GLM Proxy Data

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Introduction

- 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
Proxy Performance (2)

• Information content?
• Using Chris Schultz's (M.S. Thesis) Lightning Jump cases, gen. “proxy flashes”
• Dan Proch (M.S. Thesis) 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: Detection efficiency is uniform and low (about 10%)

- ENTLN: Detection efficiency is sporadic in time and non-uniform spatially
Results from CHUVA

• Previous analysis done with NALMA (12 yrs)
• CHUVA: Comparison of LIS with SPLMA
• Statistics (shape, size, DE, location, FR, timing, etc.) compared favorably with NALMA
• This is important – Brazil is in a very different climate, geography, topography and latitude from NALMA.
• CHUVA data confirm previous analysis used for proxy.
• We can now use SPLMA data to generate Southern Hemisphere GLM proxy data and to qualify other proxy datasets created during the CHUVA campaign.