



NGLMA

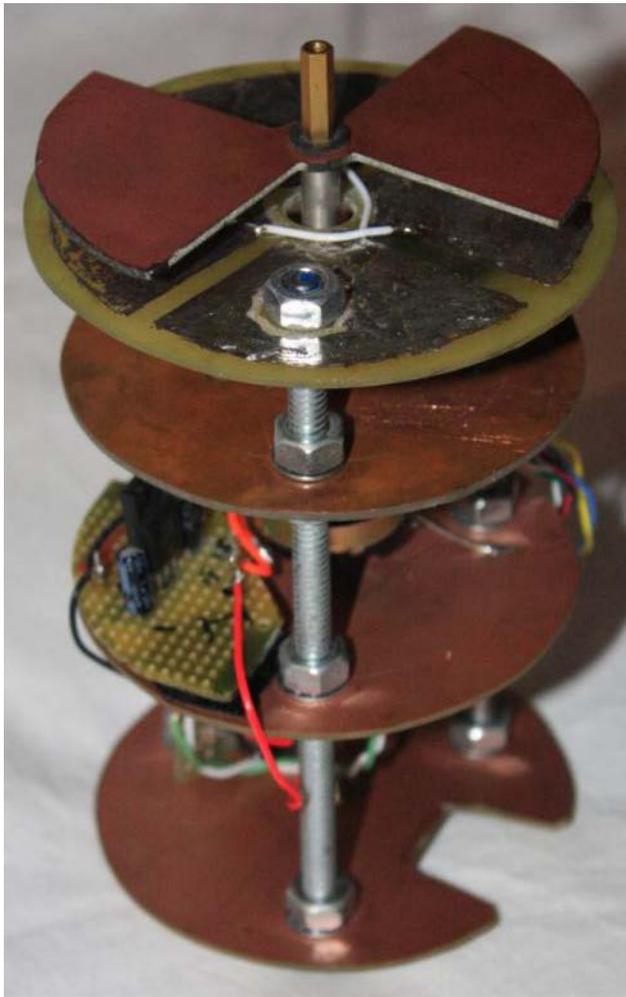
North Georgia Lightning Mapping Array

John Trostel
Severe Storms Research Center
Georgia Tech Research Institute

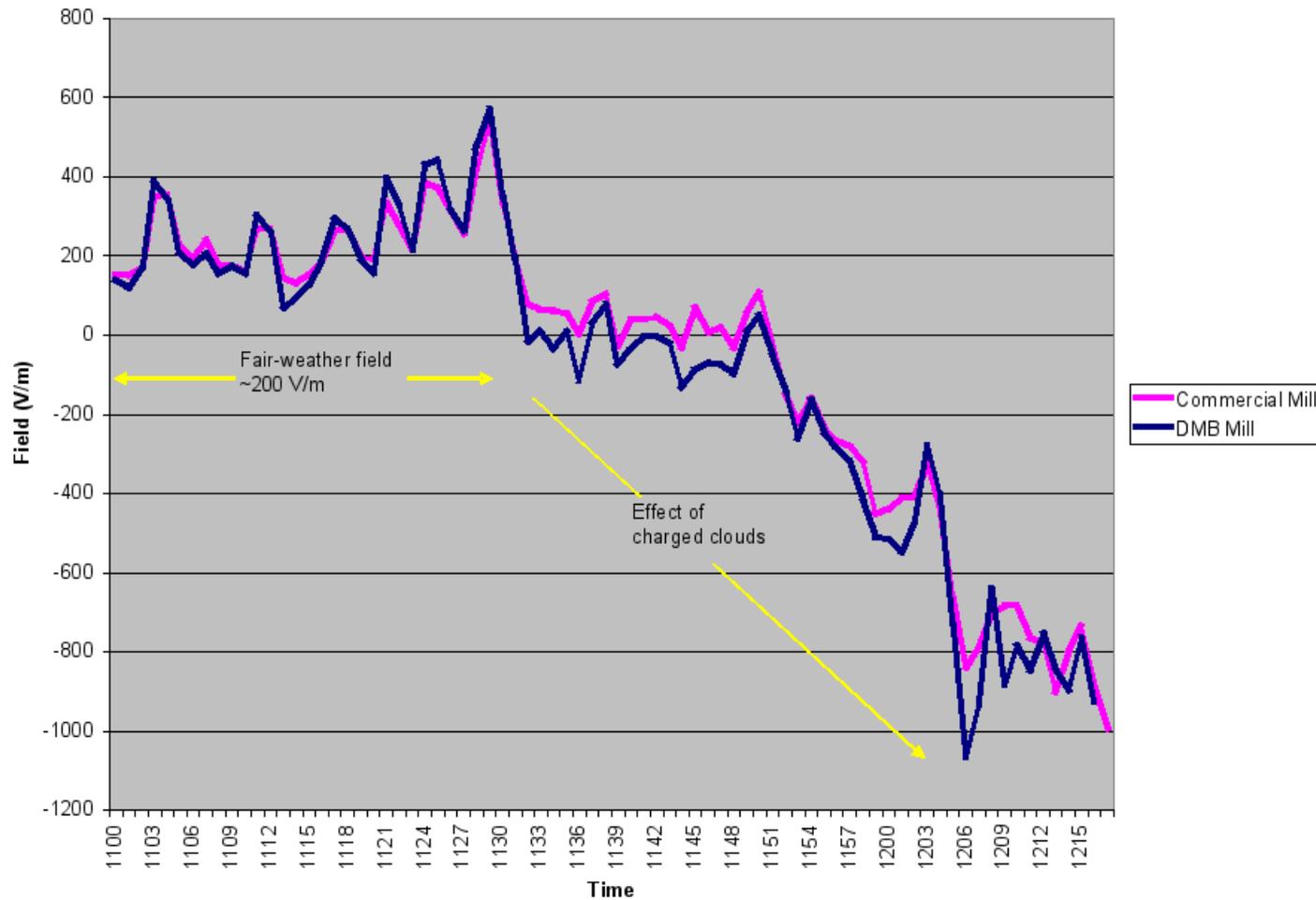
GLM Annual Science Team Meeting, 24 Sept 2013

- **Development of the High School Field Mill**
- **Collaboration with GT EAS for HASP**
- **Investigation of CG/CC lightning rate and tornadogenesis**
- **Operation of LMA stations at CCRF and NWSFO Peachtree City and expansion to independent NGLMA**

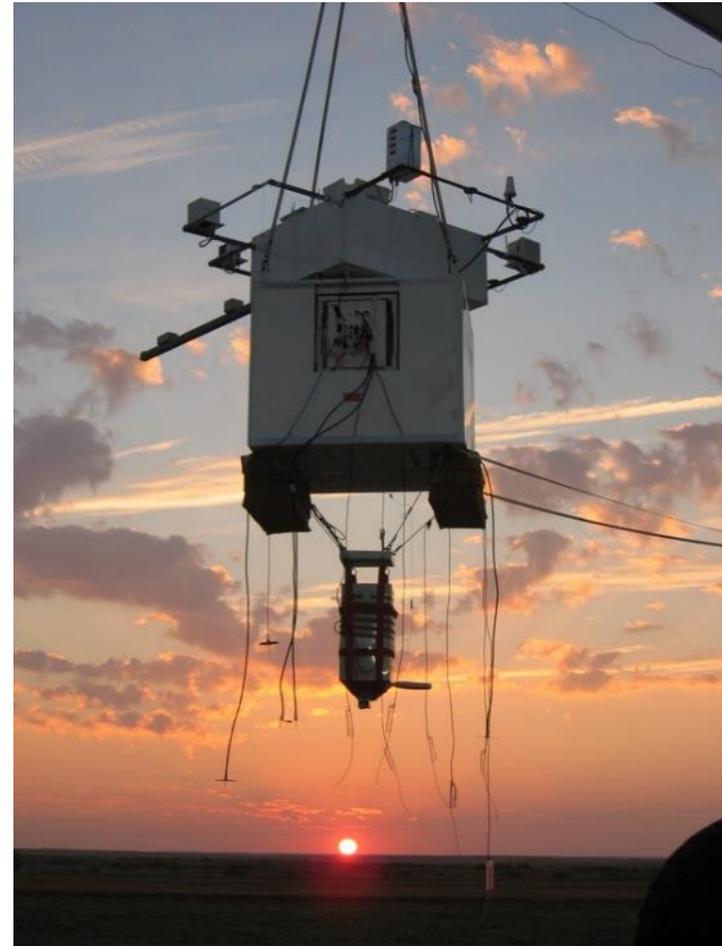
Progression of the HS Field Mill



Side by Side Comparison with EFM-II

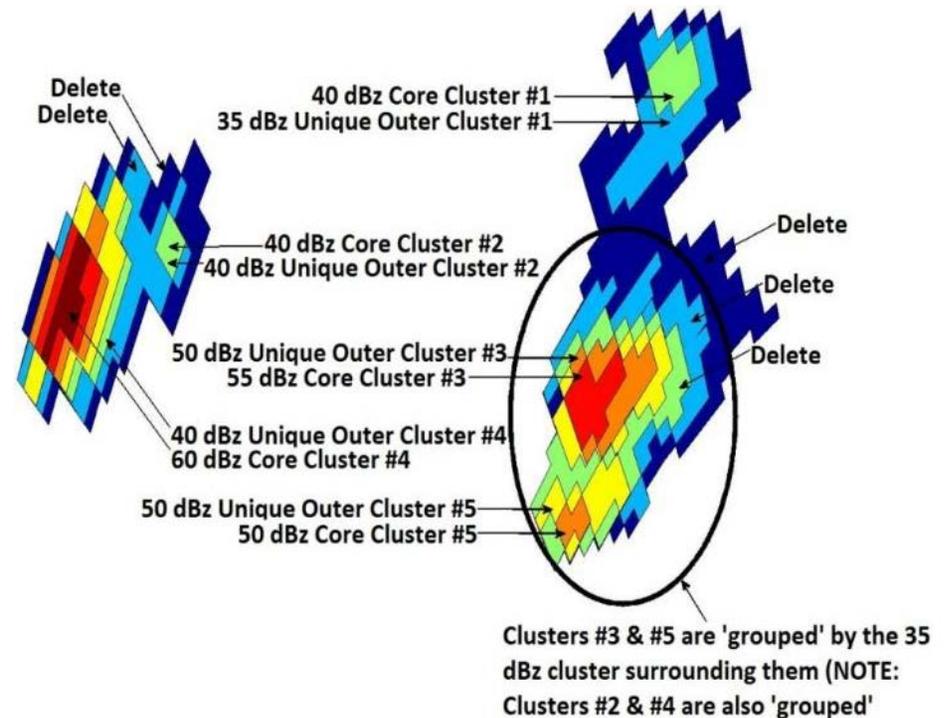
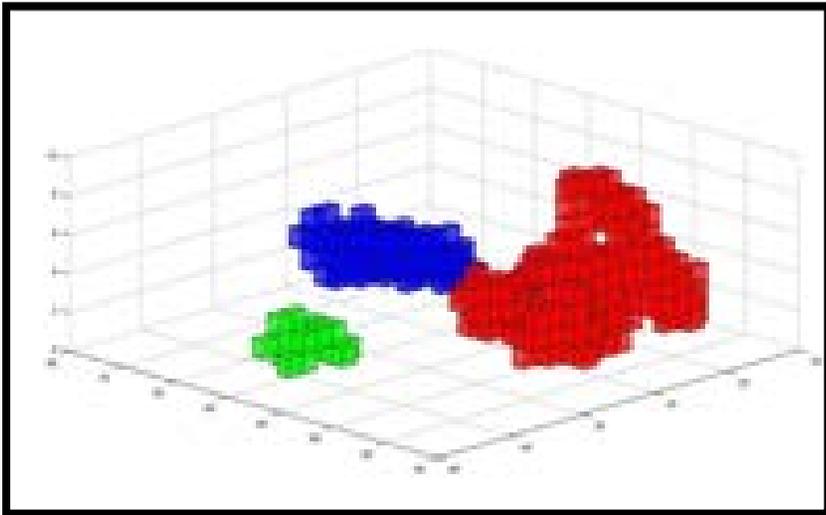


- NASA High Altitude Scientific Platform (HASP) Balloon-borne Electric Field Meter

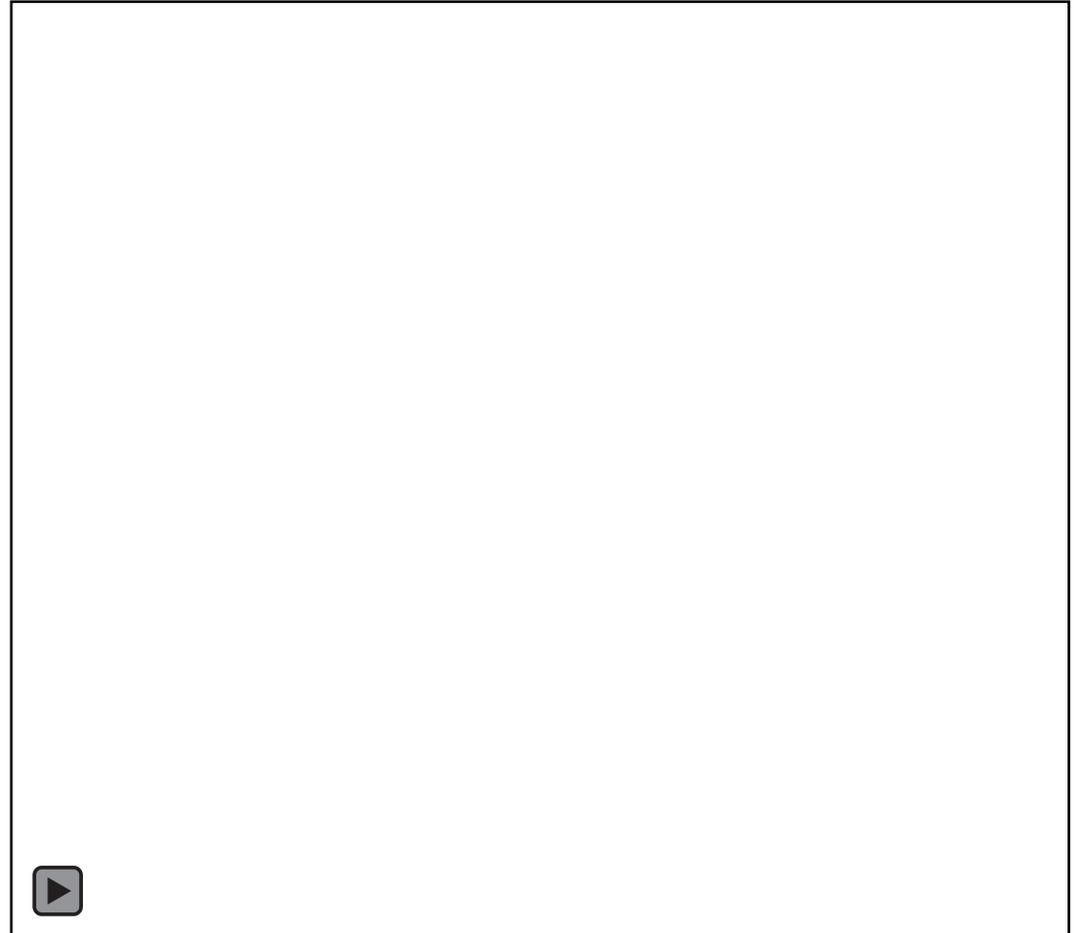
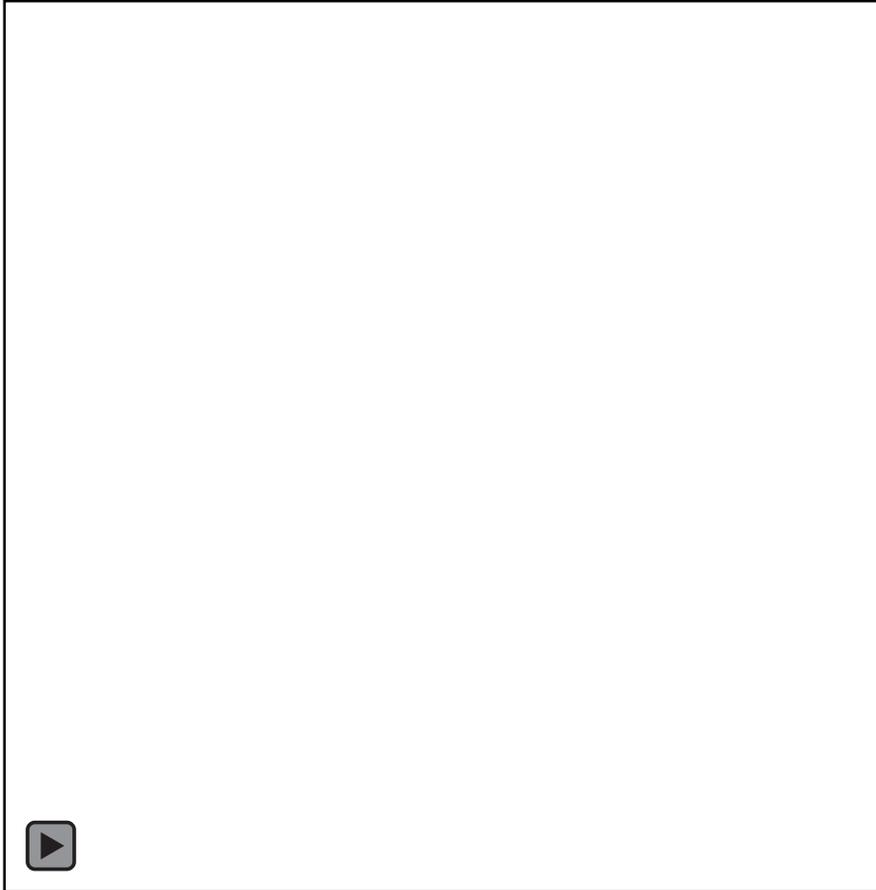


Improved GT SCIT – Cell Definition using DBSCAN

- Multiple threshold, three dimensional clustering method:
 - Density Based Spatial Clustering Algorithm with Noise (DBSCAN)
 - Allows for irregular, concave and convex 3-D objects
 - Allows for high reflectivity cores with lower reflectivity 'unique outer clusters'
 - Cell tracking using JPDA



Original NEXRAD and Tracked Cells

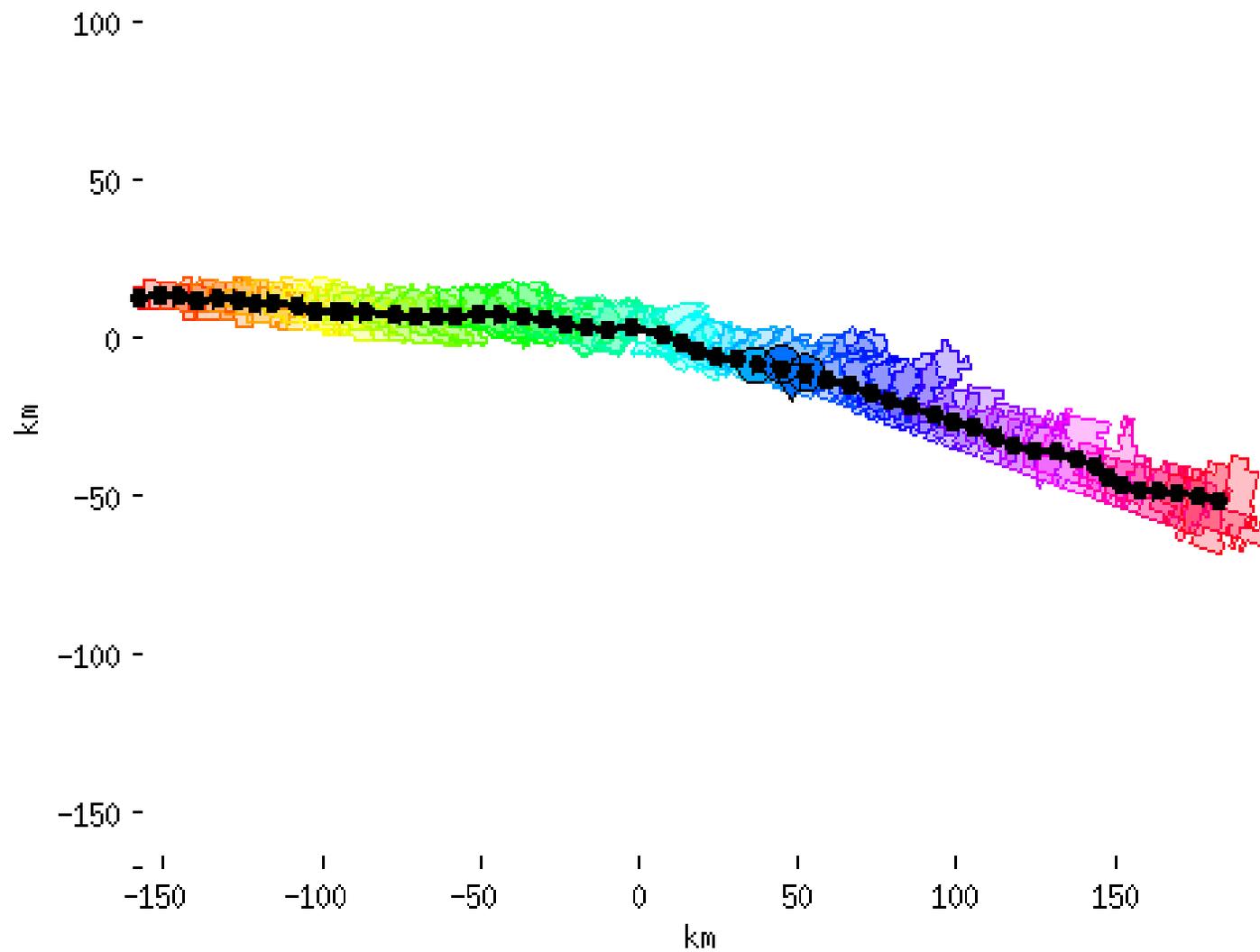


Initial Frontal Passage: Magenta and Blue cells

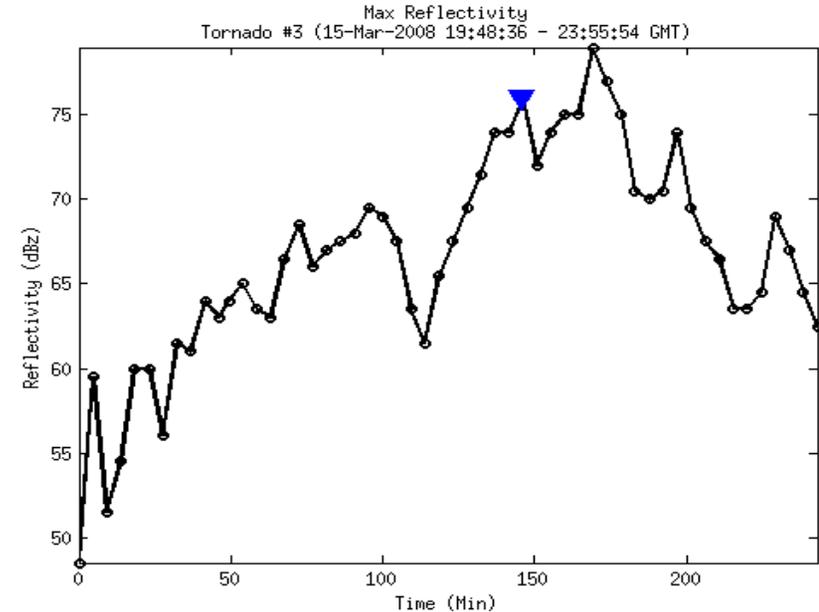
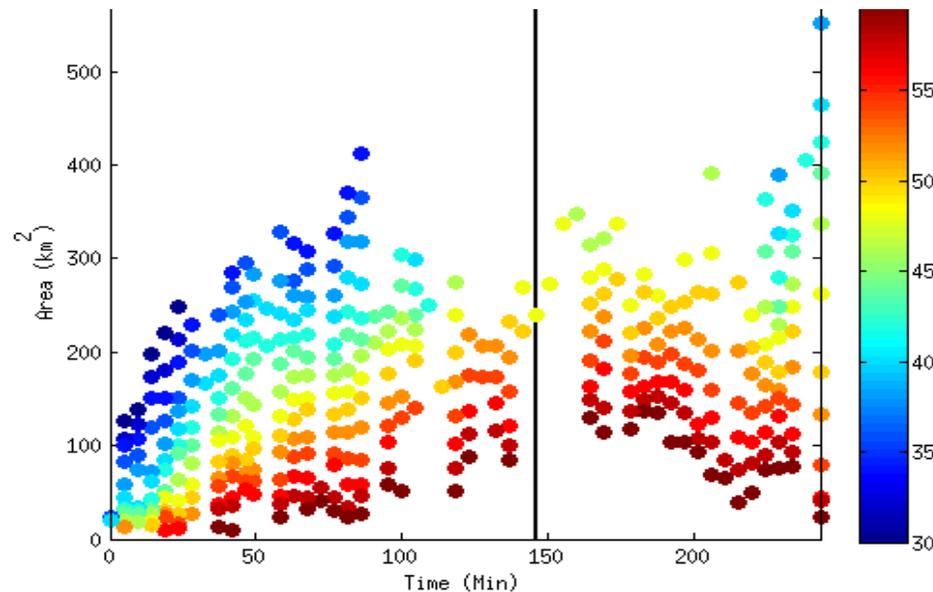
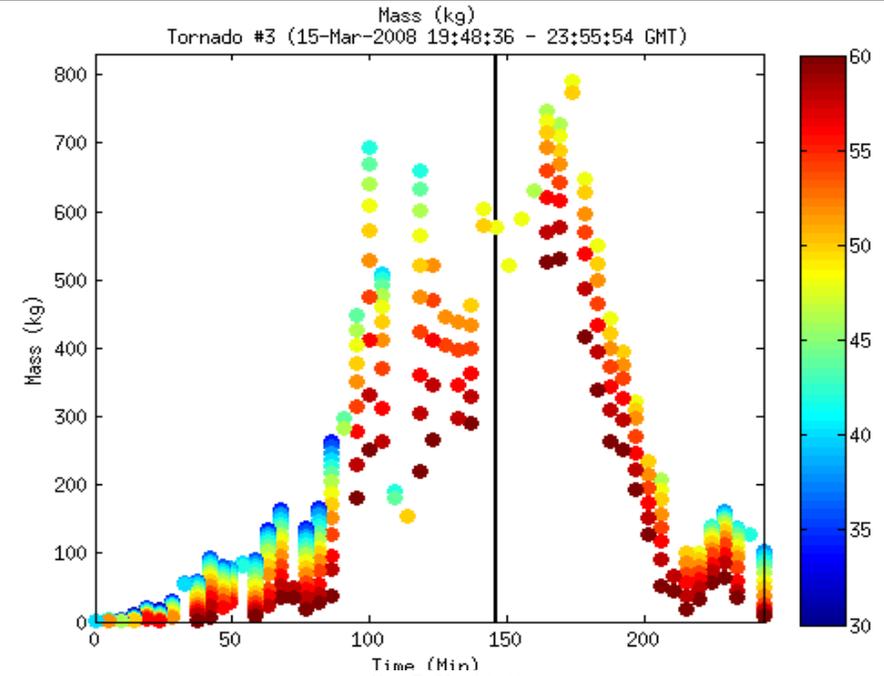
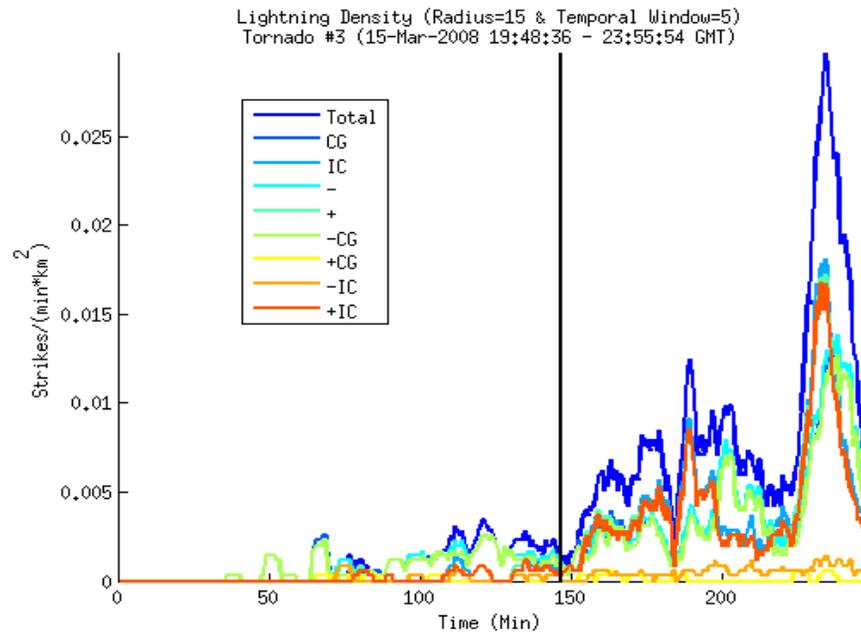
Trailing Cold Front: Red, Green, Cyan

Cell #3 (EF0): Track Quality

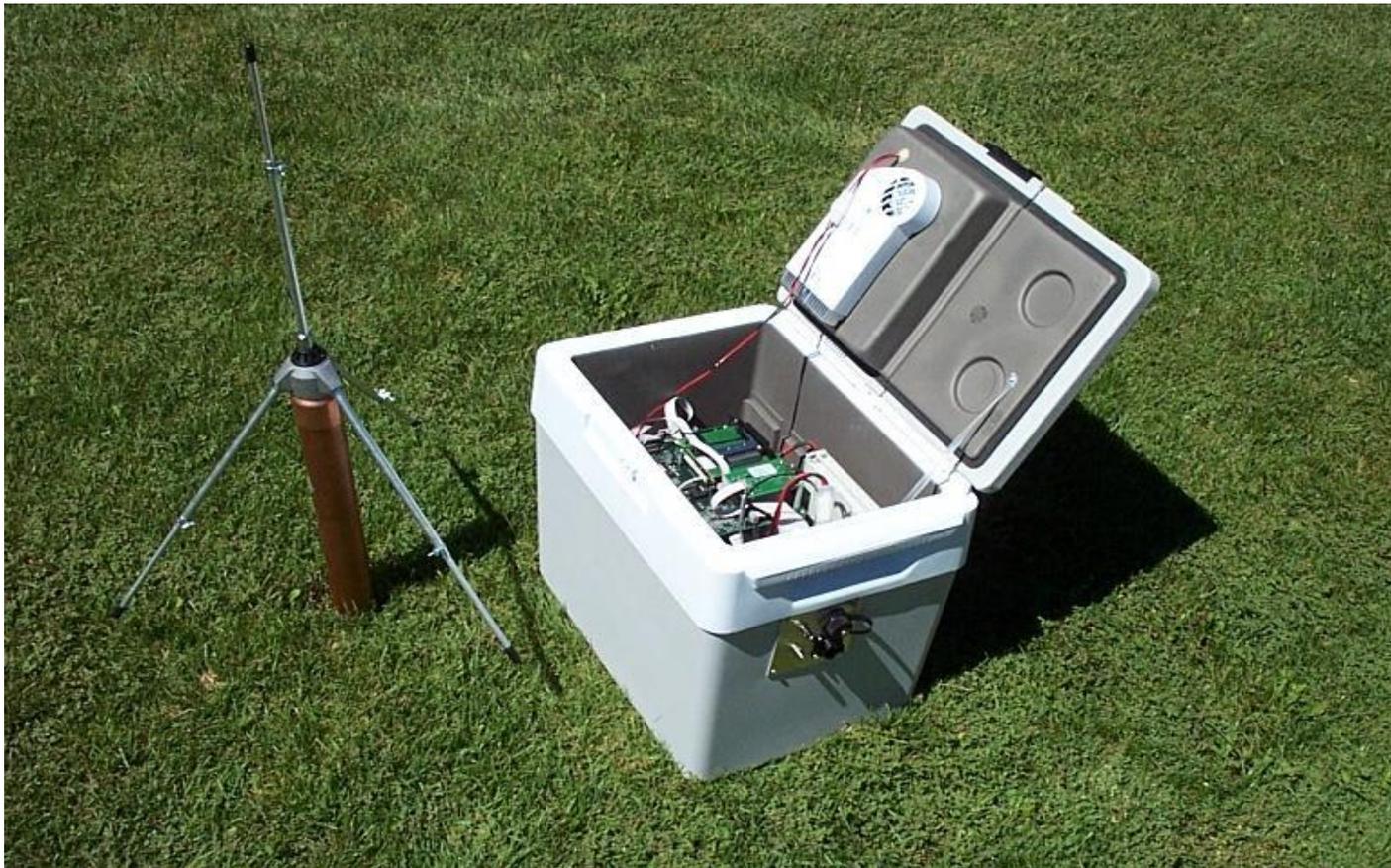
Storm Cell Track
Tornado #3 (15-Mar-2008 19:48:36 - 23:55:54 GMT)



Lightning Association and Determination of Bulk Properties



Original (2006) Equipment Description



(Illustration source: New Mexico Tech)

- **Electronic Cooler with VHF Antenna**
- **Original LMA Hardware acquired and installed in 2006**
- **Additional unit acquired in 2008 and installed in 2013**



Antennae located on facility roof



**Computer in Cooler
in Operations Room**

LMA at NWSFO Peachtree City



Antenna mounted on mast



**Computer in Cooler in
Computer Room**

Emory/Atlanta Install



Antenna mounted on roof of building on Clifton Rd.



- **Cooler inside building a floor below**
- **Diagnostics being performed using keyboard and monitor**

New LMA Sensor Style



Early 2013 – GTRI learns to assemble more compact NMT sensors

Emory/Yerkes Install



Antenna on roof on pallet



Interior placement of new design computer, power supply and battery

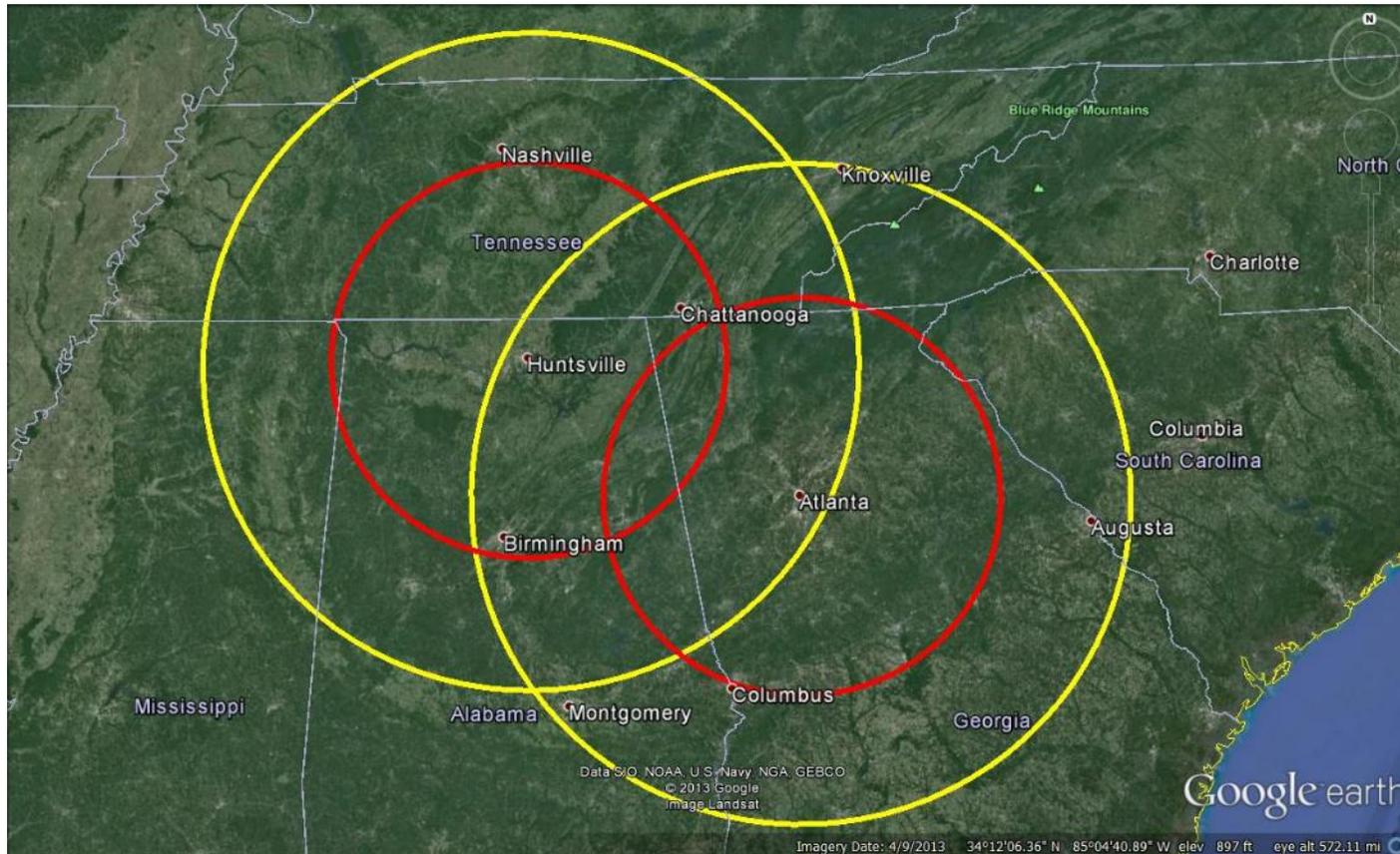
Sensor Deployment Schedule

Entries in parentheses and italicized are (*planned*), but not yet accomplished

Sensor Location	Fab & Test	ID Site	Survey Site	Installation
CCRF	2006	2006	2006	2006
NWS-KFFC	2006	2006	2006	2006
Emory	2008	2012	Apr/May 2013	May 2013
Yerkes	May/June 2013	May 2013	June 2013	July 2013
Oxford (Emory)	May/June 2013	May 2013	July 2013	Sept 2013
Douglas Co.	May/June 2013	<i>(Sept 2013)</i>	<i>(Sept 2013)</i>	<i>(Oct 2013)</i>
near Hartsfield Airport	May/June 2013	<i>(Sept 2013)</i>	<i>(Oct 2013)</i>	<i>(Oct 2013)</i>
Gwinnett Co.	May/June 2013	<i>(Oct 2013)</i>	<i>(Oct 2013)</i>	<i>(Nov 2013)</i>

Collaboration with NALMA

A network of networks



Rings centered around Huntsville and Atlanta
Inner, red rings at 150 km
Outer, yellow rings at 250 km

- **Deployment of minimal sensors to produce data**
 - **Complete Oxford deployment = 5 sensors**
 - **Work on processing computer ongoing**
 - **Data being ingested from SSRC, NWSFO, Emory, Yerkes, (Oxford)**
- **Identify, Survey and Install remaining 3 sensors**
 - **GEPD sites may be possible**
- **Produce data on processing computer**
 - **Output 10 minute, hourly and daily files for web**
 - **Output real-time data for ingest for AWIPS at NWS**
 - **Use real-time and archived data for SSRC research**