Flash-Type Discrimination

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Highlights of Progress for GLM-R3
Flash-Type Discrimination Algorithm Development

- Significant progress has been made in defining, testing, and applying a novel method for retrieving the fraction of ground flashes in a set of $N$ flashes observed from a satellite-based lightning imager (e.g., GLM, LIS/OTD).

- Bayesian inversion & a mixed exponential distribution model is what the retrieval method is based on.

- 3 full-length journal articles have been written (and submitted for review) which discuss the optical data, the retrieval theory, numerical simulations, and the preliminary application results.

- Maximum Group Area (MGA) data is inverted by the retrieval method. Note that several “optical groups” compose a “flash”, and MGA is a type of “return stroke detector”.

- Retrieval errors from simulations are very reasonable when $N > 2000$ flashes.

- Preliminary global-scale retrievals have been completed using 5yr OTD dataset.

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3 Completed Journal Papers


Maximum Group Area (MGA) Data

Ground Flashes:

- Size (total) = 12122
- Size (shown) = 11947
- Average = 493,011
- Std Dev = 467,631
- Max = 4786.34
- Median = 335,790
- Min = 50,9740

Cloud Flashes:

- Size (total) = 107166
- Size (shown) = 107135
- Average = 215,633
- Std Dev = 167,371
- Max = 4283.88
- Median = 165,245
- Min = 40,8690

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Retrieval Errors from Simulations
[an example of mean (std dev) ground flash fraction error]

Retrieval errors are shown as a function of other modeling parameters \((U_g, U_c)\) in the problem.

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Based on the 5yr OTD dataset.

Only lat/lon bins with 2000 or more flashes were analyzed.

Lat/lon bins are 4 degrees x 4 degrees.