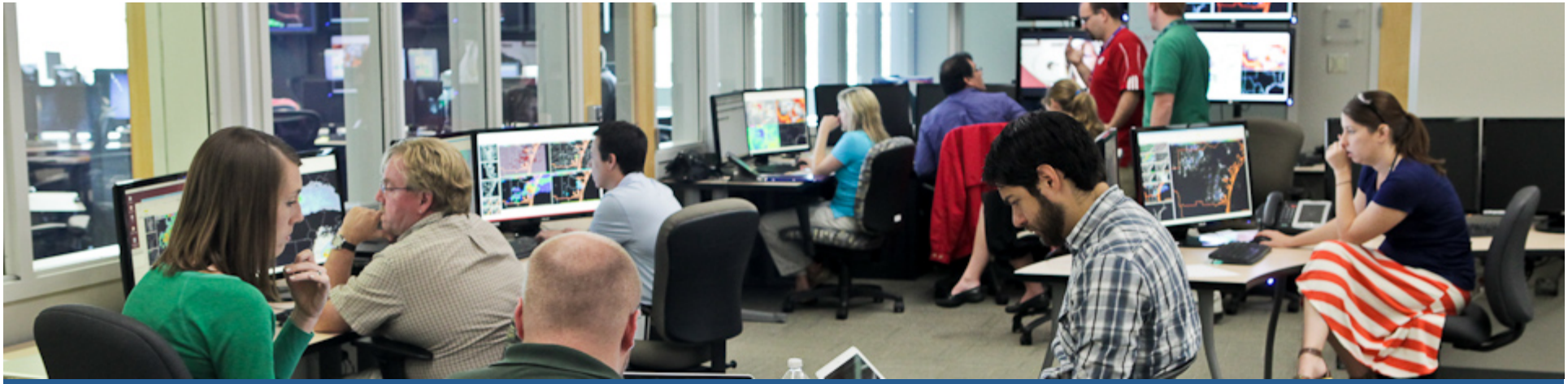


Experimental
Forecast
Program

*Prediction of hazardous weather events from **a few hours to a week in advance***

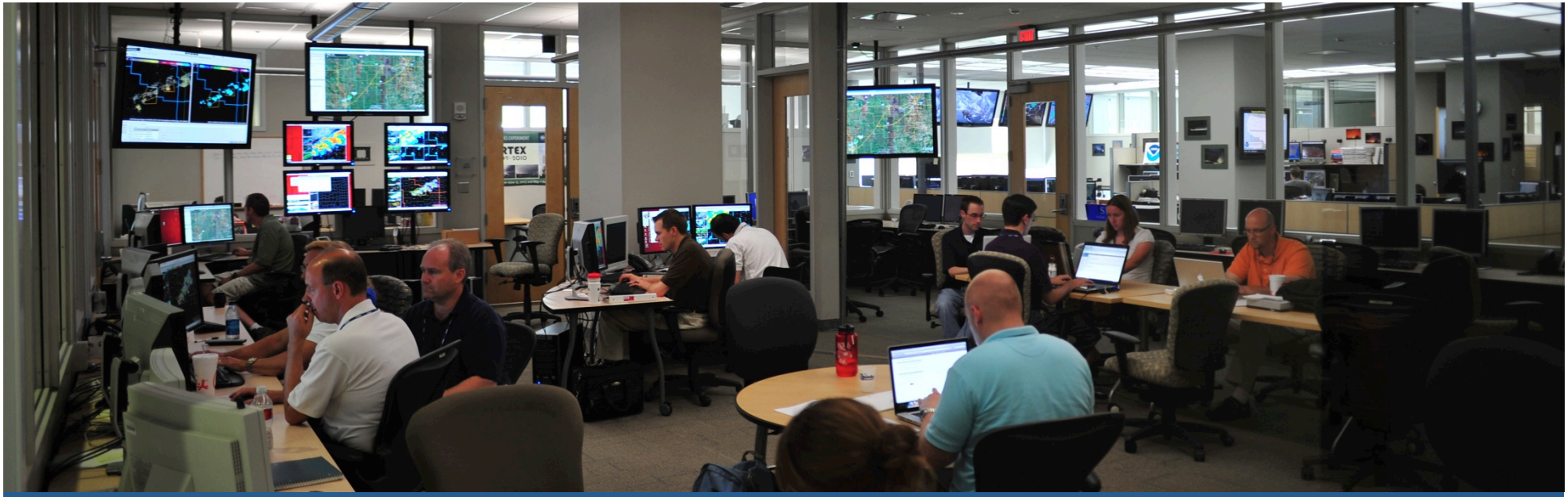
EFP

EWP

GOES-R
Proving Ground

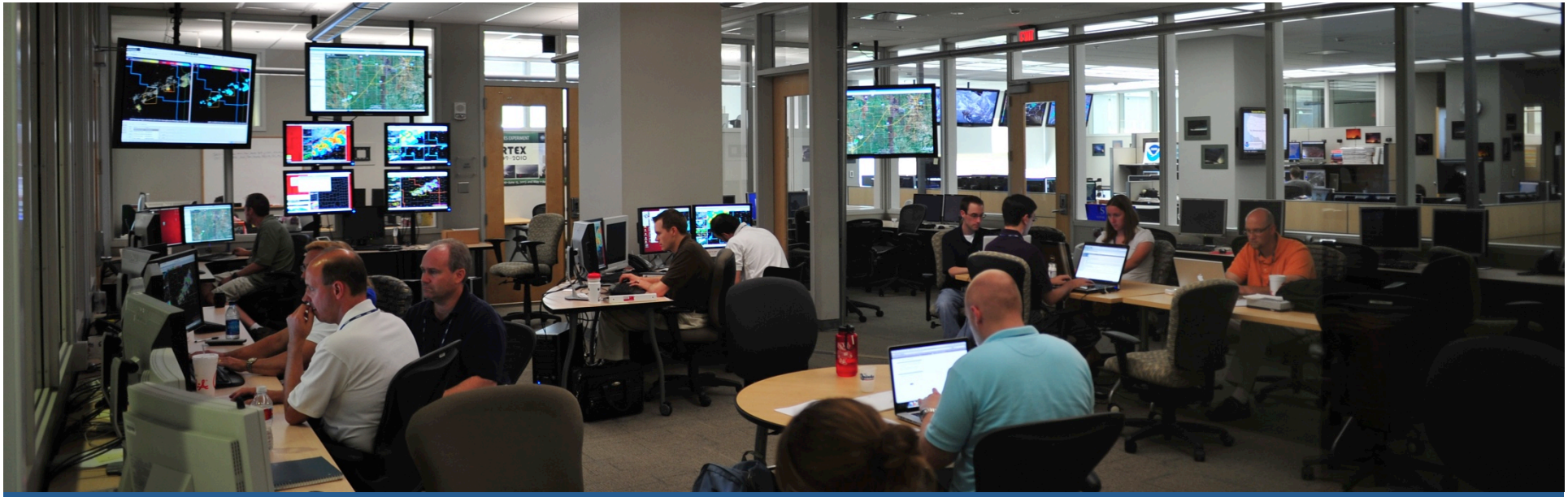
Experimental
Warning
Program

*Detection and prediction of hazardous weather events **up to several hours in advance***



The Hazardous Weather Testbed

Mission: to improve the nation's hazardous weather warning services by bringing together forecasters, researchers, trainers, developers, and user groups to develop, test and evaluate new techniques, applications, observing platforms, and technologies.

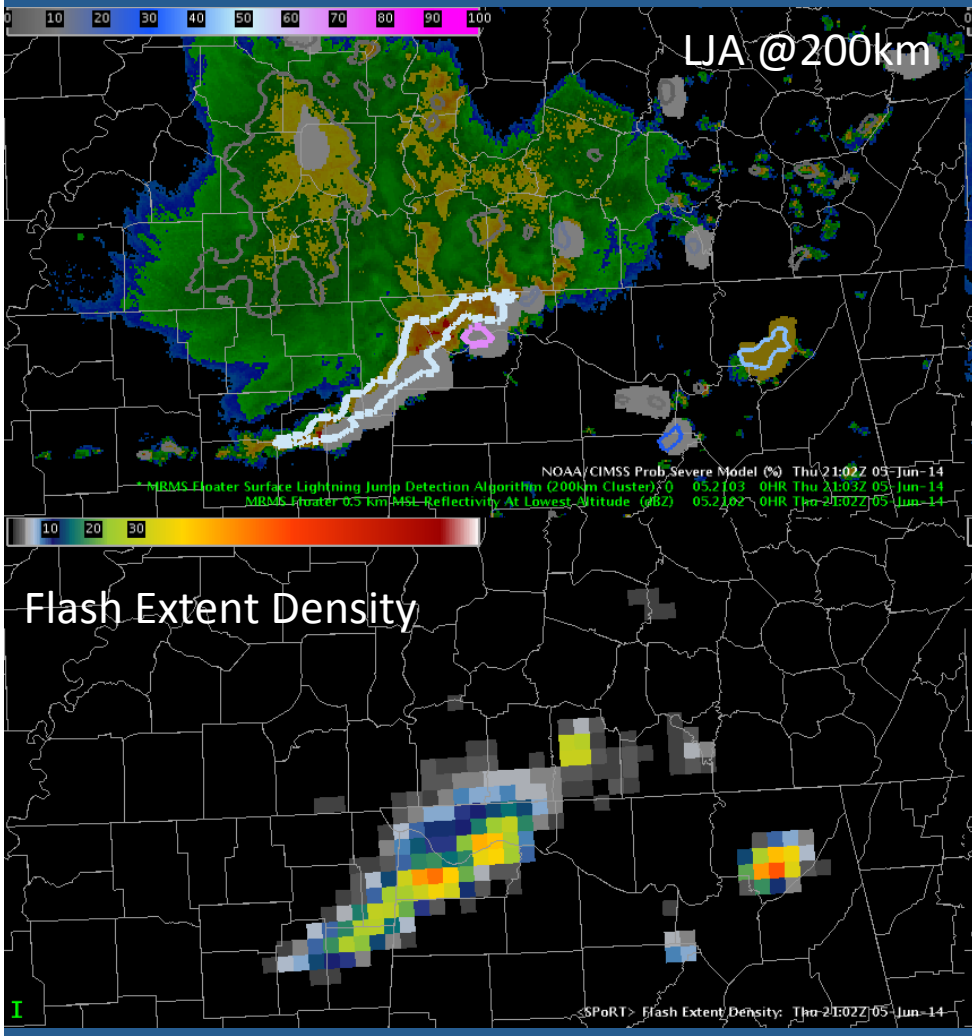


The Hazardous Weather Testbed

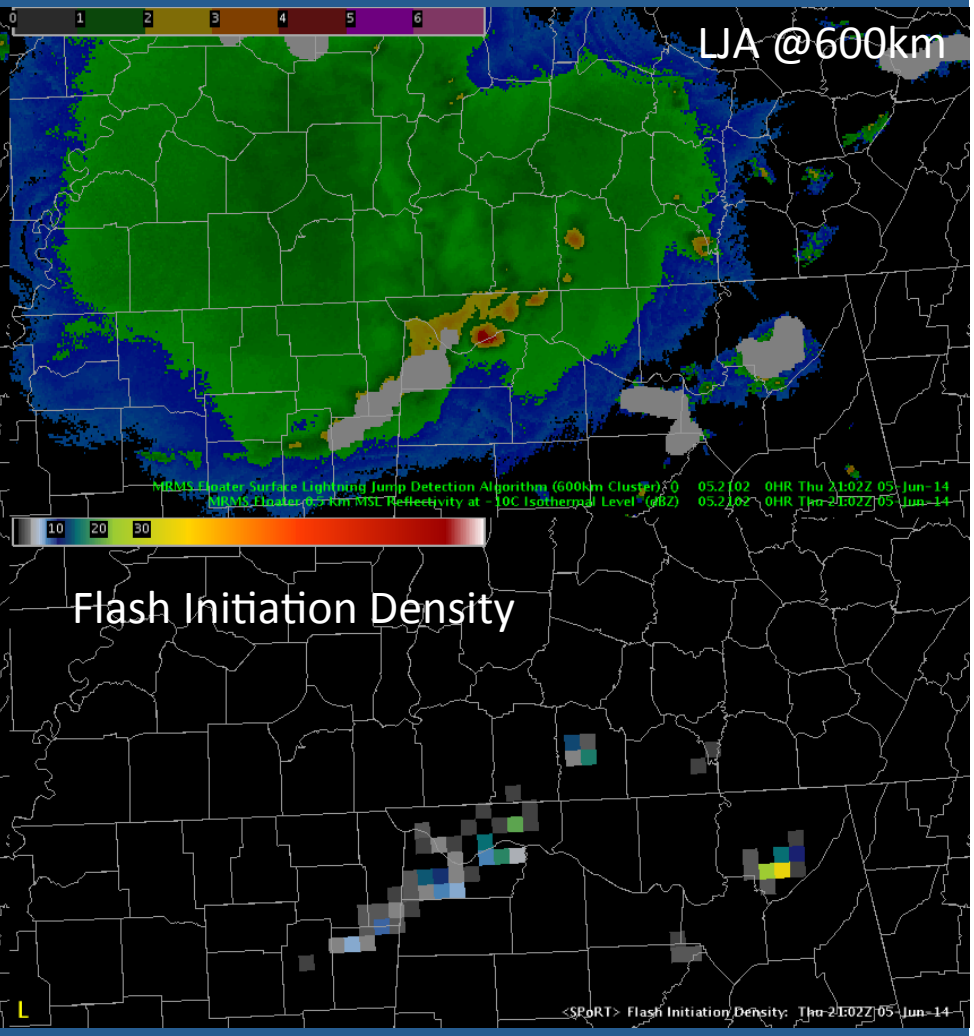
Lightning Products included in 2014:

pGLM-scale flash extent density & flash initiation density
Lightning Jump Algorithm
NASA-SPORT Moving Trace Tool

Reflectivity @ lowest altitude

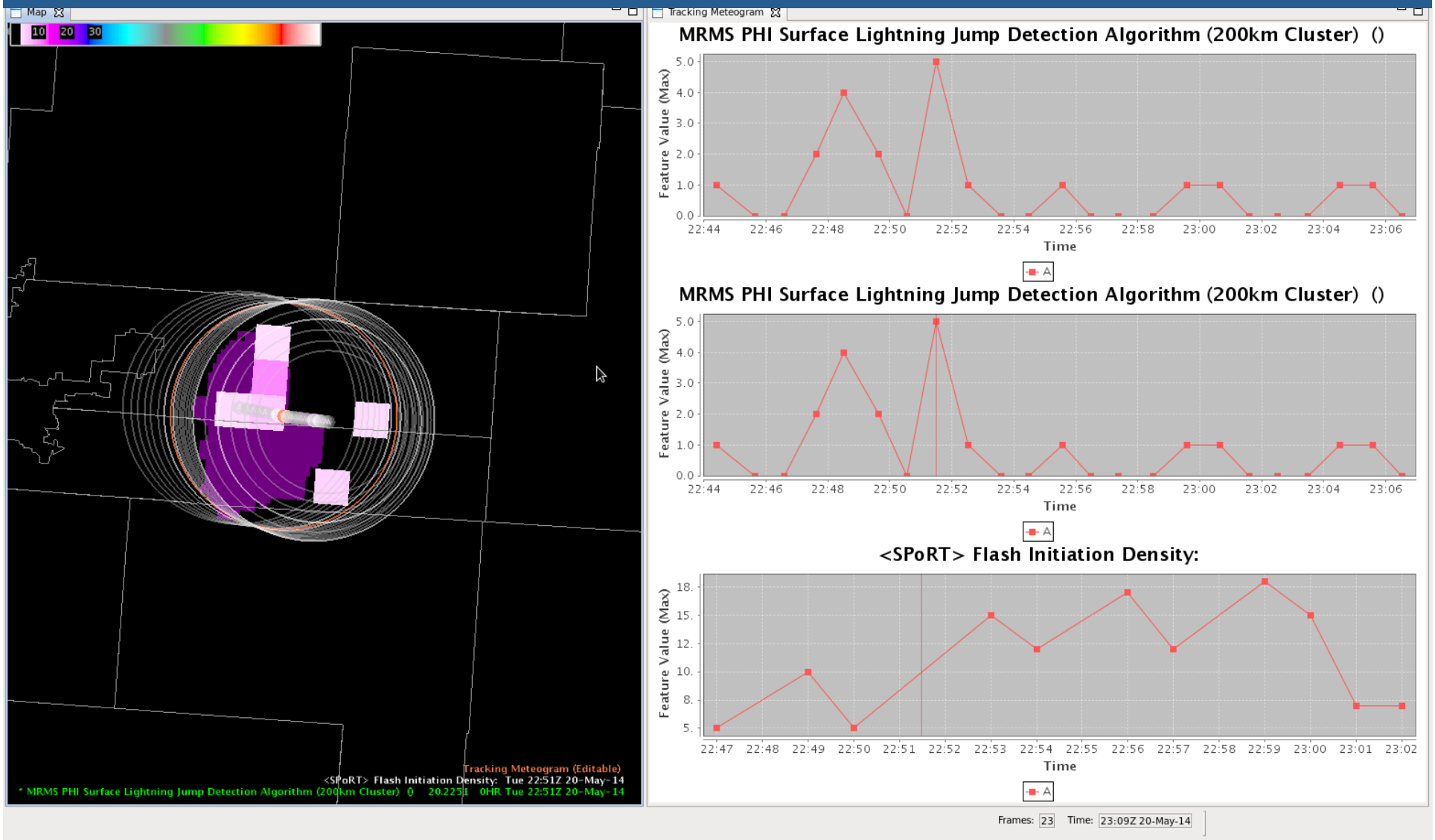


Reflectivity @ -10 C



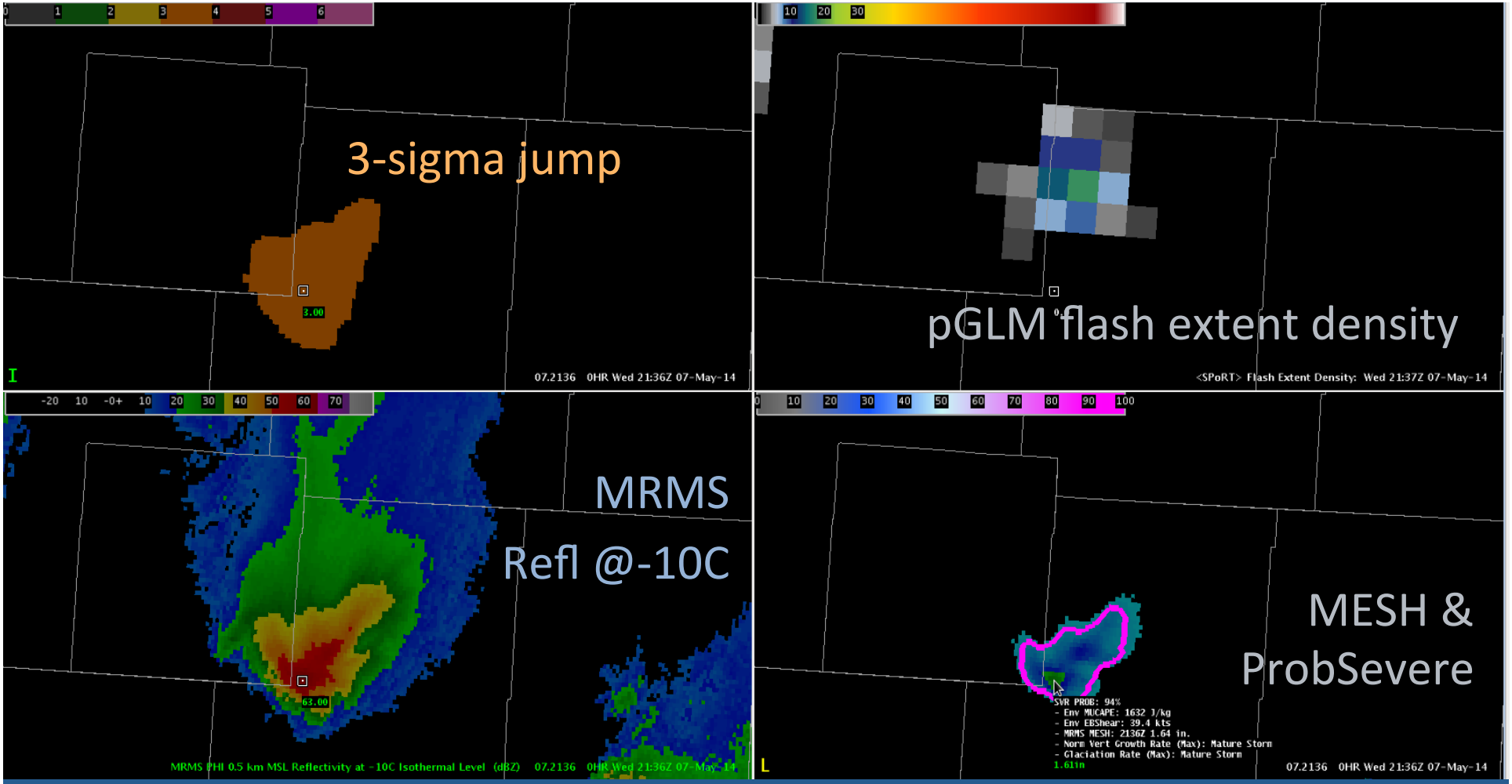
Flash Extent Density

Flash Initiation Density


Map
10
20
30
Tracking Meteogram (Editable)
<SPoRT> Flash Initiation Density: Tue 22:51Z 20-May-14
* MRMS PHI Surface Lightning Jump Detection Algorithm (200km Cluster) 0 20.225 0HR Tue 22:51Z 20-May-14
Tracking Meteogram
MRMS PHI Surface Lightning Jump Detection Algorithm (200km Cluster) ()
Feature Value (Max)
5.0
4.0
3.0
2.0
1.0
0.0
22:44 22:46 22:48 22:50 22:52 22:54 22:56 22:58 23:00 23:02 23:04 23:06
Time
A
MRMS PHI Surface Lightning Jump Detection Algorithm (200km Cluster) ()
Feature Value (Max)
5.0
4.0
3.0
2.0
1.0
0.0
22:44 22:46 22:48 22:50 22:52 22:54 22:56 22:58 23:00 23:02 23:04 23:06
Time
A
<SPoRT> Flash Initiation Density:
Feature Value (Max)
18.
15.
12.
10.
8.
5.
22:47 22:48 22:49 22:50 22:51 22:52 22:53 22:54 22:55 22:56 22:57 22:58 22:59 23:00 23:01 23:02
Time
A
Frames: 23 Time: 23:09Z 20-May-14

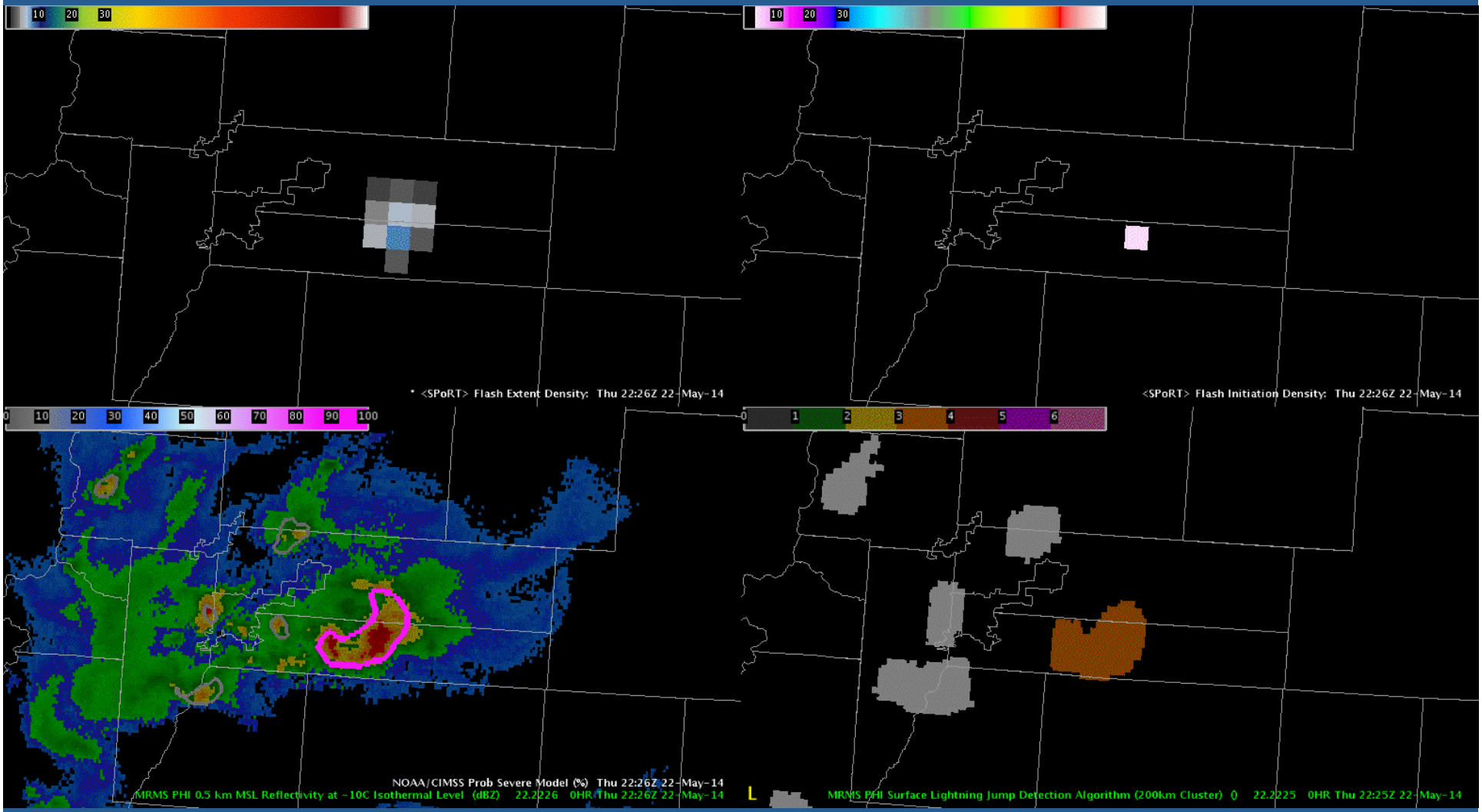
Current work:
Lightning Jump Algorithm

- HWT evaluation over LMA regions
  - real-time: < 2 min delay – primarily due to LMA lag time
- High-resolution evaluation
  - SHAVE data & radar-proxy (e.g., MESH)



Lightning data was heavily utilized in Warning Operations:

- 1 min update (filled in gaps in time / distance from radars)
- Jump provided view of rapid intensification in multiple storm environments
- Provided extra confidence in warning decision

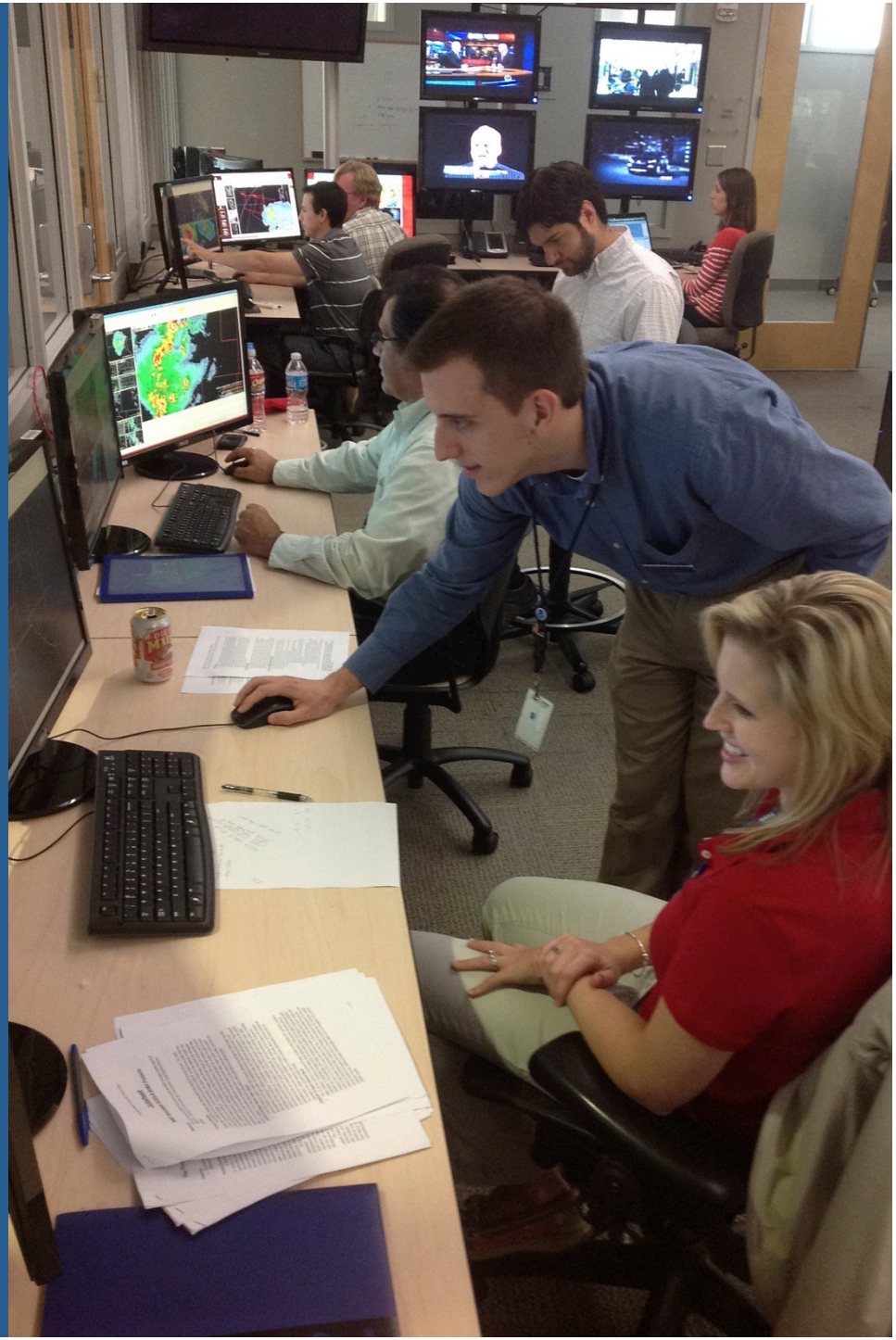

10 20 30
* <SPoRT> Flash Extent Density: Thu 22:26Z 22-May-14
10 20 30
<SPoRT> Flash Initiation Density: Thu 22:26Z 22-May-14
10 20 30 40 50 60 70 80 90 100
NOAA/CIMSS Prob Severe Model (%) Thu 22:26Z 22-May-14
MRMS PHI 0.5 km MSL Reflectivity at -10C Isothermal Level (dBZ) 22.2226 0HR Thu 22:26Z 22-May-14
1 2 3 4 5 6
L
MRMS PHI Surface Lightning Jump Detection Algorithm (200km Cluster) 0 22.2225 0HR Thu 22:25Z 22-May-14

Comments from the 2014 Lightning Jump Evaluation:

"When I saw the jump and maybe a couple scans in a row, I was confident to issue a severe t'storm warning. It also drew my eye to the storm in general!"

"The jumps were very helpful in identifying quickly intensifying storms. … it provided valuable information that, to my knowledge, is not displayed elsewhere."

"I really think this could be one of the most valuable tools in WFO operations. Once a jump - or more precisely a series of jumps occurred - there seem to be excellent correlation to an increase in storm intensity."



HWT provides ability to integrate forecaster opinions prior to implementation

For LJA this means improvements such as flash rate (current / past) and integration with other tools

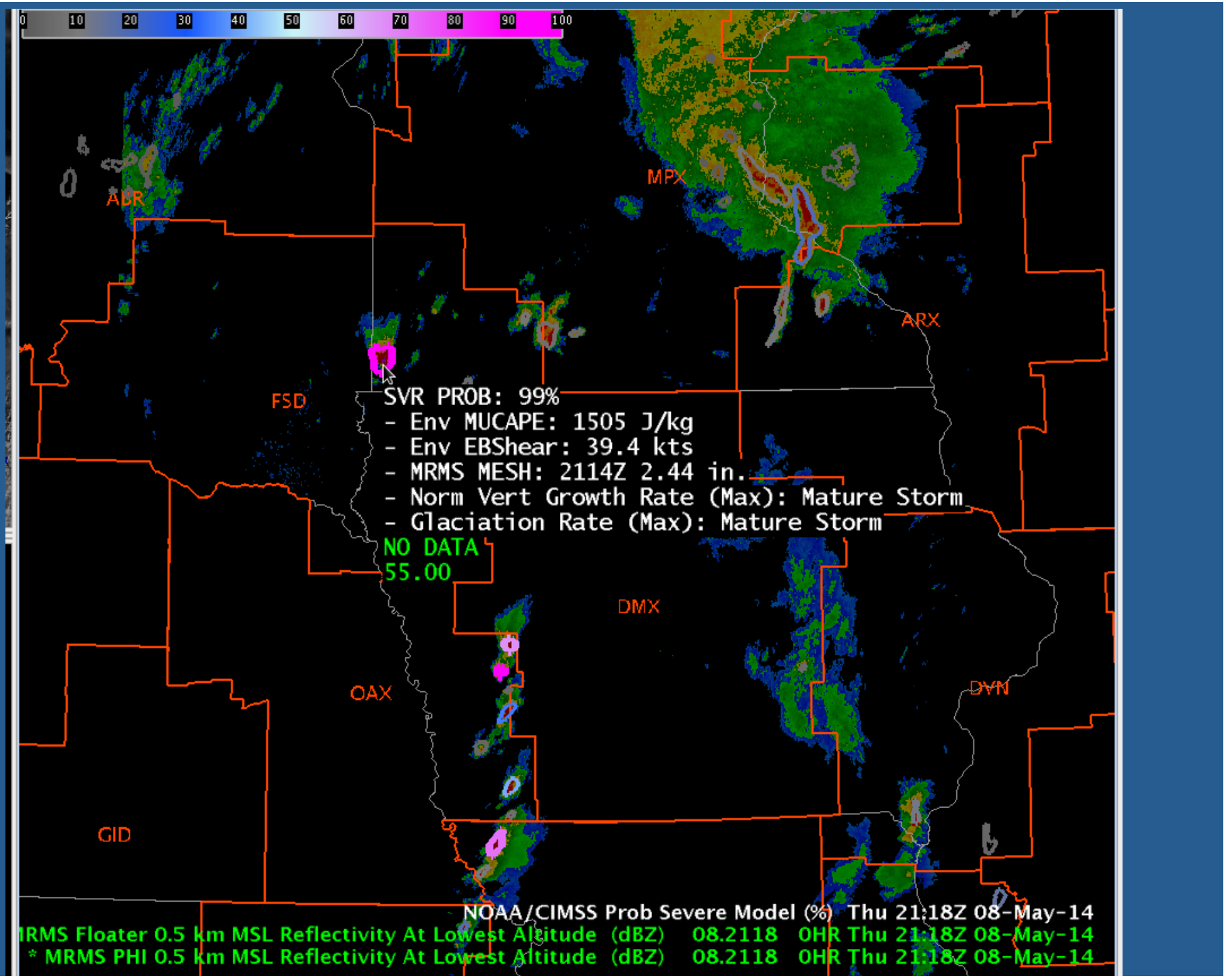
Future work (year 2/3): Lightning Jump Algorithm

CONUS-wide evaluation of LJA using Earth Networks data.

increased computational resources to complete CONUS-wide storm tracking, but fewer problems with range dependency

Collaboration with UW-CIMSS (Pavolonis / Cintineo) for probablistic-based fusion product

Combines Satellite, Radar, NWP and Lightning data for probabilities of severe (hail / wind / tornado)


0 10 20 30 40 50 60 70 80 90 100
ABR
MPX
ARX
FSD
SVR PROB: 99%
- Env MUCAPE: 1505 J/kg
- Env EBShear: 39.4 kts
- MRMS MESH: 2114Z 2.44 in.
- Norm Vert Growth Rate (Max): Mature Storm
- Glaciation Rate (Max): Mature Storm
NO DATA
55.00
DMX
OAX
DVN
GID
NOAA/CIMSS Prob Severe Model (%) Thu 21:18Z 08-May-14
IRMS Floater 0.5 km MSL Reflectivity At Lowest Altitude (dBZ) 08.2118 0HR Thu 21:18Z 08-May-14
* MRMS PHI 0.5 km MSL Reflectivity At Lowest Altitude (dBZ) 08.2118 0HR Thu 21:18Z 08-May-14