Evaluation of the Pseudo-GLM

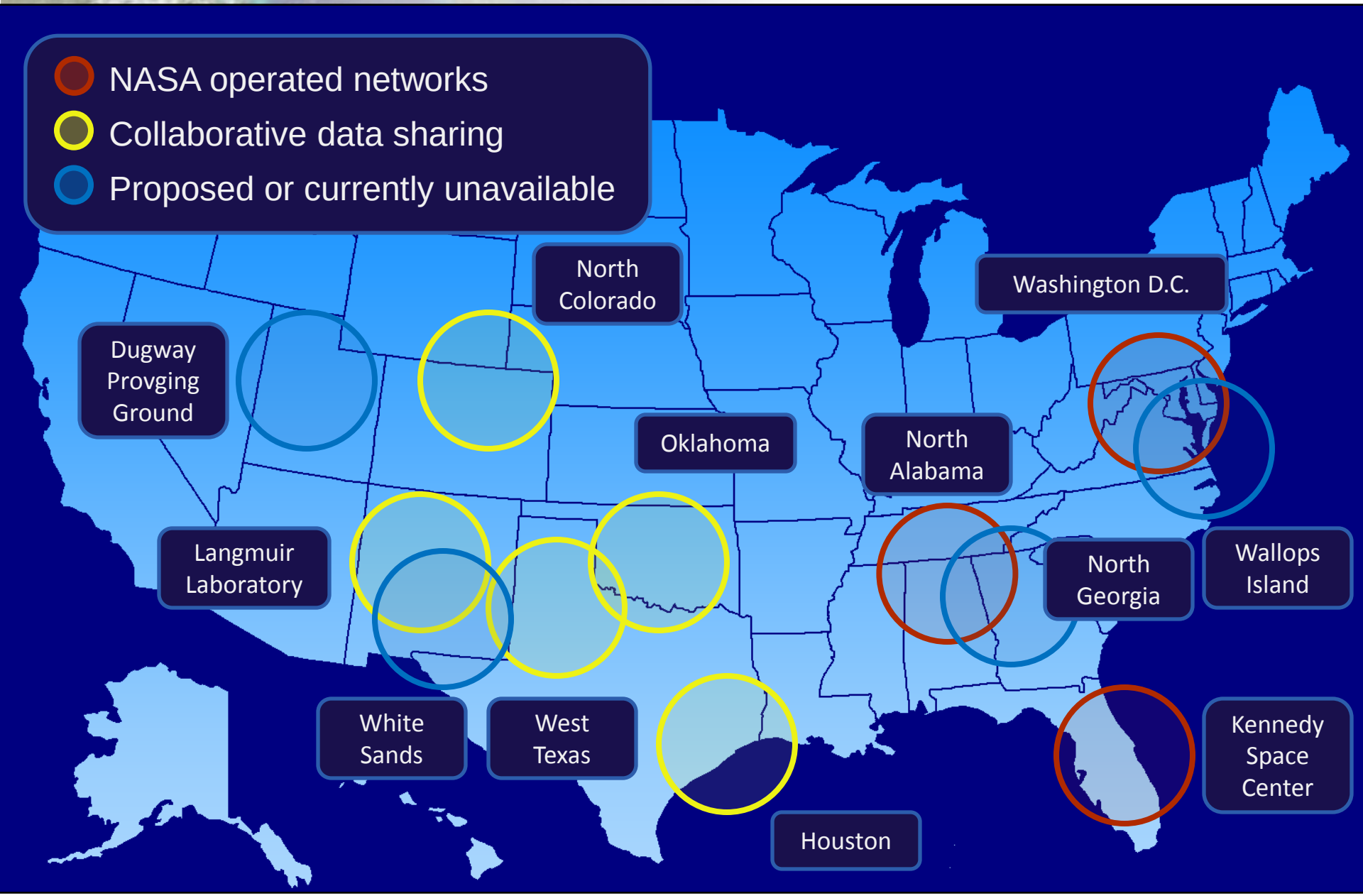
Geoffrey Stano – NASA SPoRT / ENSCO Inc.
Kristin Calhoun – NOAA NSSL / CIMMS
Amanda Terborg – NOAA AWC / CIMSS

GLM Science Meeting
Huntsville, Alabama
24-26 September 2013

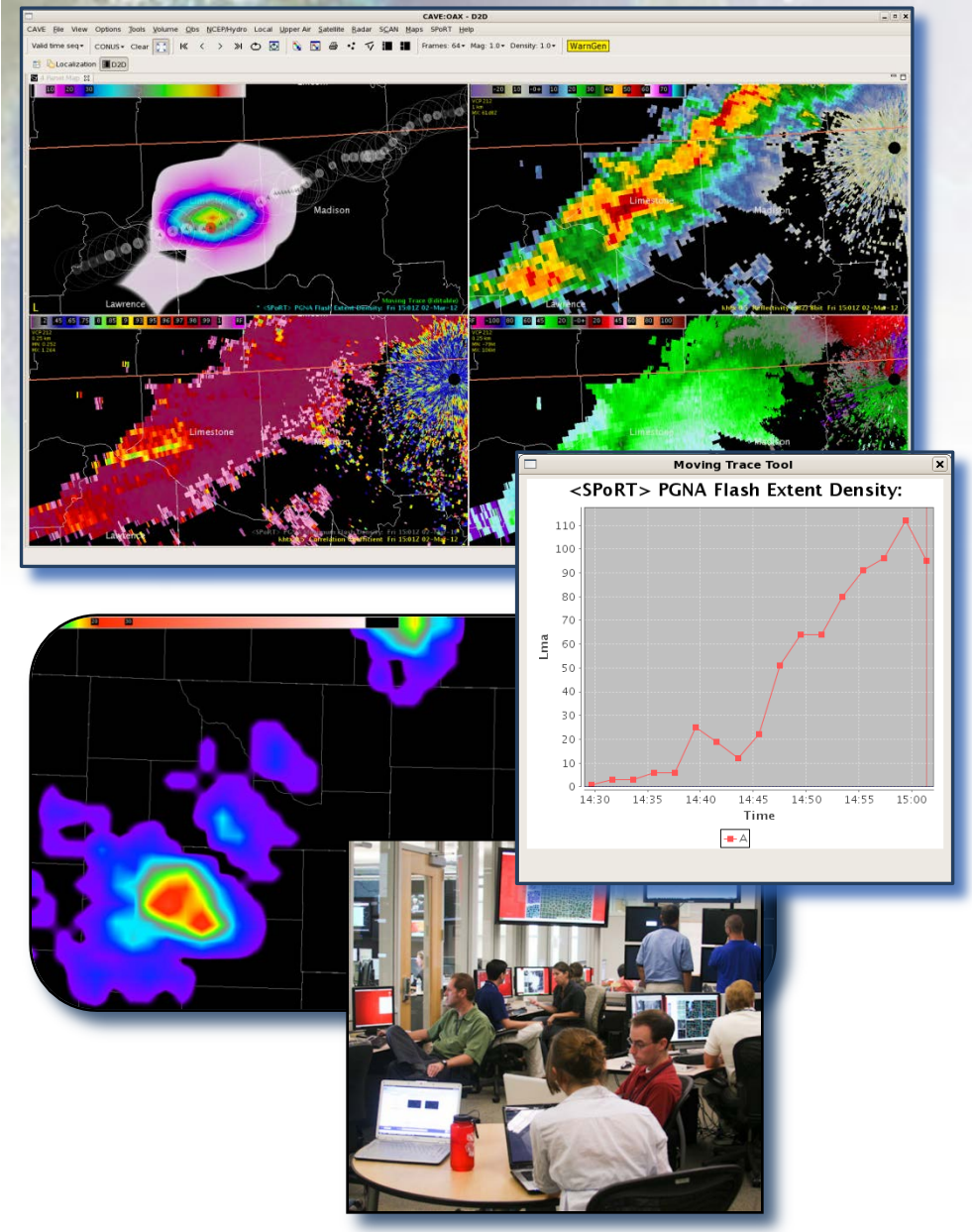
Outline

- Collaborators
- Evaluators
  - Focus
  - New since 2012
- Evaluation Results
- Looking Forward

Collaborators



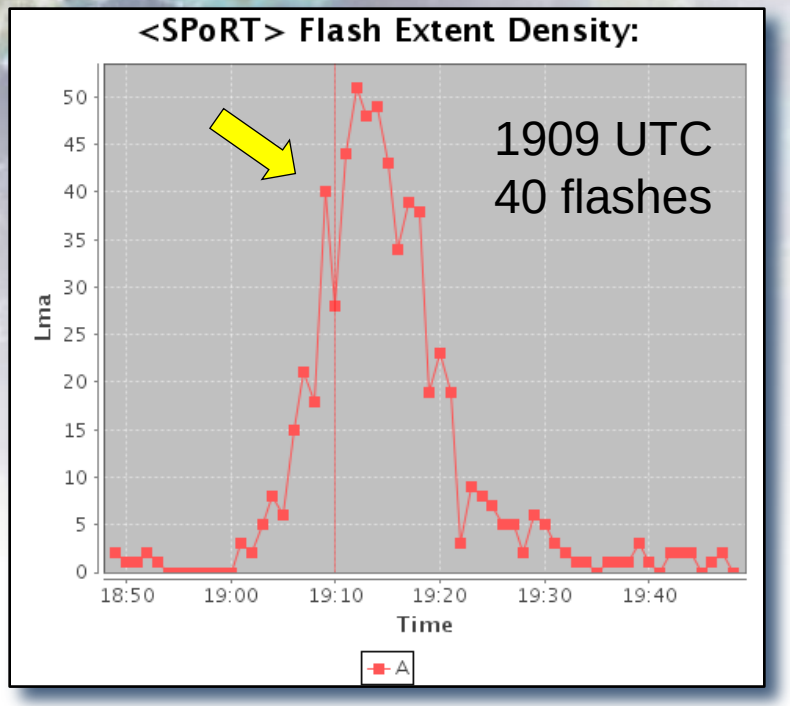
Evaluators

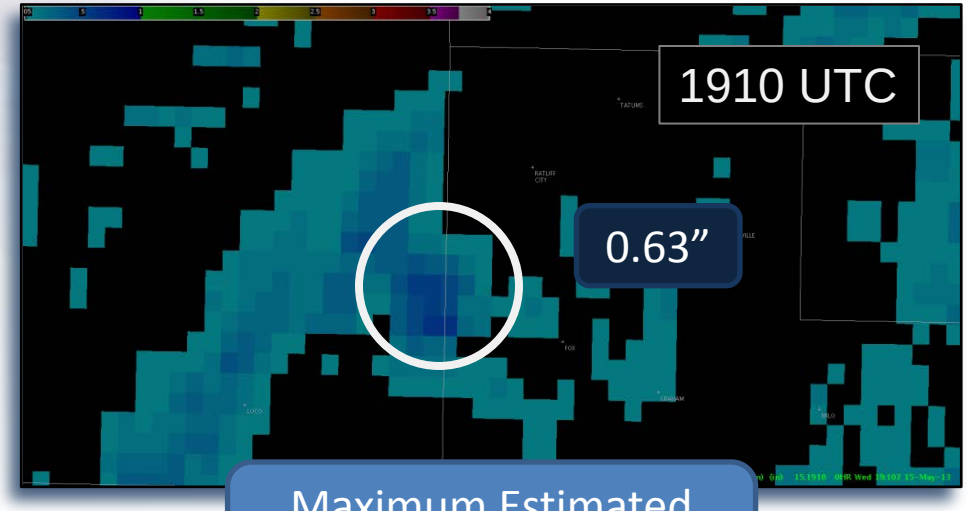


Spring Program (HWT)

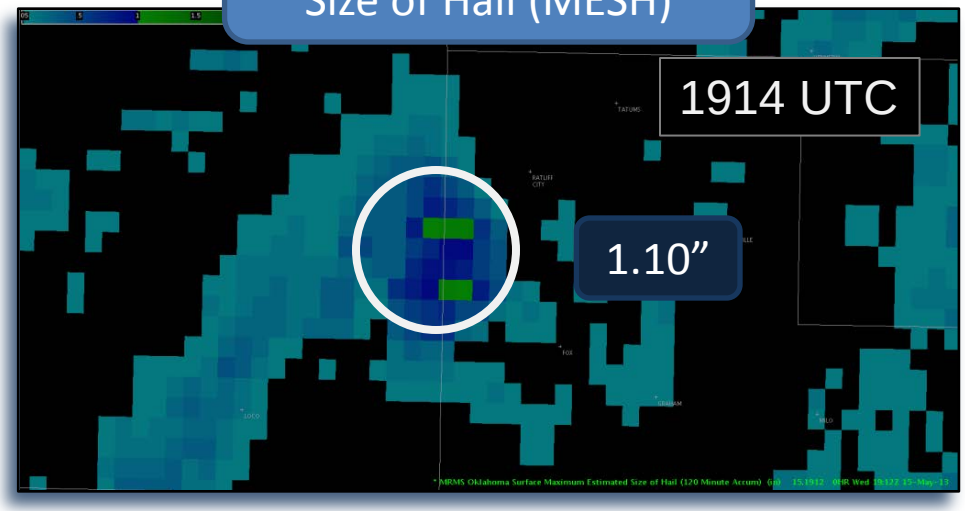
- Focus:
  - Primarily severe weather operations and product integration with AWIPS II
- GLM-related work
  - Pseudo-GLM (PGLM)
  - Total Lightning Tracking Tool
- New for 2013
  - Training module
  - NASA SPoRT LMA plug-in
  - Total Lightning Tracking Tool

Forecaster Examples



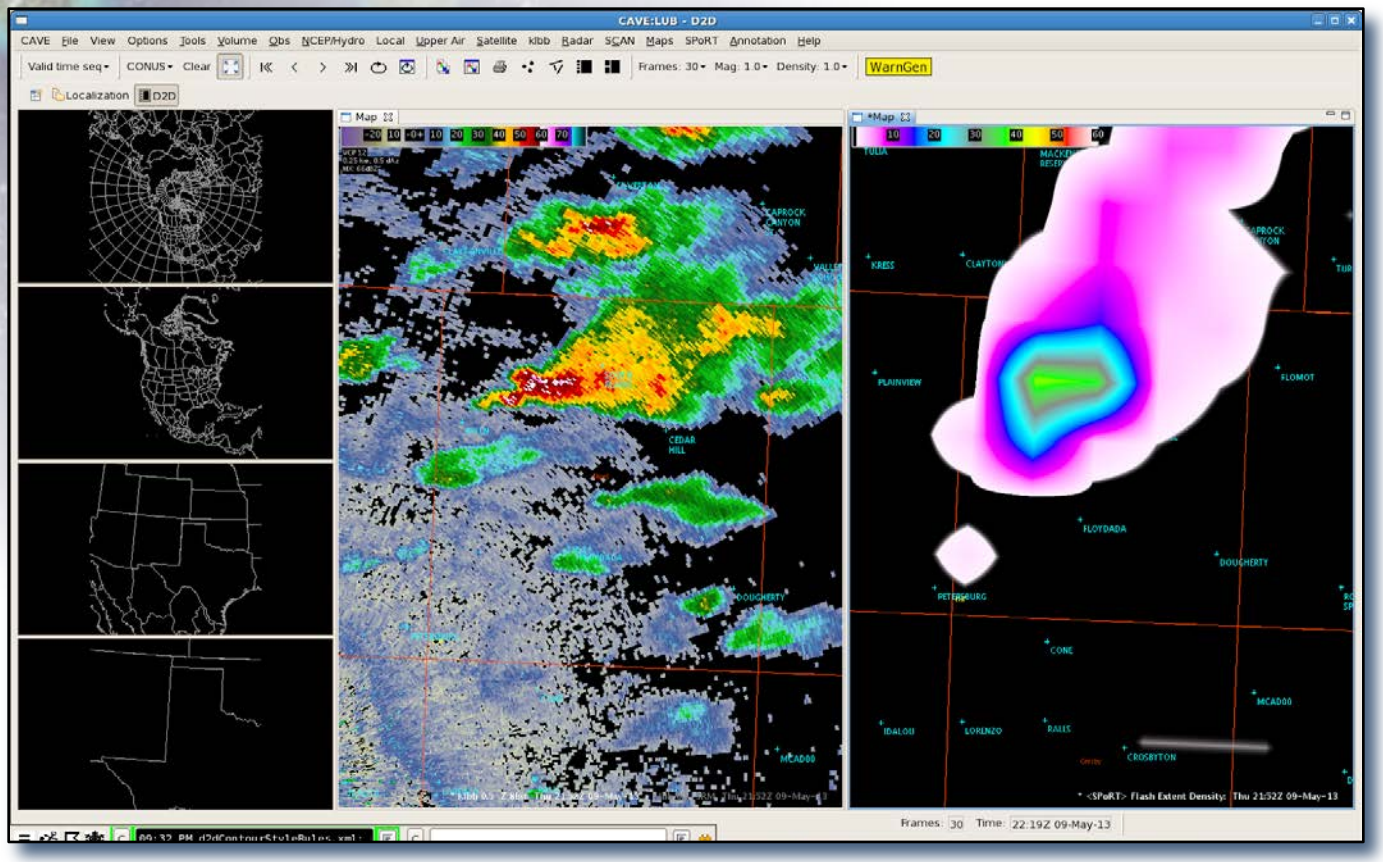


Maximum Estimated Size of Hail (MESH)



- Combination of PGLM, tracking tool, and MESH
- Jump at 1909 UTC
- MESH exceeded 1” at 1914 UTC
- Severe hail reported at 1926 UTC

Forecaster Examples



- Situational awareness example
- Strong updrafts (50 dBZ) up to 26 kft
- PGLM reached 40 flashes, just short of a jump
- Dime sized hail 10 minutes later

"Although the storm didn't reach severe criteria, it was beneficial that the Flash Extent Density updates in 1 minute intervals, which lets the warning forecaster monitor for rapid updraft development between radar volume scans."

Summary of Feedback

<u>Usefulness of the PGLM</u>

- Avg. of 3.95 out of 5

<u>Usefulness of the TLTT</u>

- Avg. of 3.24 out of 5

- The flash extent density proved most useful
  - Negatives were data drop outs and trying to implement the tracking tool
- The TLTT was conceptually very well received
  - Requires work on implementation

"The strengths were a good correlation with "lightning jumps", i.e., rapid increases in lightning density and increases in storm severity in terms of large hail. The weakness was several instances of data dropping out."

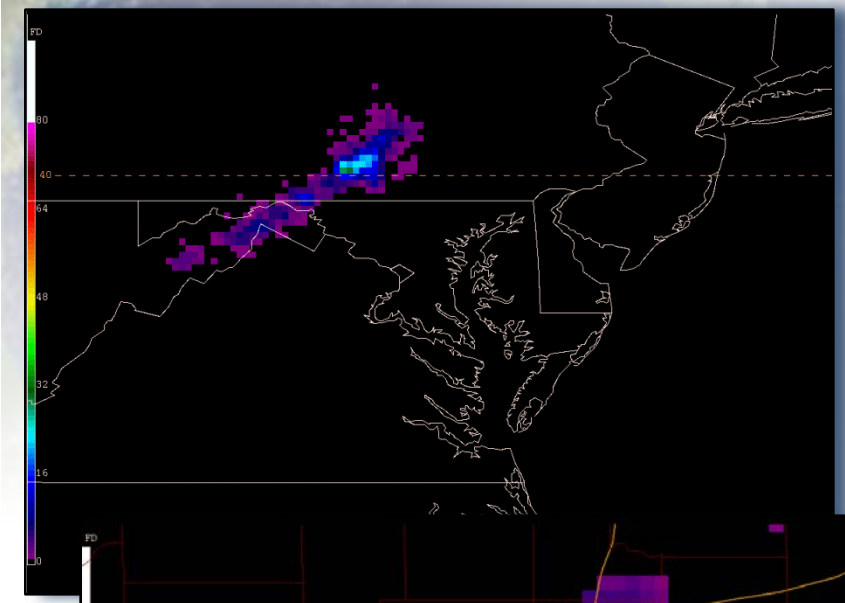
"I found the FED to be extremely useful, especially with the sub-severe convection it offered a glimpse in the storms intensity between volume scans and offered a way to monitor their growing intensity."

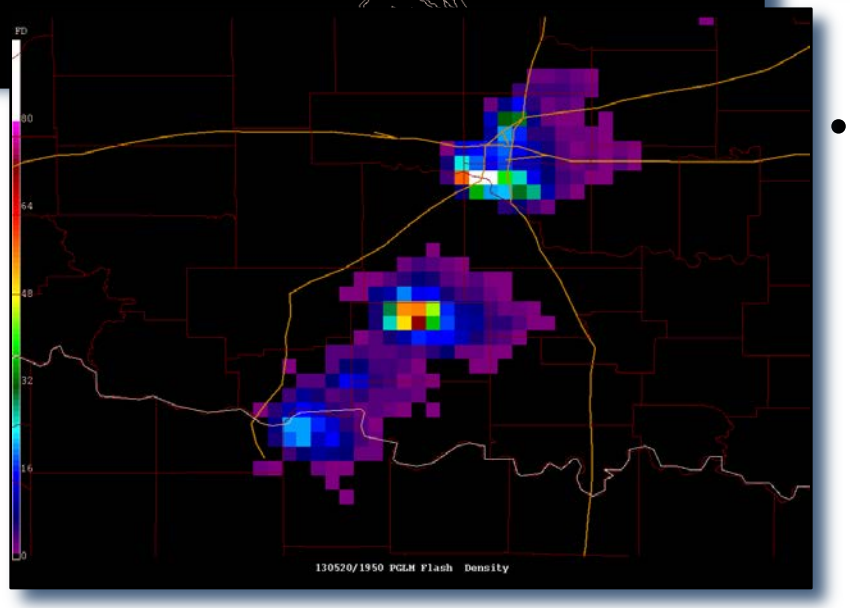
"The PGLM was very responsive recognizing quick ramp ups of lightning flashes."

"The total lightning tracking tool is very beneficial, but it will take some modifications to make it useful to a warning forecaster."

"The frequency of one minute is great!"

Evaluators



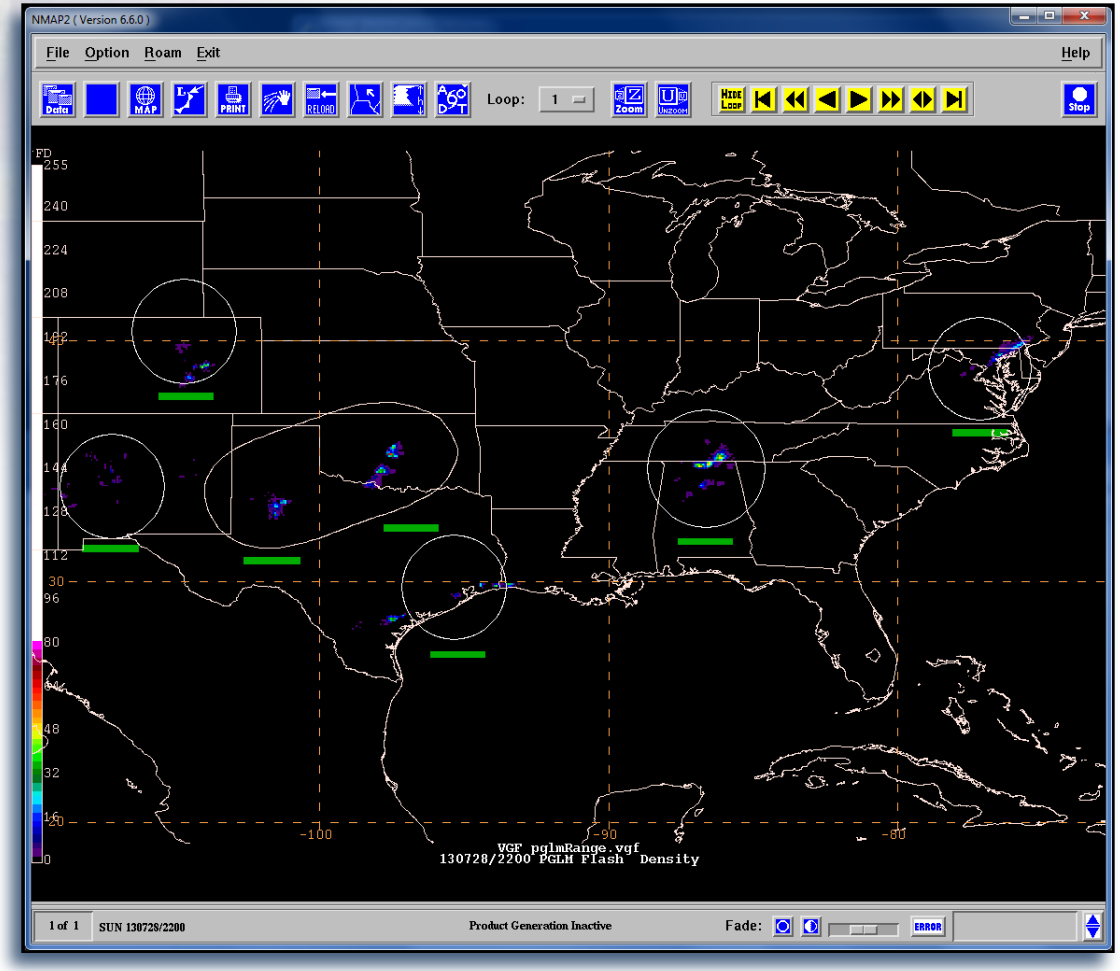


Summer Experiment (AWC)

- <u>Focus</u>:
  - Aviation forecast needs
- <u>GLM-related work</u>
  - Pseudo-GLM mosaic
  - Demonstrating total lightning
- <u>New for 2013</u>
  - Training module
  - Completely revamped product display
  - Incorporated lessons from 2012

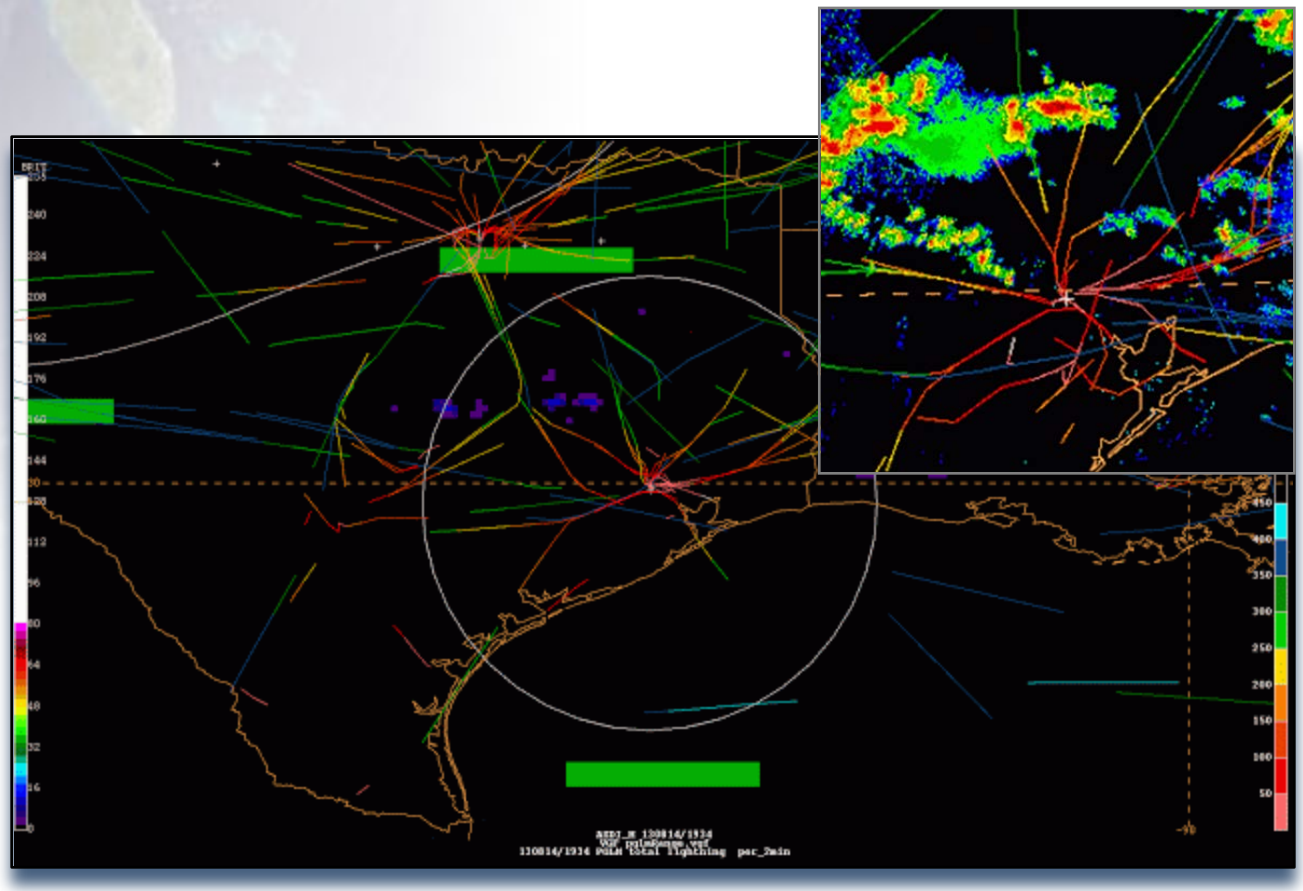
The Pseudo GLM Mosaic

- 2013 used 7 collaborating networks
- All one display
- Updates every 2 minutes
- <u>Improvements since 2012</u>
  - Adjusted time stamp to better match NLDN time stamp
  - Enhanced color curve
    - (more fidelity)
  - Range rings
  - Network status bars



Forecaster Example

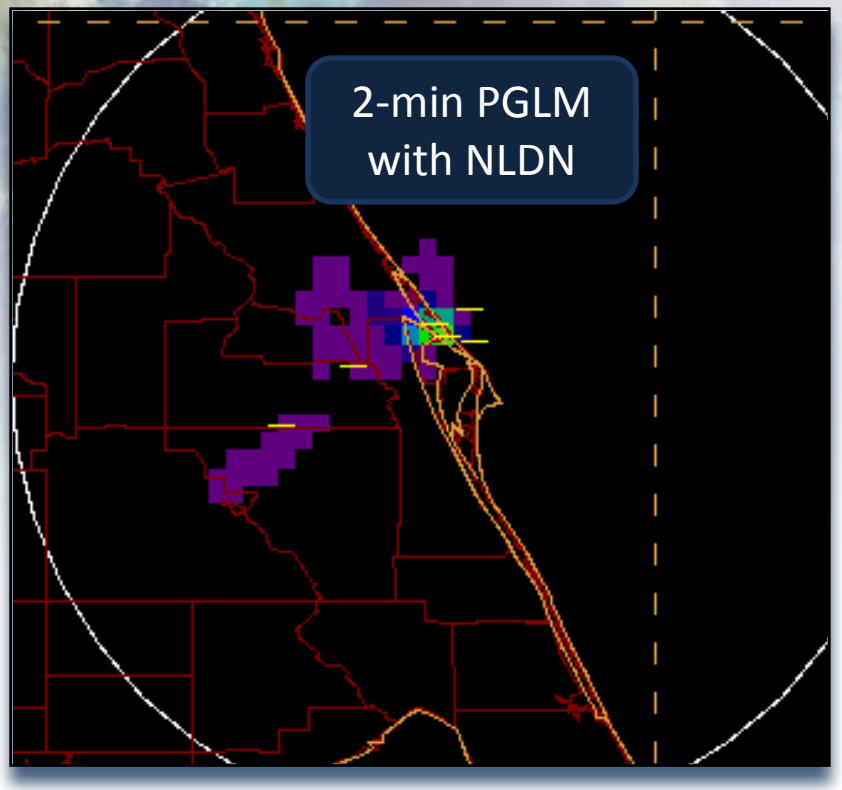
- This example best used by the convective desk or at CWSUs
- Radar showed storms between Dallas and Houston
- Limited CG activity
- PGLM showed >40 flashes in 2 min
- Flights began diverting

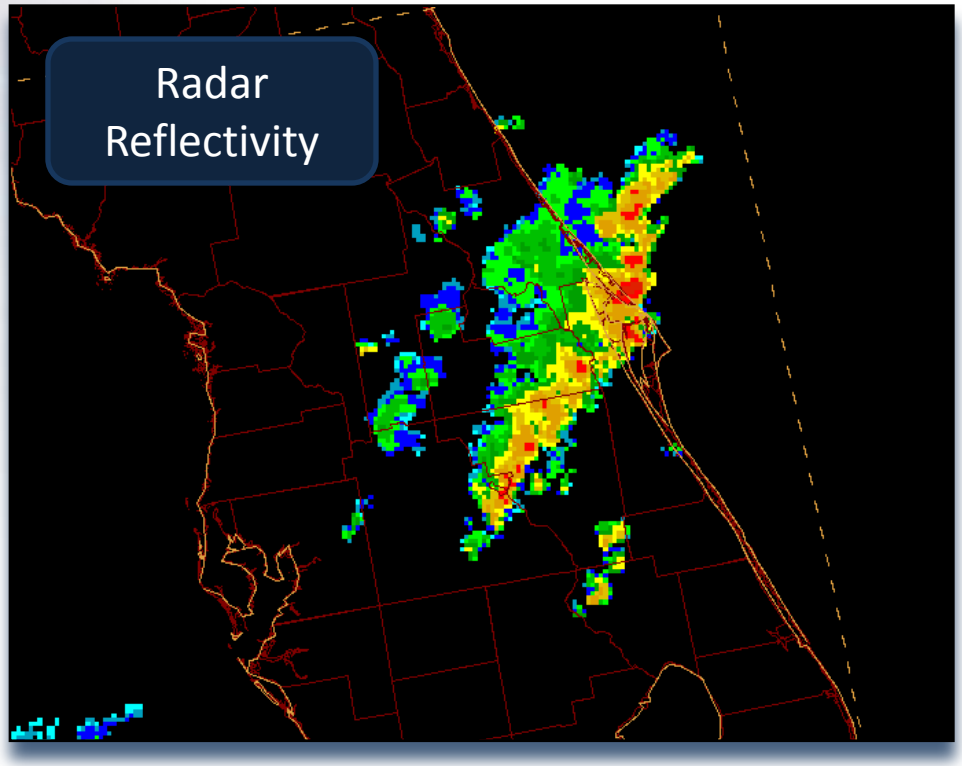


- Why not just use radar?
- Learn concepts now for when GLM observing data sparse regions

Animation: PGLM Mosaic (Houston LMA) with aircraft flight tracks and radar reflectivity snapshot

Forecaster Examples





- Example from upcoming publication
- PGLM observing flashes behind main line of convection
- Useful to convective SIGMET forecasters

"Throughout different cases we found about a 5 to 10 minute increase time when we had an increase in PGLM data when reflectivity increased afterwards. This can be helpful to forecasters."

Summary of Feedback

- Numerous challenges based on limited convection during evaluation and limited LMA domains and their locations
  - Although limited, participants were pleased with the results
- Particular interest from the Convective SIGMET and National Aviation Meteorologist (NAM) desk
  - Advise traffic flow managers (divert routes or “shoot the gap”)
  - Monitor convection for SIGnifican METeorology statements
- Global graphics desk extremely interested in total lightning
  - PGLM too limited in domain for evaluation, but…
  - Lightning is one of the main ways their products are produced and validated
- Other uses
  - Determining if the cap is breaking
  - Updates to mesoscale discussions

Looking Forward

- Overall: Strong buy-in from forecasters

<u>Upcoming Activities</u>

- PGLM mosaic moving to the operations floor (AWC/SPC)
  - Also preparing the AWIPS II version of product
- AWIPS II
  - Updating the Total Lightning Tracking Tool based on feedback
  - Will be evaluated by the Operations Proving Ground (Spring 2014)
  - Baseline the SPoRT LMA plug-in for
  - Spin-off: Can support Earth Networks data
- SPoRT preparing a Spring 2014 total lightning evaluation
- More collaborations
  - Central Florida, North Georgia, and Wallops Island LMAs

Questions

Thank-you for your time!

Geoffrey Stano
geoffrey.stano@nasa.gov

SPoRT webpage: http://weather.msfc.nasa.gov/sport/

Wide World of SPoRT Blog: http://nasasport.wordpress.com/

Hazardous Weather Testbed Blog: http://goesrhwt.blogspot.com/

Aviation Weather Testbed Blog: http://awtse.blogspot.com/