DC3 Lightning Mapping Observations
(work in progress)

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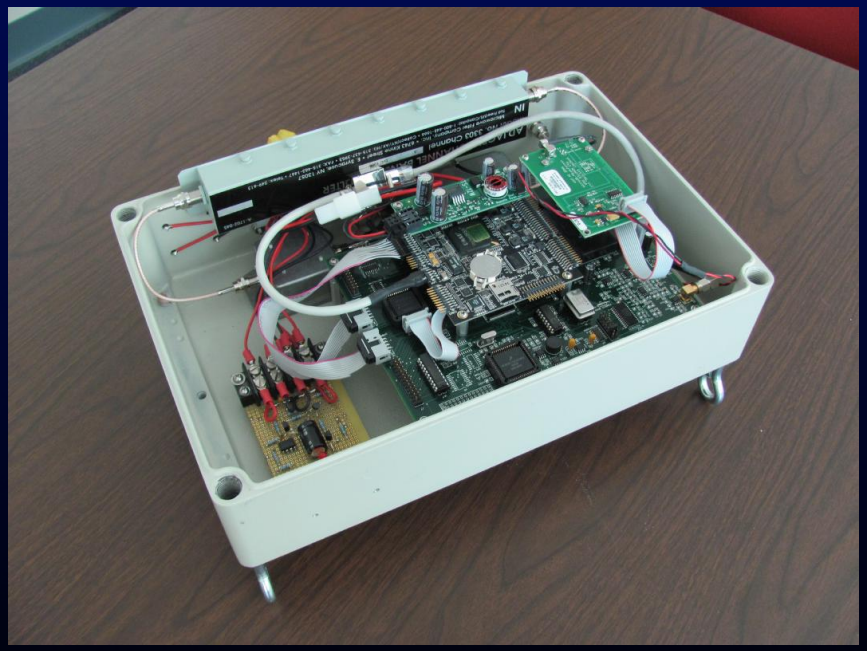
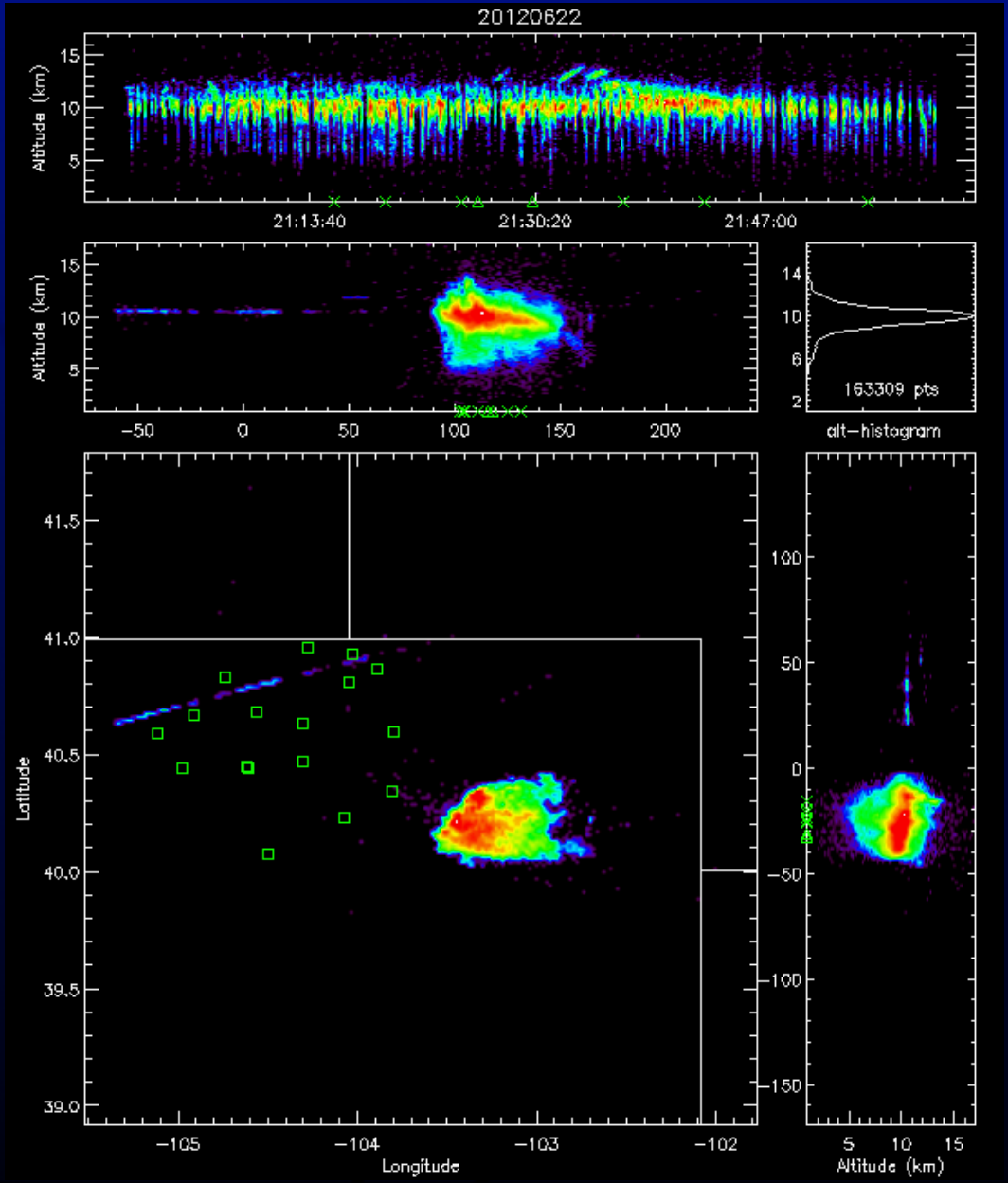
DC3 Teleconference
November 13, 2012

N. Colorado Lightning Mapping Array (LMA)
15 stations, 100 km diameter area

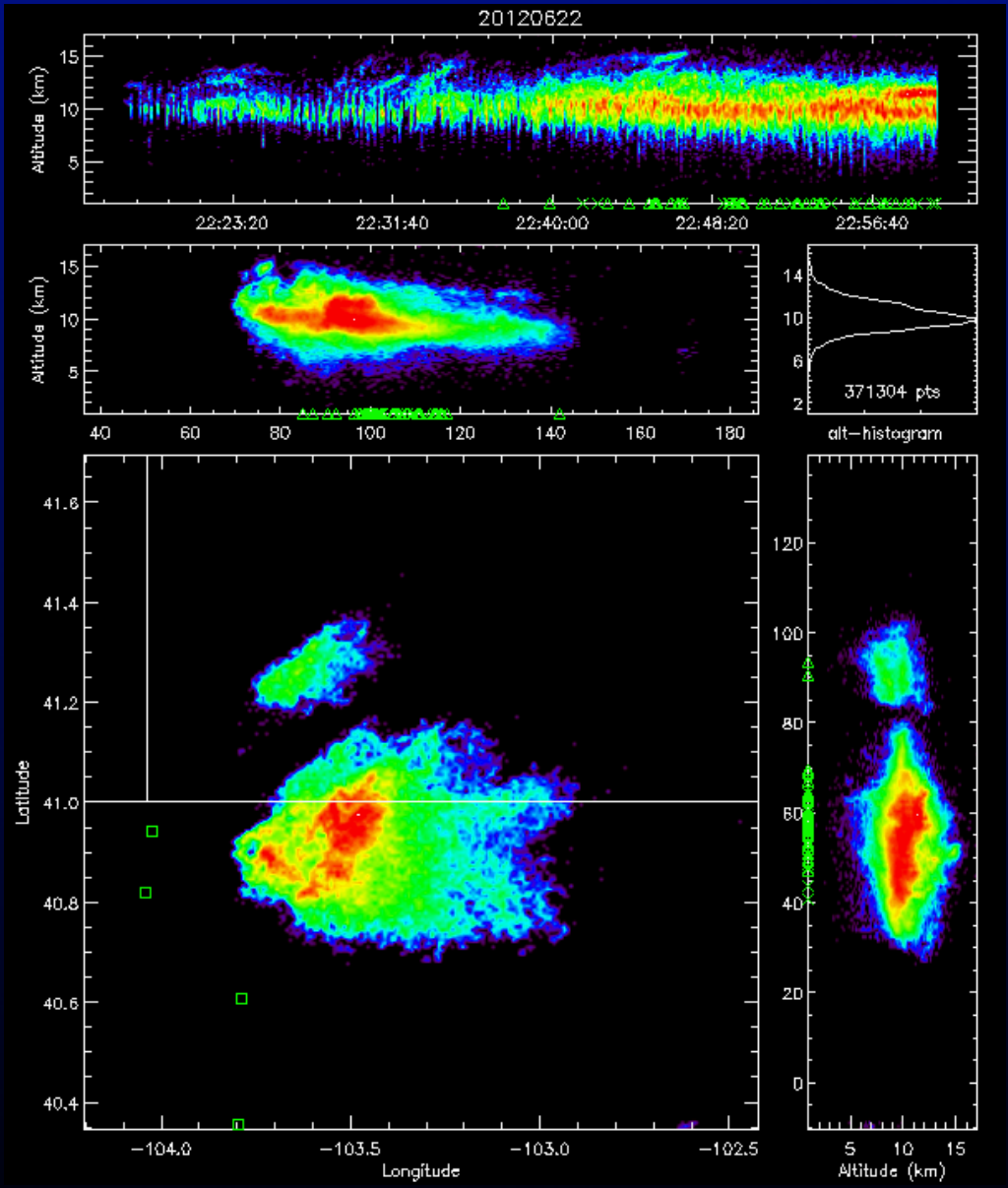


June 22 2012 storms (targeted by G-V and DC8)

First storm, 2100-2200 UTC

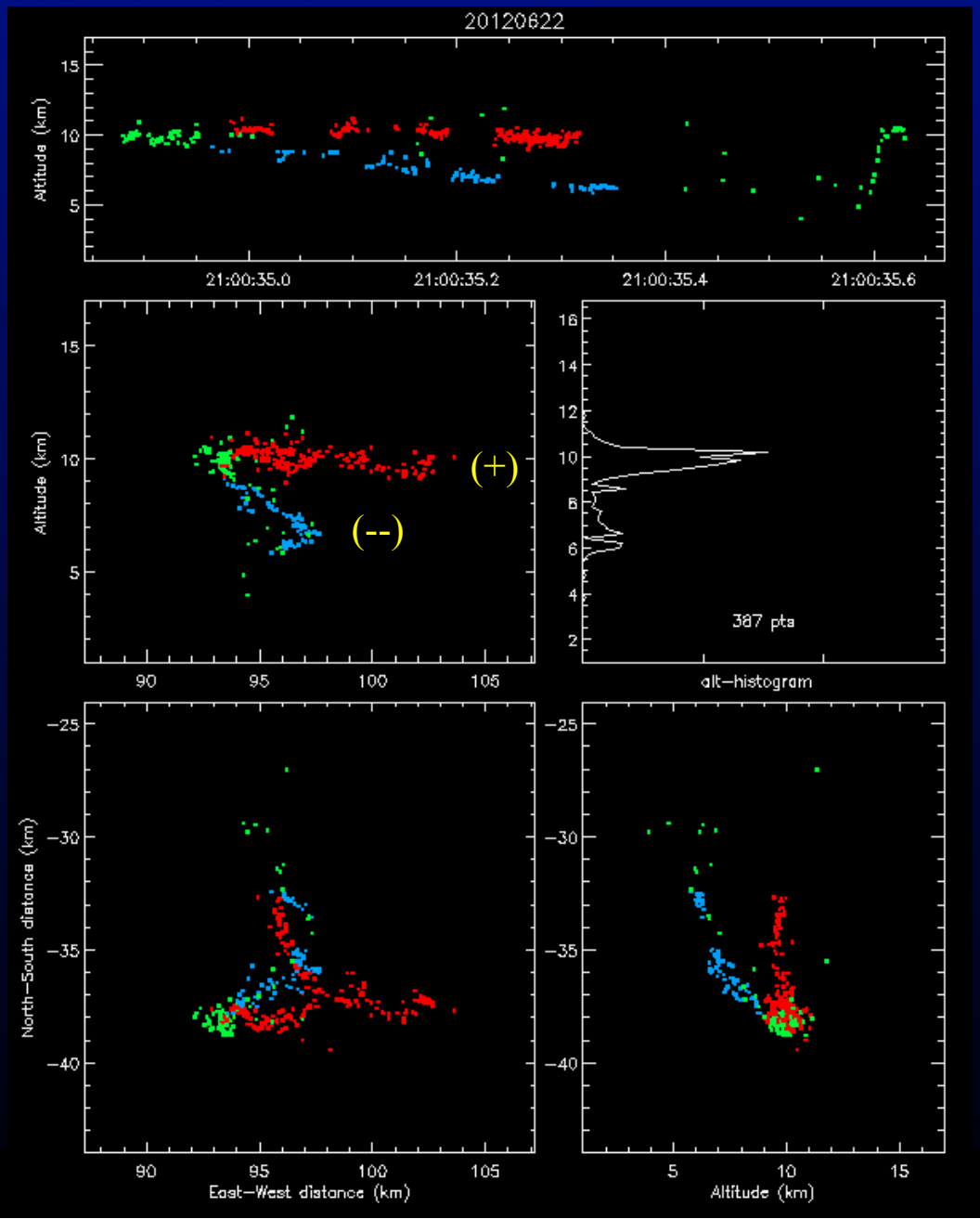


Second storm, 2215-2300 UTC

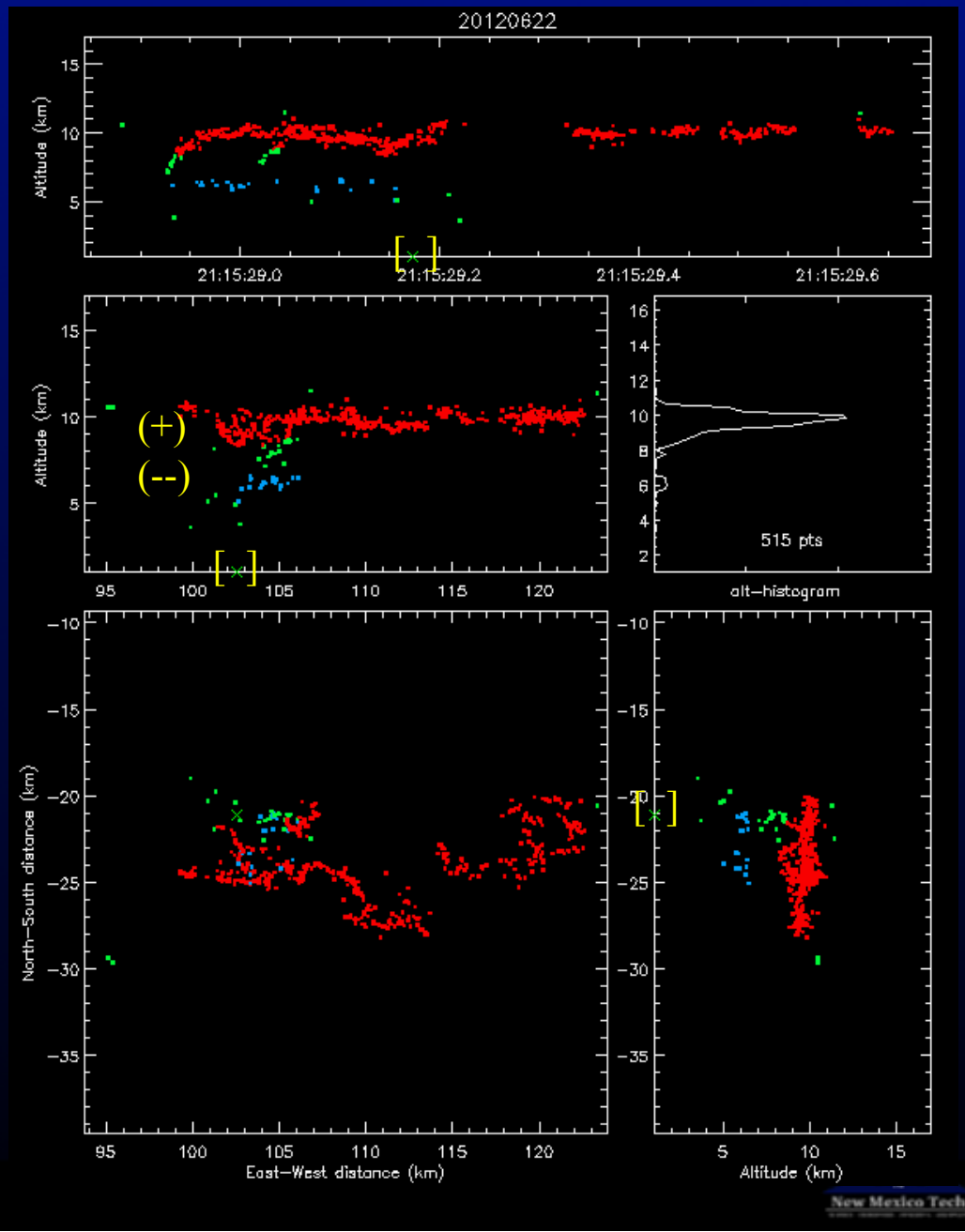


June 22 2012 First Storm: Early and later flash examples

21:00:34 UTC
Downward IC (normal polarity)

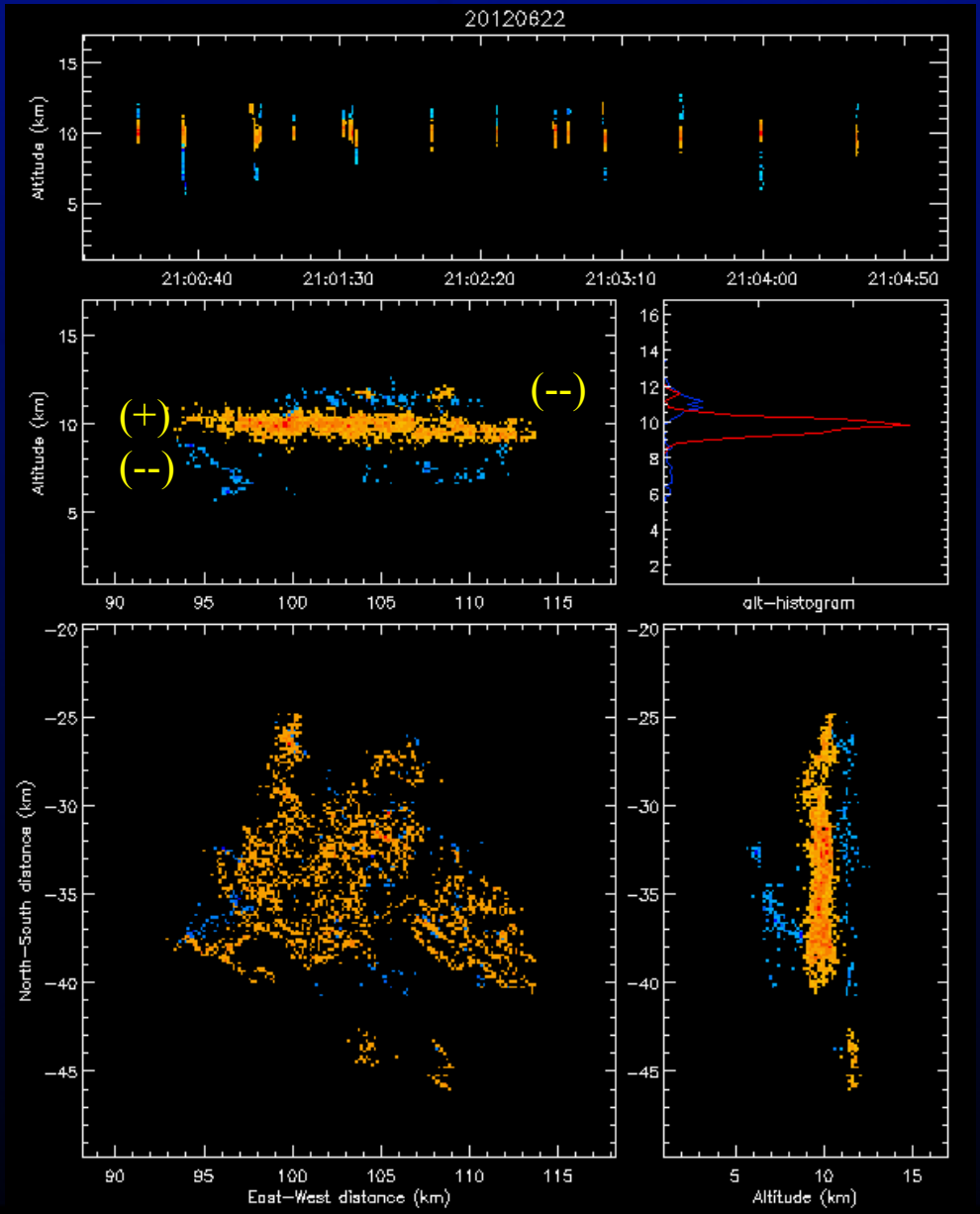


21:15:29 UTC
Upward IC (normal polarity) & 39 kA +CG!!

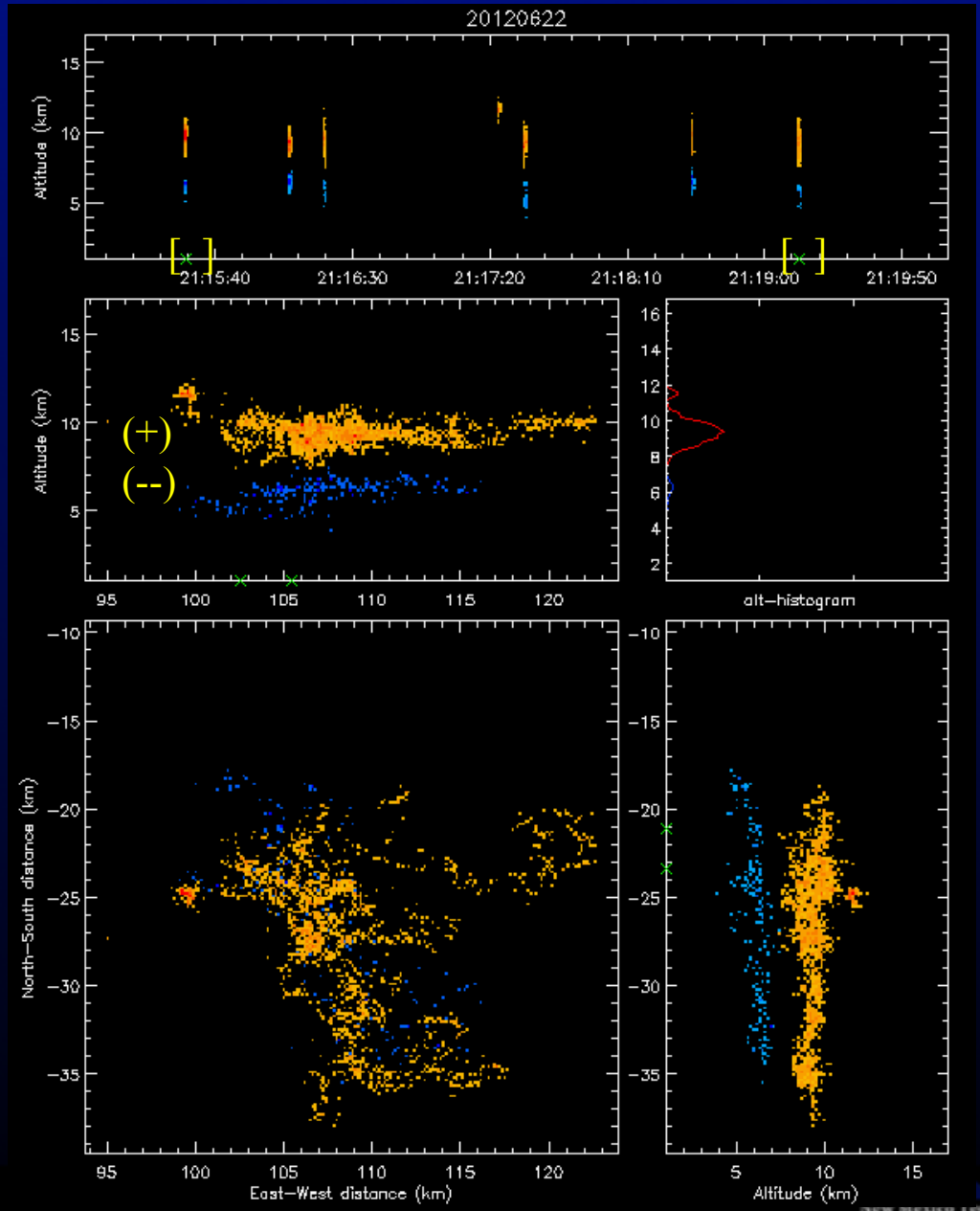


June 22 2012 First Storm: Charge Density Results

2100-2105 UTC (Early)
(screening discharges and downward ICs)



2115-2120 UTC (later)
(upward ICs and +CGs!)



Detailed VHF Interferometric Observations of an Intracloud Flash

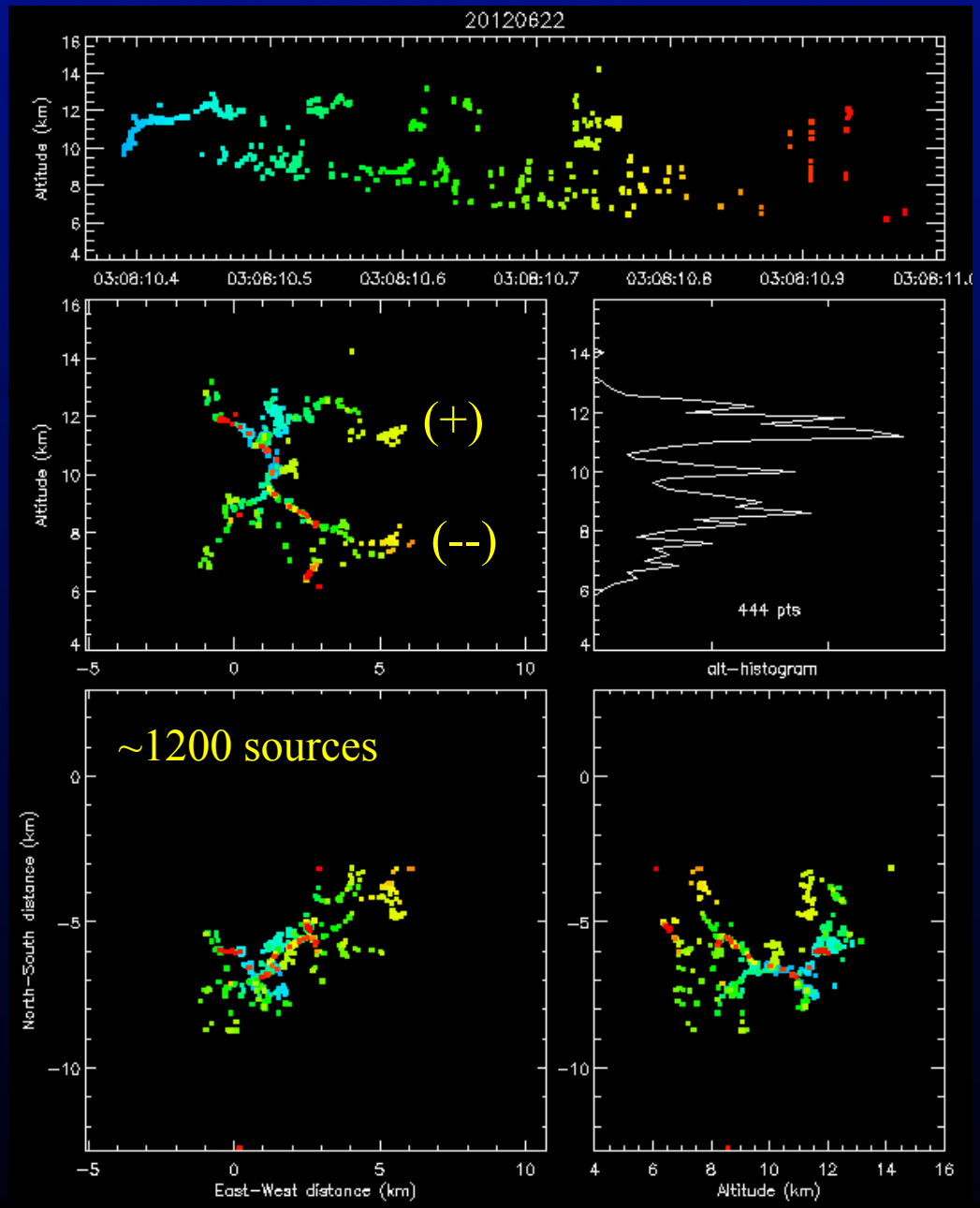
Langmuir Laboratory, Summer 2012

DARPA/NIMBUS QPR
Kennedy Space Center, FL
November 2, 2012

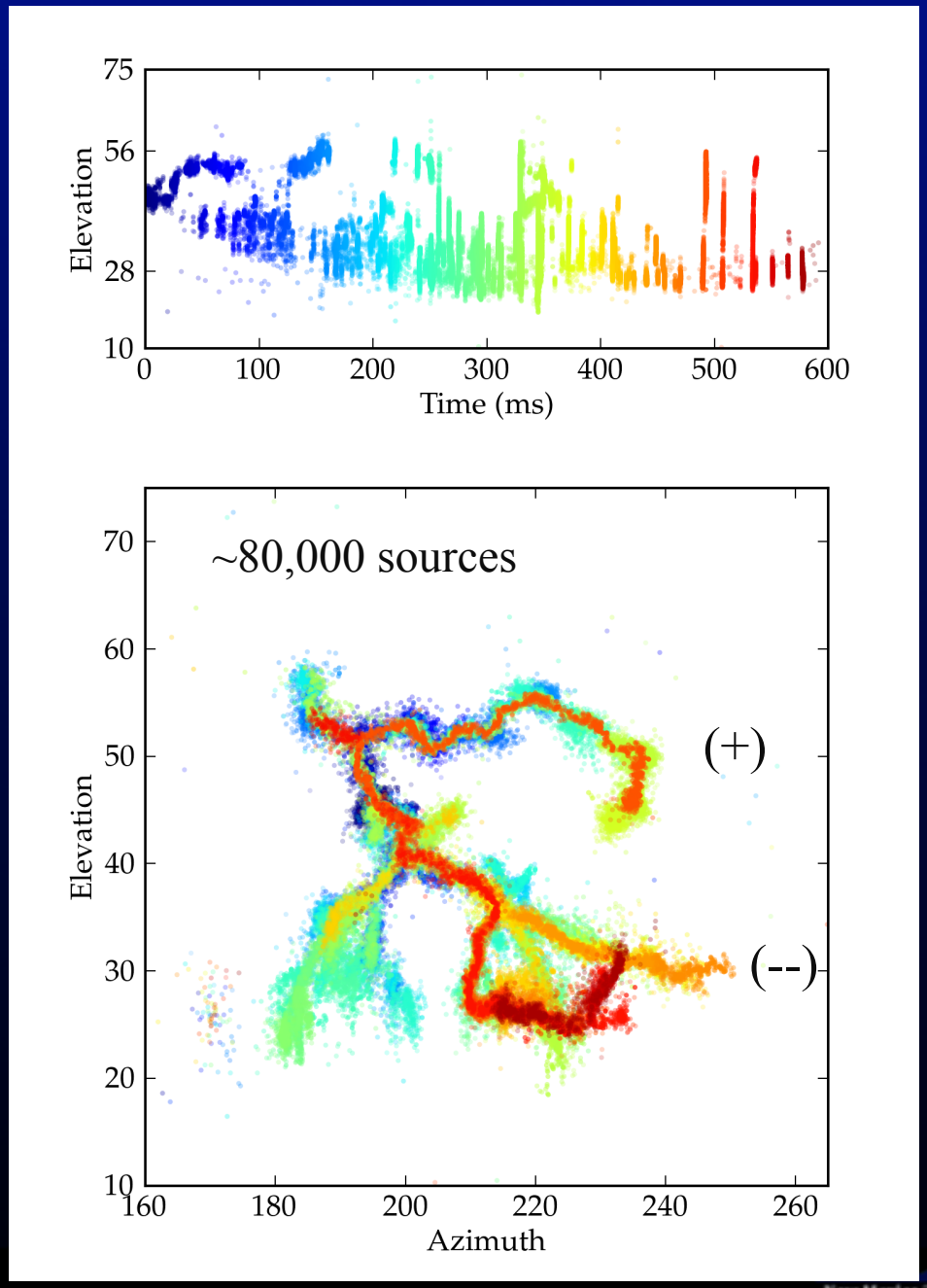
New Mexico Tech

Classic bilevel IC flash (normal polarity); Langmuir Laboratory,, August 8 2012

LMA observations (3D; 80 μs sampled)

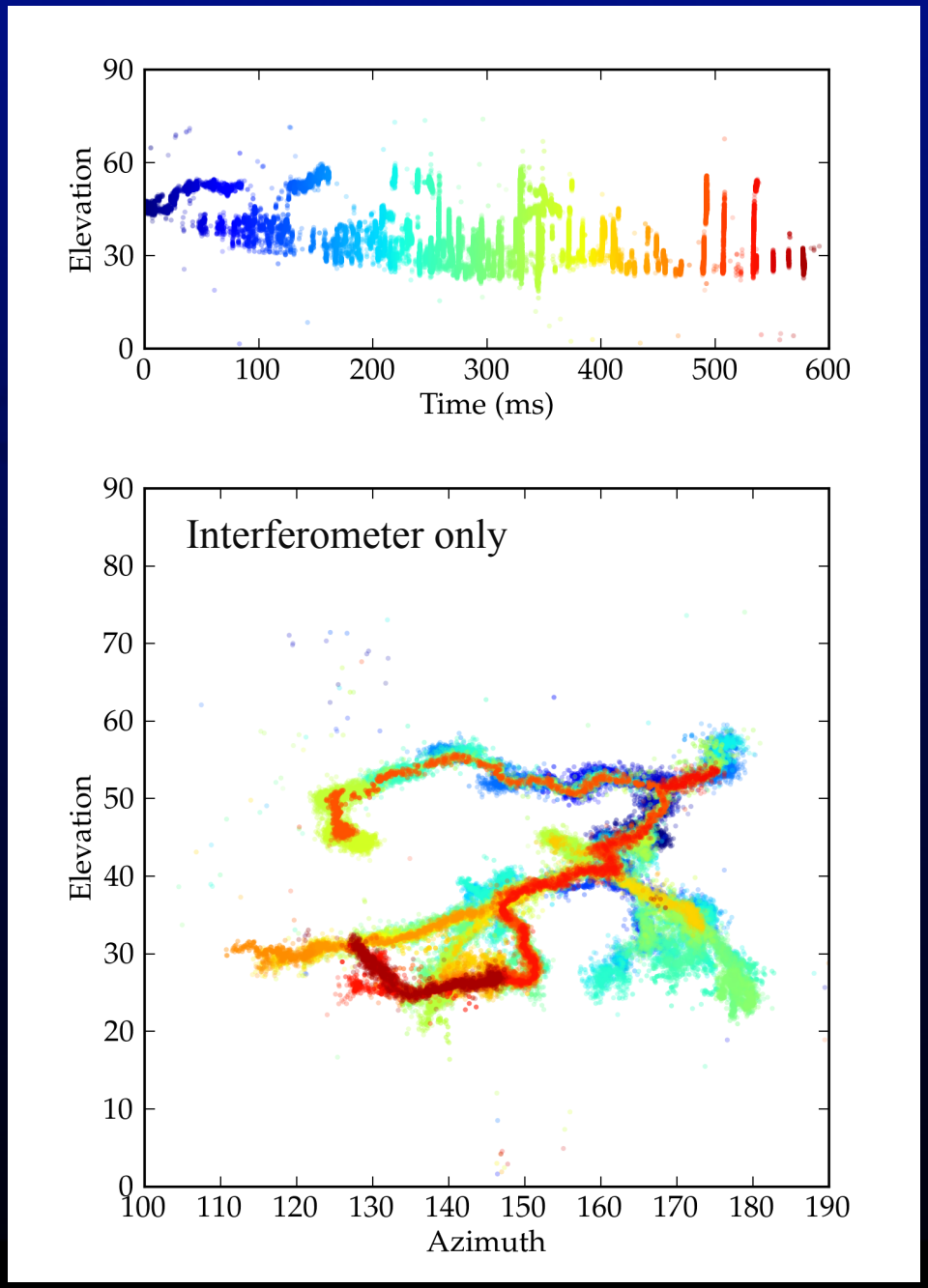


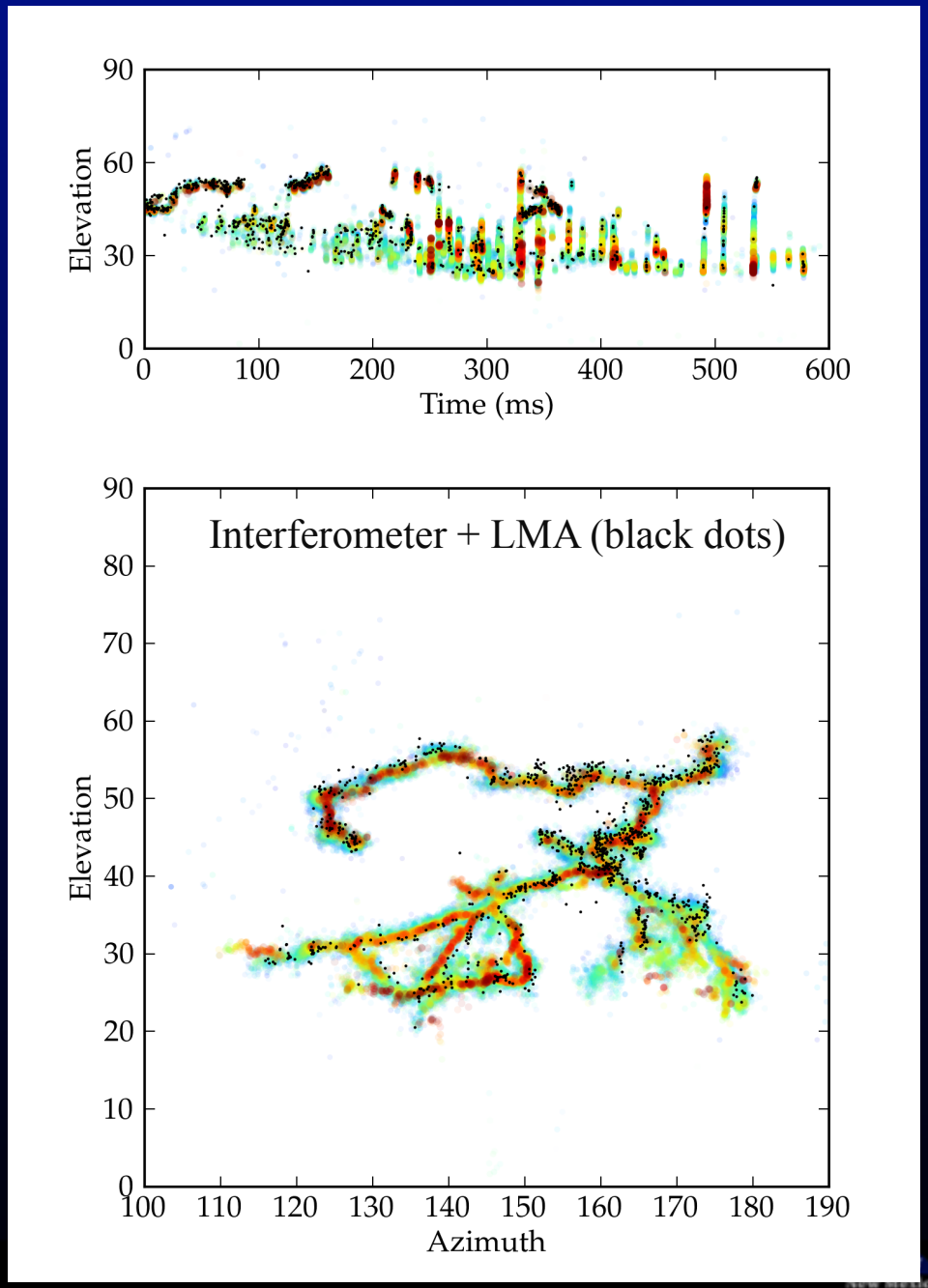
Intf observations (2D Az, El; 1 μs continous)



Use LMA data to estimate 3D structure of Interferometer data

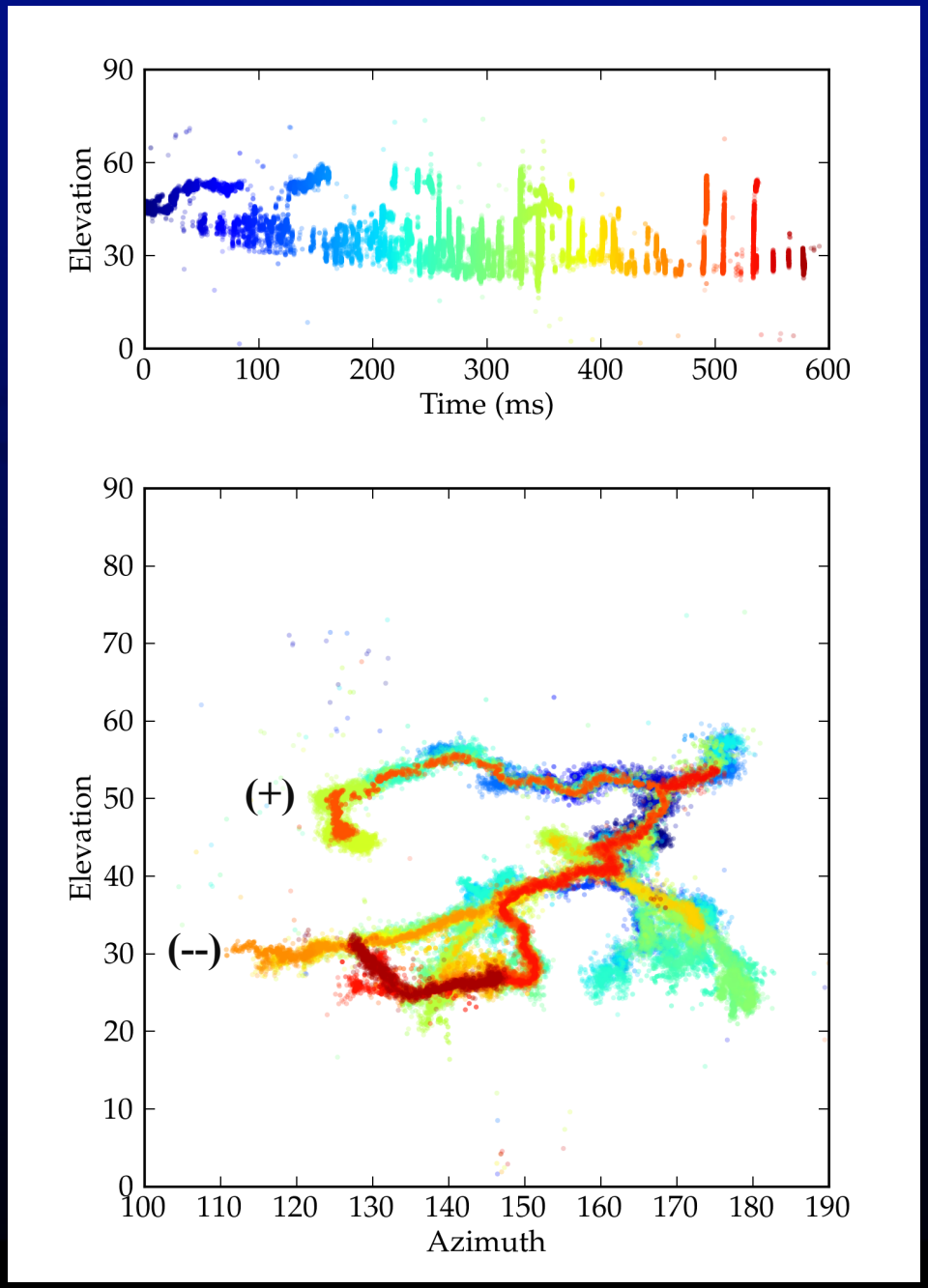
Plot LMA data in Az, El coordinates & compare to get source ranges



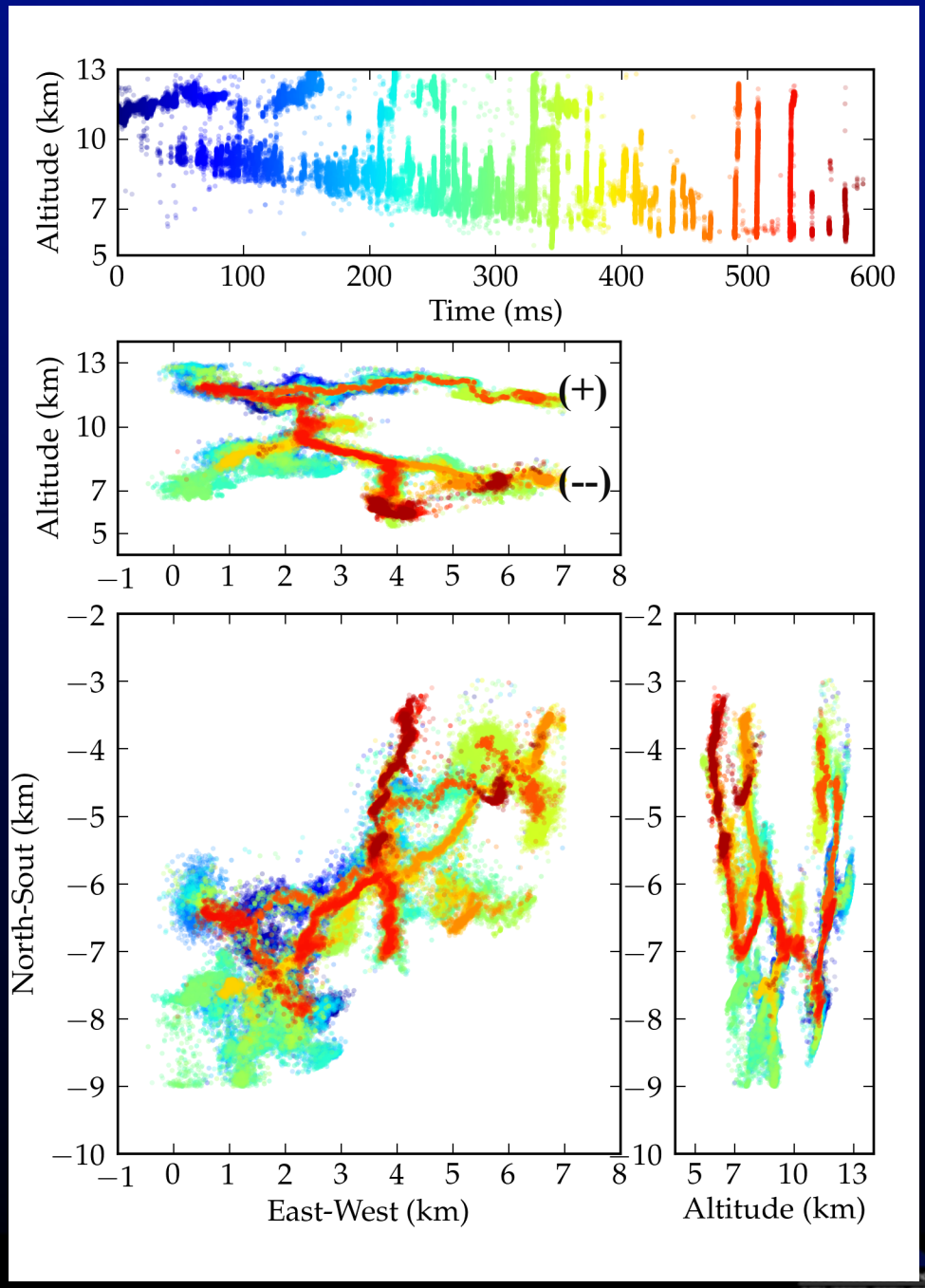


Obtain quasi-3D picture of lightning flash, with microsecond time resolution - Animate

2D Azimuth, Elevation



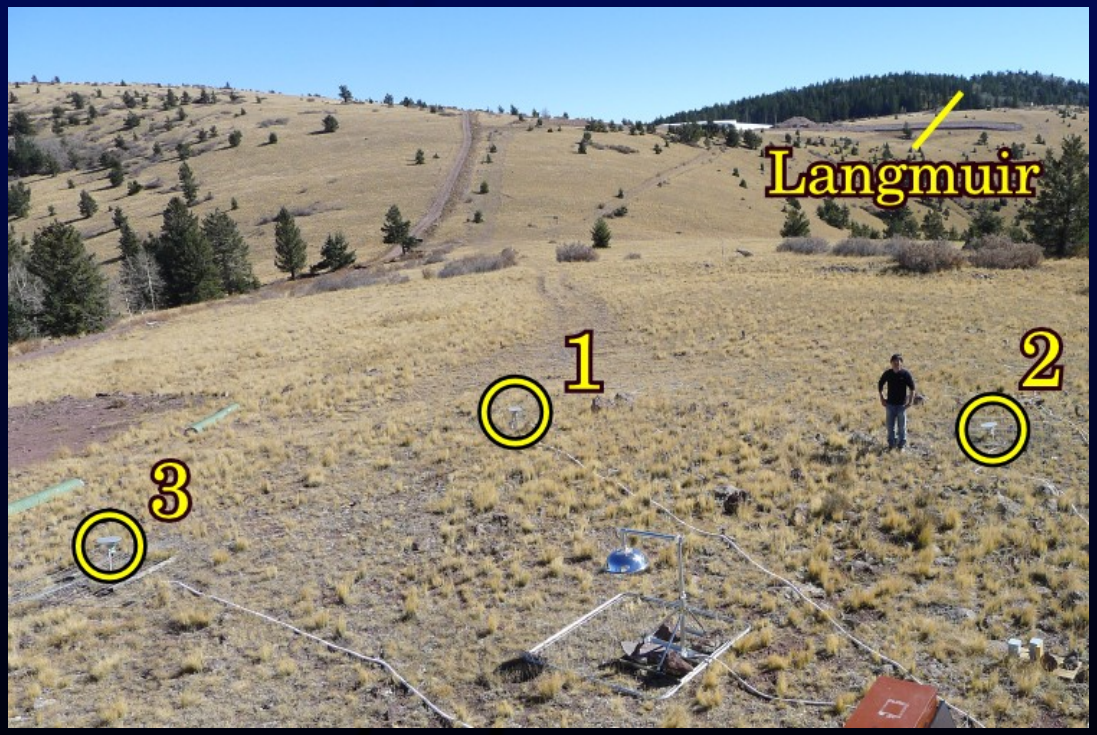
Quasi-3D



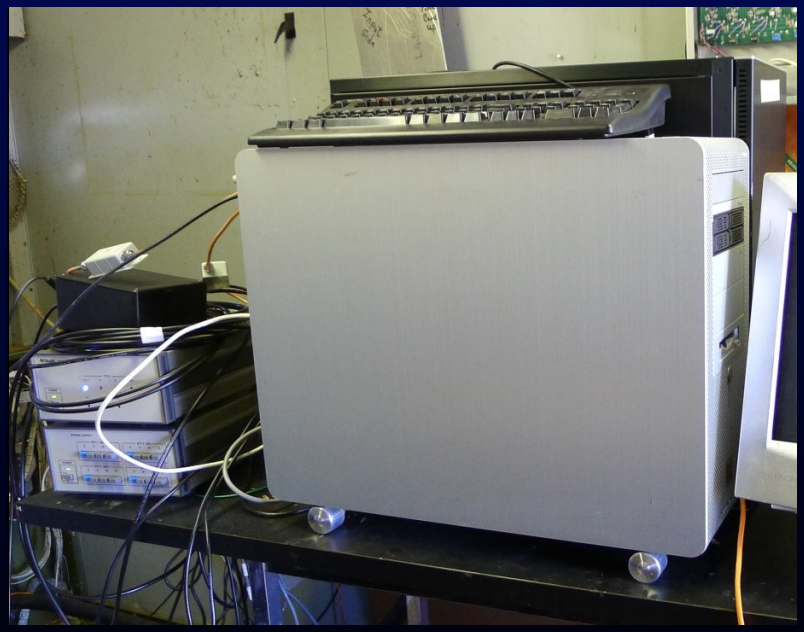
(Animation)

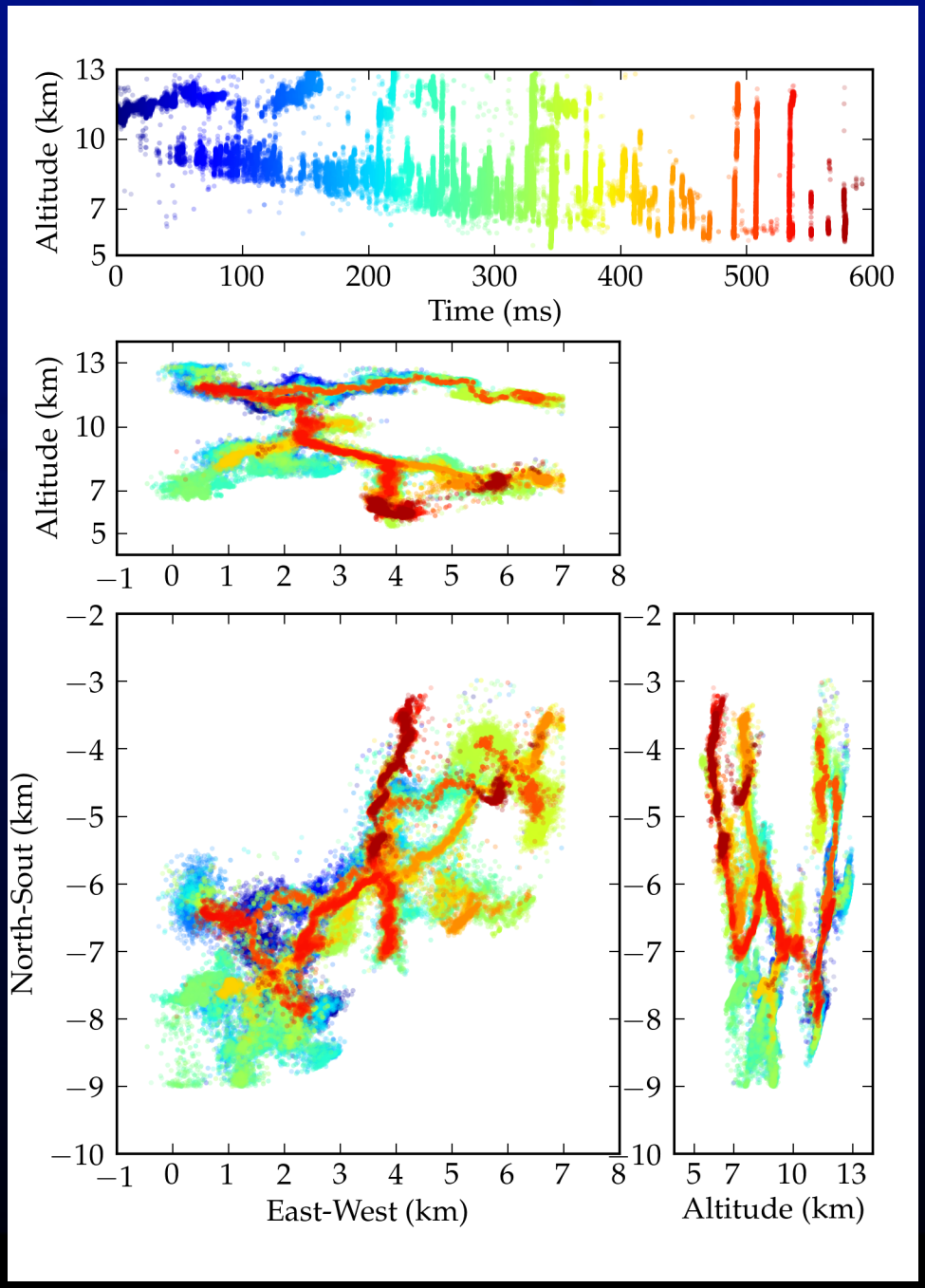
Broadband VHF Digital Interferometer

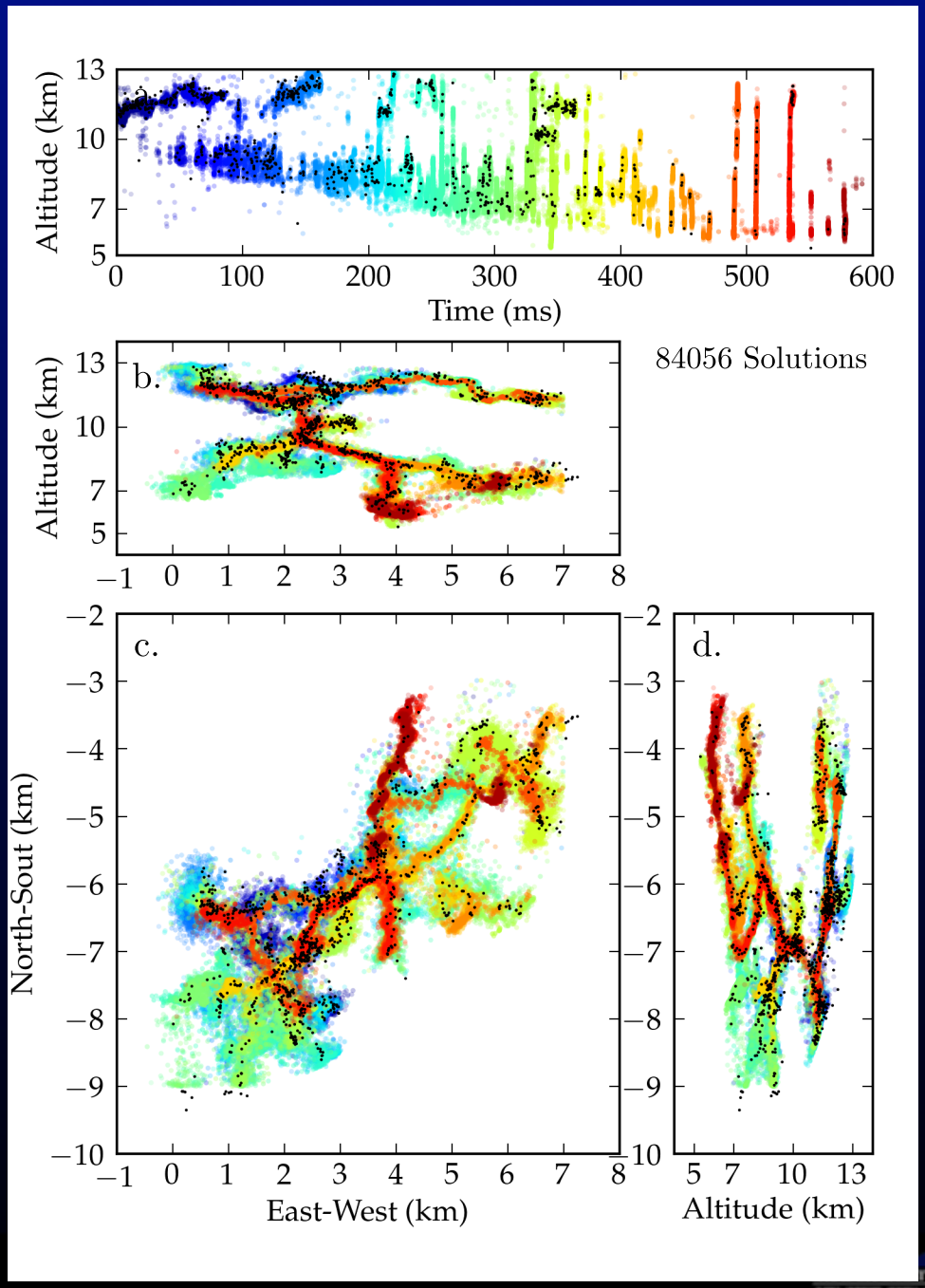
- 3 antennas, 10.2 m orthogonal spacing
- 20-80 MHz receiver (60 MHz bandwidth)
- Continuously record 4-channel time series
- data for entire flashes
- 180 MHz streaming digitizer; 16 bits
- (96 dB dynamic range)
- Cross-correlate raw data in post-processing
- to obtain Az, El vs. time (sub-microsecond
- time resolution)
- Compare with LMA data to infer 3D structure



Antenna array at Langmuir Laboratory




Altitude (km)
Time (ms)
Altitude (km)
North-Sout (km)
East-West (km)
Altitude (km)


Altitude (km)
Time (ms)
84056 Solutions
b.
Altitude (km)
North-Sout (km)
c.
d.
East-West (km)
Altitude (km)