National Aeronautics and Space Administration

Airborne GLM Simulator

Fly's Eye GLM Simulator

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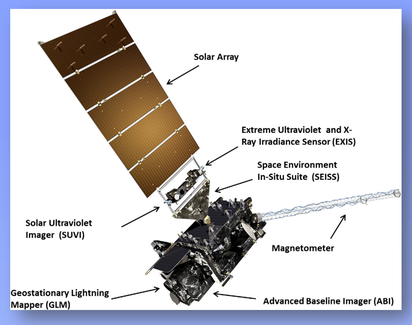
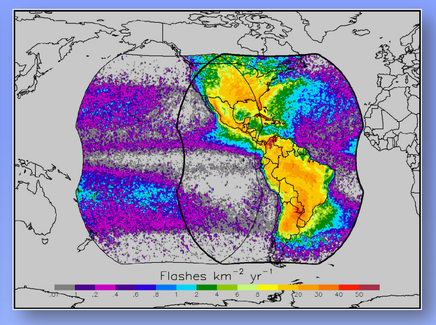
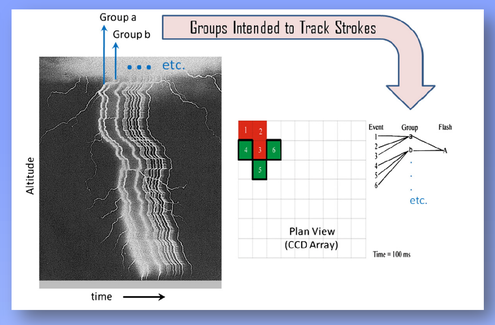
Geostationay Lightning Mapper - 'Total' Lightning Optical Observations from Space



GOES-R



Potential GLM Coverage



Lightning Cluster Filter Algorithm

- Early indication, tracking, monitoring of storm intensification
- More timely and accurate forecasts and warnings
- In-cloud lightning dominates severe storms
- Lightning "jump" identification
- Lightning climatology

Fly's Eye GLM Simulator (FEGS)

Objectives

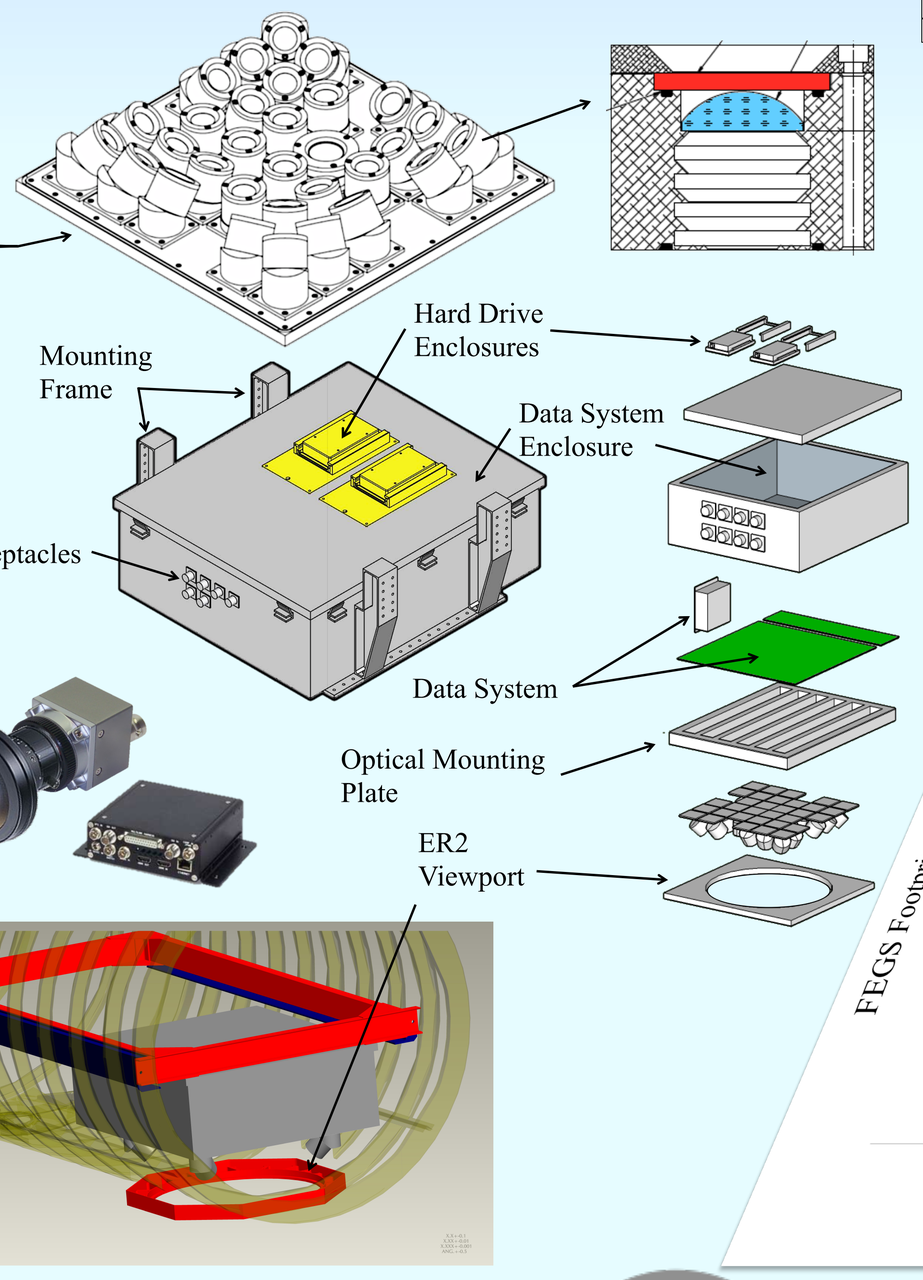
- Calibration of the Optical Energy observed by GLM
  - Background radiance (day/night)
  - Signal radiance
- Validate GLM events while observing the same storms
  - location accuracy in space and time
- Determine GLM Detection Efficiency

Constraints

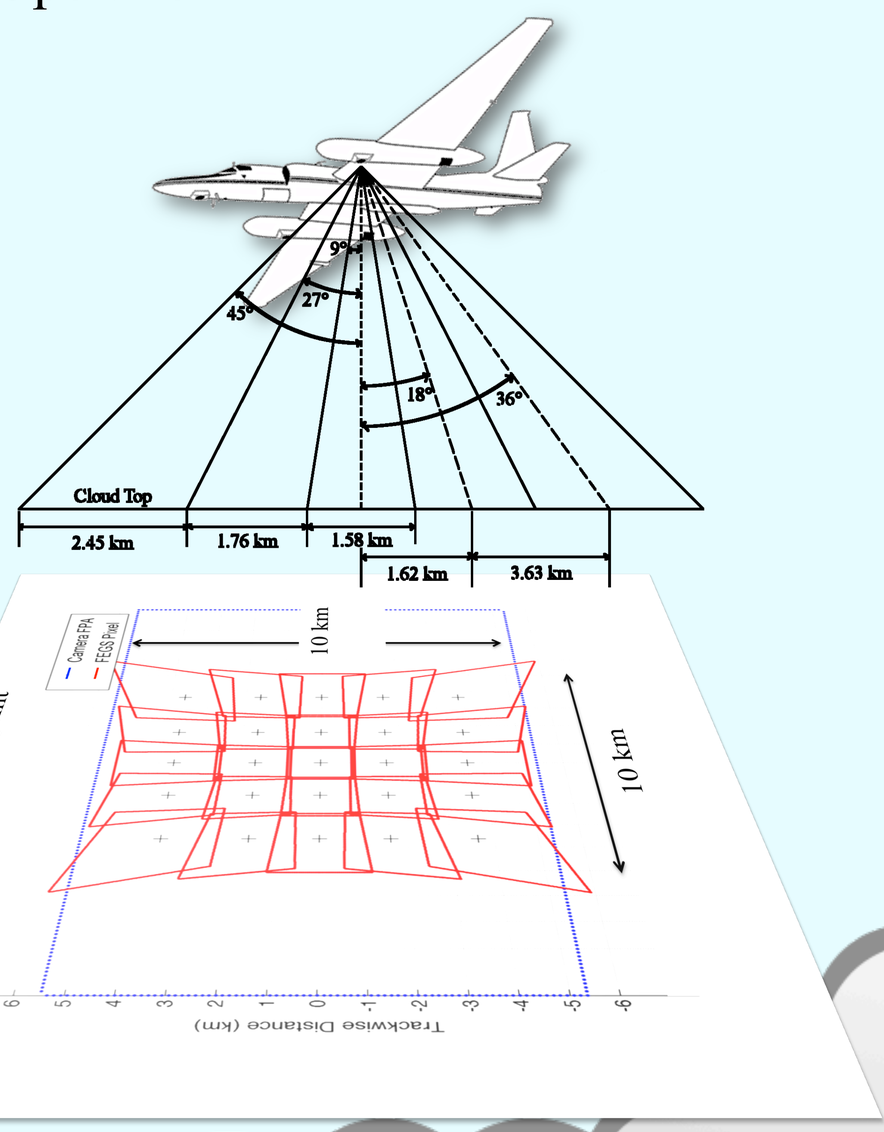
Spec	Requirement	Constraints	Determine	
Spatial Resolution	> GLM spatial resolution (8 x 8 km)	ER-2 flight altitude	IFOV	18 deg
			FOV	90 deg
		Cloud top height	Looking Angles	Δ18 deg
			Resolution	2 x 2 km
Temporal Resolution	Resolve variation of signal over GLM integration (2 ms)	Previous measurements	Sample Rate	100 kHz
			Signal BW	≤ 50 kHz
			Disk Space	≥ 500 GB
			Memory Allocation	100 ms pre-trigger
			Triggering	Optical or External
Sensitivity	Detect signals below GLM threshold	Background and Signal estimates	RMS Noise	≤ 1.5 nA

Design

- 5 x 5 array of radiometers
  - OI: 777 nm
- 5 extra spectral channels
  - UV: 337 nm
  - UV: 400 nm
  - NI: 500 nm
  - Hα: 660 nm
  - N2: 675 nm
  - WideBand: 400-1000 nm
- Wide Angle Camera, normal frame rate
- Electric Field Change Meter
- High Energy Particle Detectors



Operation



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References

Steven J. Goodman, Richard J. Blakeslee, William J. Koshak, Douglas Mach, Jeffrey Bailey, Dennis Buechler, Larry Carey, Chris Schultz, Monte Bateman, Eugene McCaul Jr., Geoffrey Stano, The GOES-R Geostationary Lightning Mapper (GLM), *Atmospheric Research*, Volumes 125–126, May 2013, Pages 34-49, ISSN 0169-8095, http://dx.doi.org/10.1016/j.atmosres.2013.01.006.

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Poster No. xxx