GLM Proxy Data Roadmap

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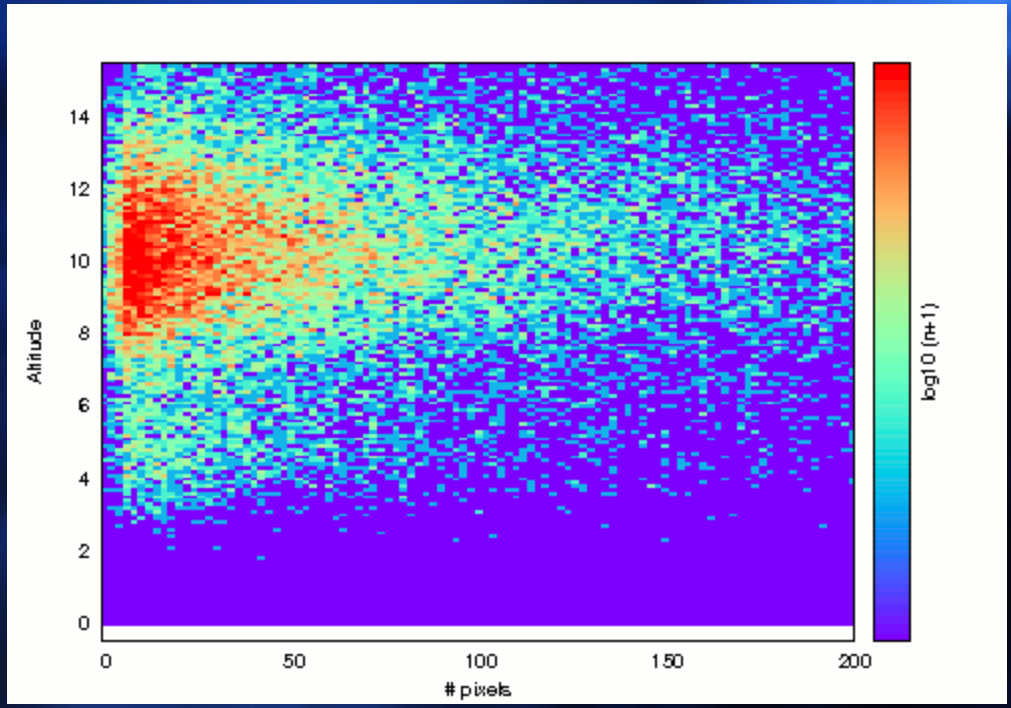
Proxy Data Creator

Background

- GLM is an optical instrument
- Closest analog is LIS
- LIS is LEO; has a limited time “on station” for a particular storm
- Have several ground-based, 24x7 networks; all are RF sensors
- Comparison between RF & optical characteristics of lightning?

Comparisons Showed...

- Not much in common – looking at different physics
- If flash is higher in cloud, more light gets out the top to LIS

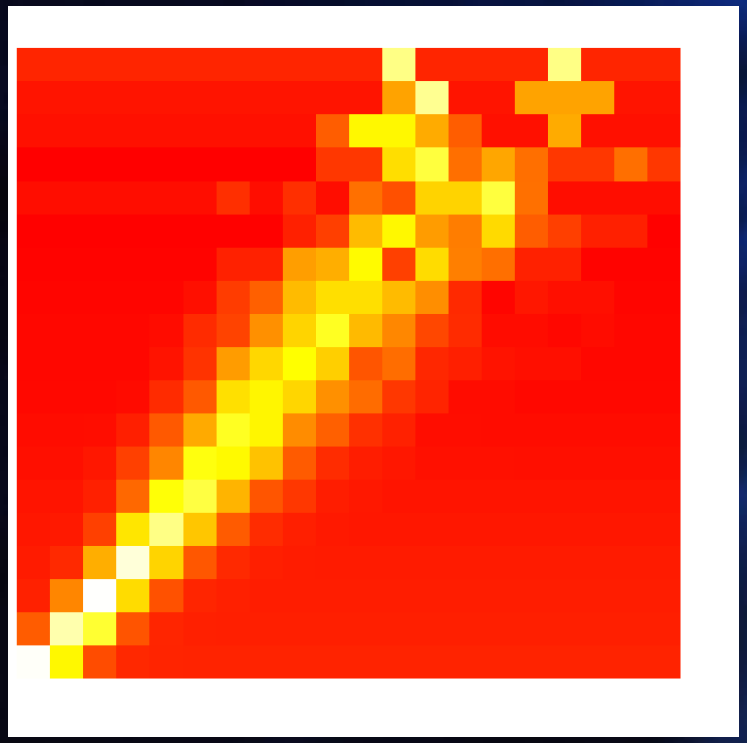


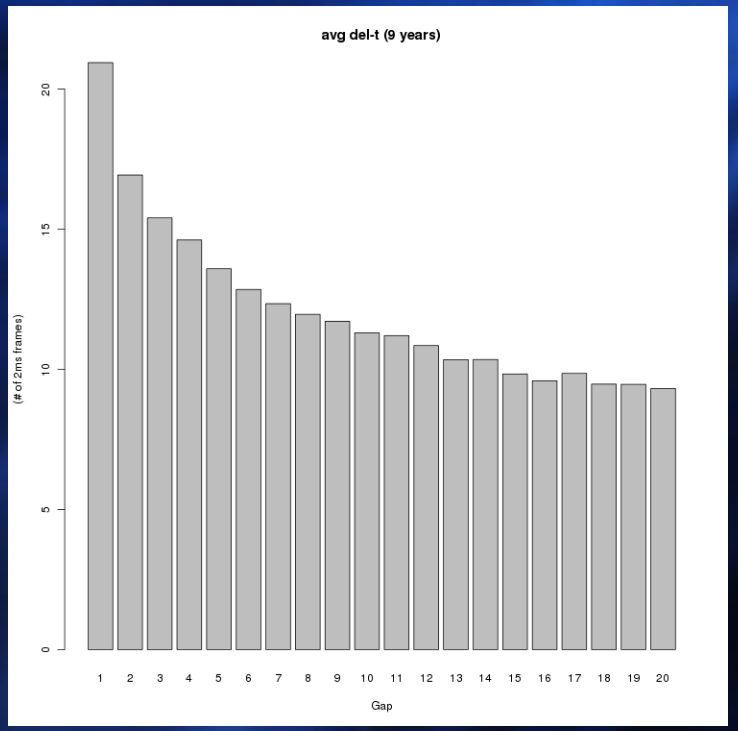
Needed to know...

- How to generate “realistic looking” lightning pixels?
- What is the temporal and spatial distribution of pixels that LIS sees?
- Have a catalog of lightning size, shape and time statistics

What we learned about LIS flashes

- mostly round
- some seasonal dependence
- inter-stroke interval gets successively shorter
- Can gen proxy flashes that match what LIS sees.





Proxy Performance (1)

- How well does it work?
- Generated several cases of proxy GLM pixels
- Sent to LCFA
- Compared clustered output with the original
- Possible outcomes:
  Correct/Merged/Split = 85/15/0
- Very good performance – merging “reasonable” ?
- Needed a tool (more later)

Proxy Performance (2)

- Information content?
- Using Schultz's (M.S. Thesis) Lightning Jump cases, gen. “proxy flashes”
- Proch tuned a similar LJ algorithm for use with the proxy flashes
- Worked equally well as Schultz's LMA algorithm, and better in a few cases

Caution...

- Care must me taken in using ground-based network data
- WWLLN: July 2010, 7-15% compared to LIS

WTLN vs. LIS — DE, N. America, 2010

Mon	Rng%	mean	σ	Mon	Rng%	mean	σ
Jan	2-90	45%	28.5	Jul	27-79	58%	14.1
Feb	12-97	41%	25.3	Aug	21-88	49%	21.4
Mar	8-83	53%	23.7	Sep	27-88	58%	14.9
Apr	5-89	52%	24.8	Oct	8-81	54%	20.1
May	22-87	69%	16.9	Nov	2-74	21%	25.6
Jun	27-75	50%	11.4	Dec	2-93	30%	32.0

Shallow & Deep Dive Tool(s)

- This tool lets us investigate flash merging
- Sometimes the RF is nicely (nearly) constrained by the LIS pixels; sometimes very different
- Converting RF data directly to optical pixels gets the size, shape and temporal distribution wrong