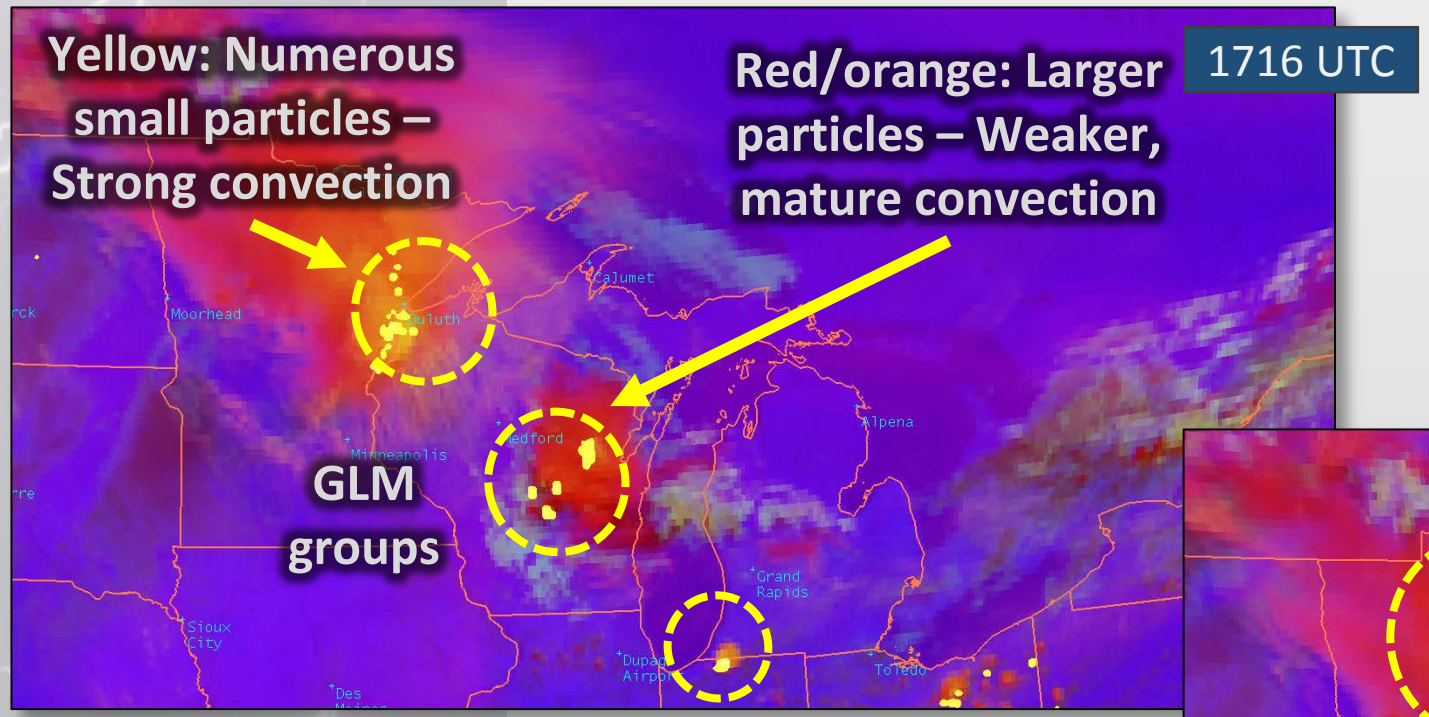
Note flashes observed to southeast in low reflectivity region

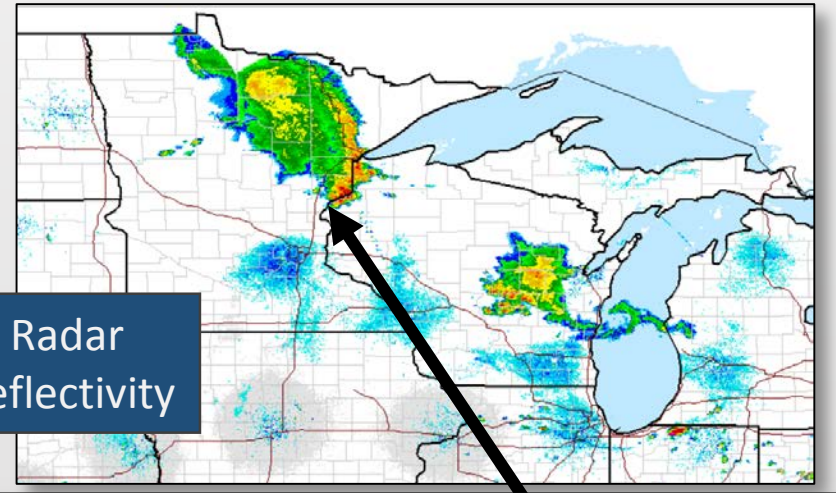
(Preliminary, non-operational)

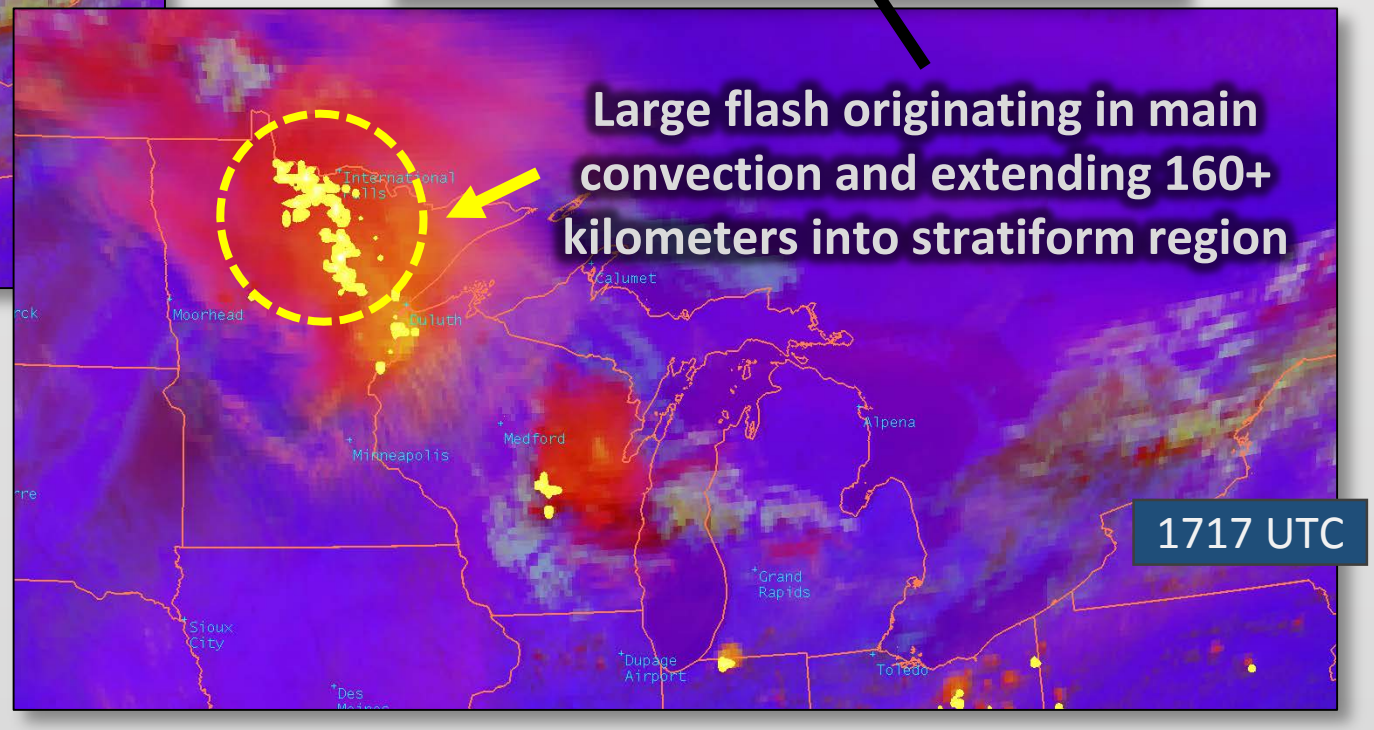
Convective Monitoring (Still Image)



Long Flash Example (Lightning Safety)







ABI Daytime Convection RGB (EUMETSAT recipe with GLM Groups (Preliminary, non-operational)

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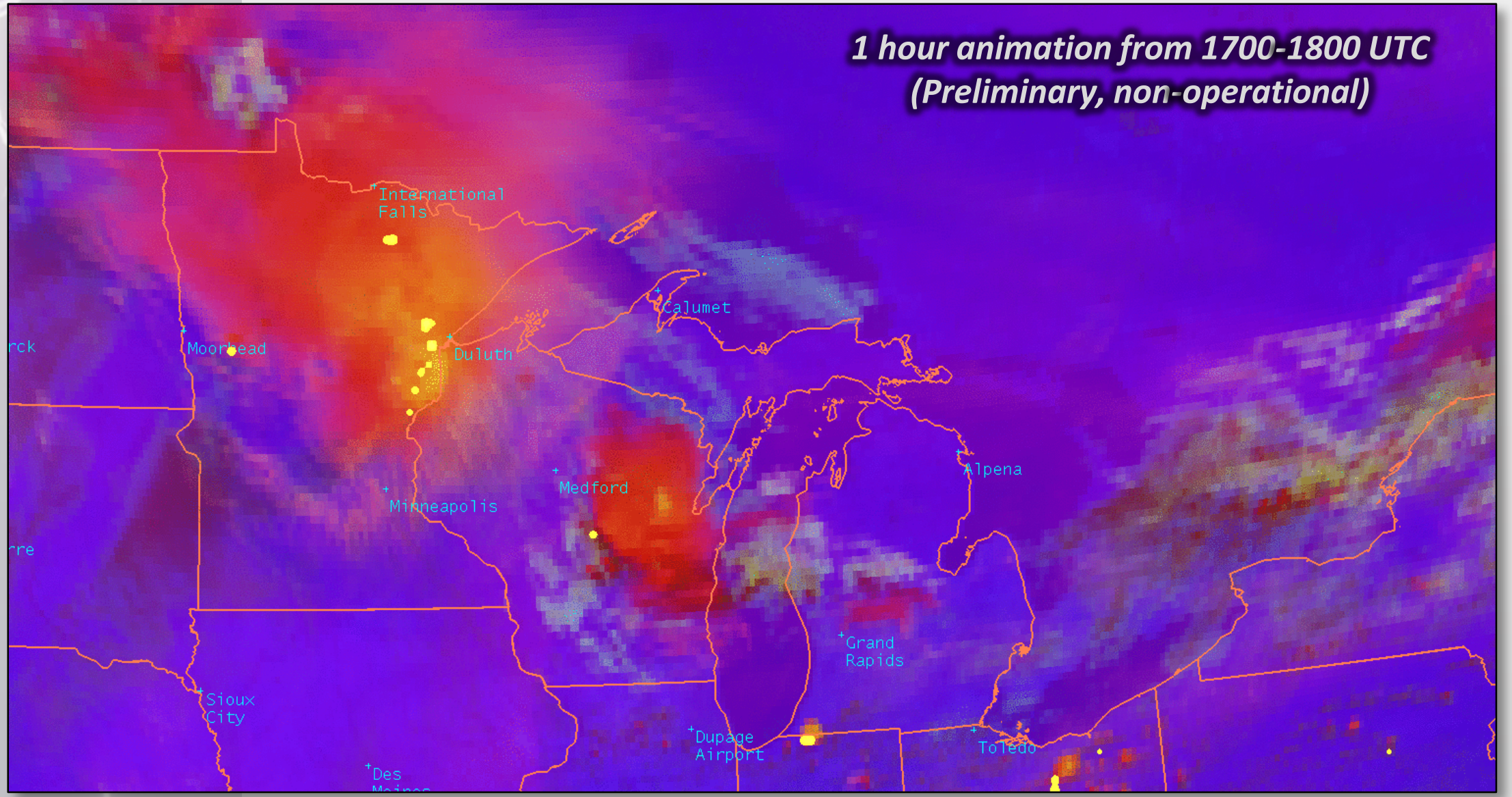
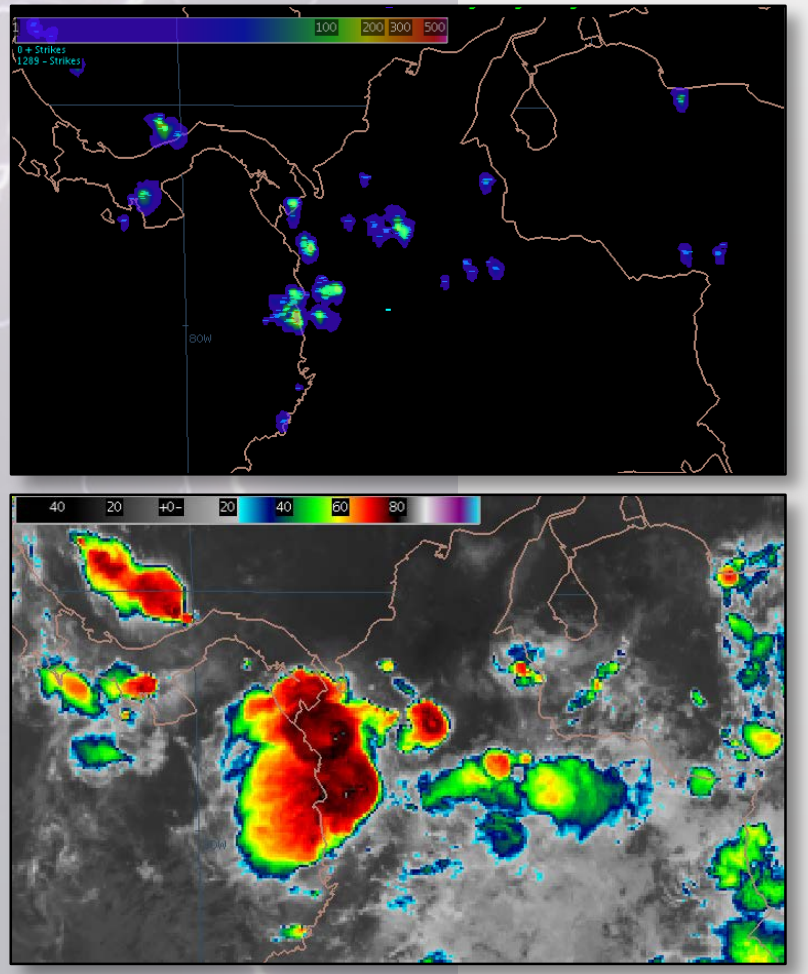
Long Flash Example Animation (Lightning Safety)



Future Activities / Acknowledgements



GLM event density with flash centoind points (top) with ABI 11.2 micron IR (bottom) (Preliminary, non-operational)

- Continue developing Proving Ground training
- Conduct GLM assessment (Spring 2018)
- Conduct assessment with local emergency managers
- Collaborate on GLM uses with aviation partners
- Develop GLM applications library examples (from forecasters!)
- Additional visualizations (flash extent density)
- Investigate using optical energy observations
- Many thanks to the GOES-R Proving Ground for funding

GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE-R SERIES
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Questions?



5 minute GLM event density with 5 minute ABI 11.2 micron infrared of Hurricane Irma from 0200 UTC, 9 September 2017 through 0000 UTC 11 September 2017 (Preliminary, non-operational)

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https://weather.msfc.nasa.gov/sport

NASA SPoRT Blog

https://nasasport.wordpress.com

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