Estimating Errors in GLM Detection Efficiency and False Alarm Rate

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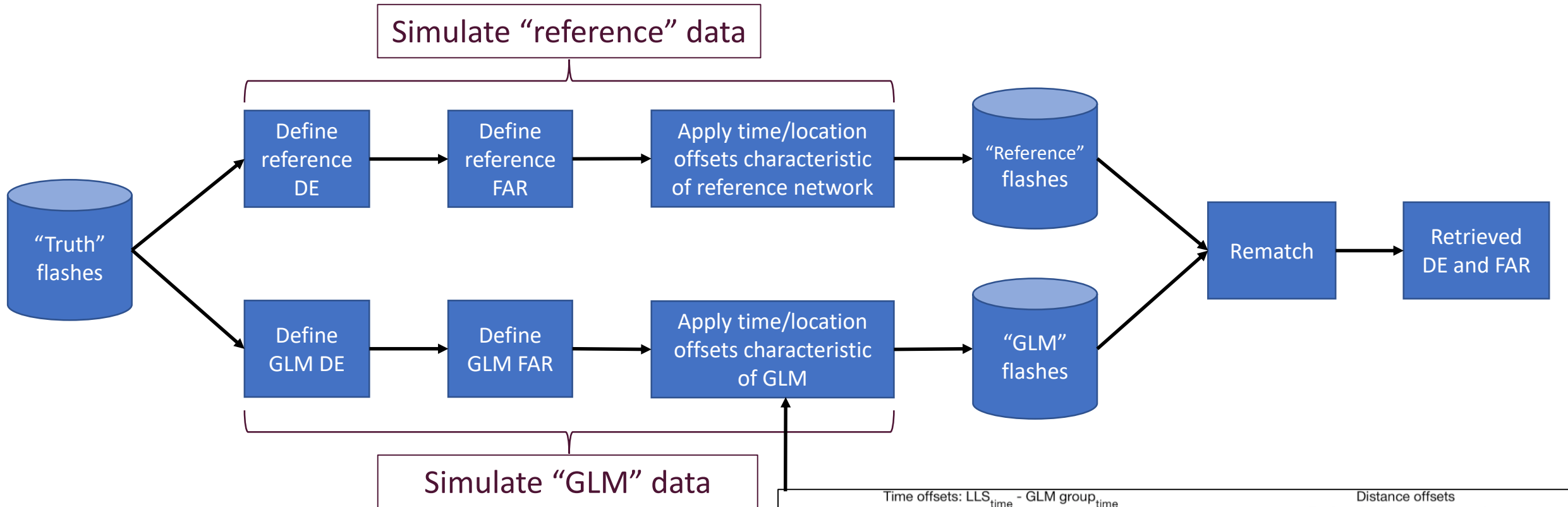
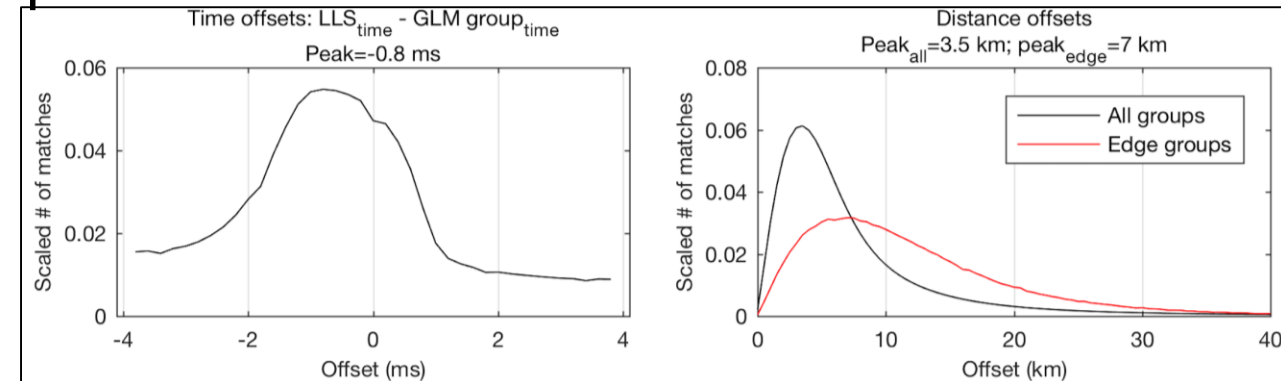GLM Science Team Meeting

8 September 2020

Estimating Errors in DE and FAR

- Analysis to date of GLM DE and FAR (Bateman and Mach 2020; Murphy and Said 2020; Zhang and Cummins 2020; others in this section) has focused on GLM performance as a function of geography, storm type, cloud characteristics, time of day, flash size and duration, etc.

- Other factors that can affect the calculated GLM DE and FAR:
  - Reference network DE and FAR
  - Location and timing accuracy of GLM and reference networks
  - Spatial and temporal matching criteria

- The challenge: Estimate the error bars on GLM DE and FAR as a function of these factors by means of a computer simulation
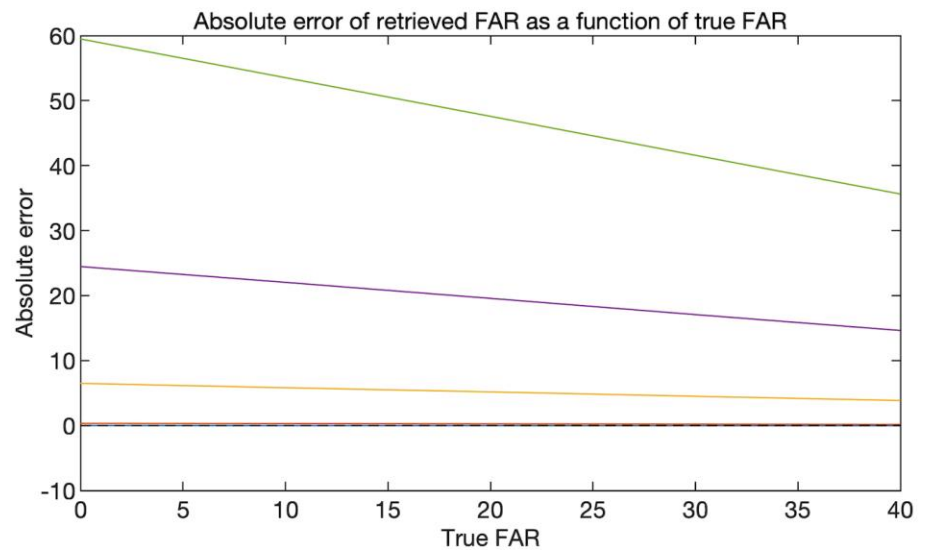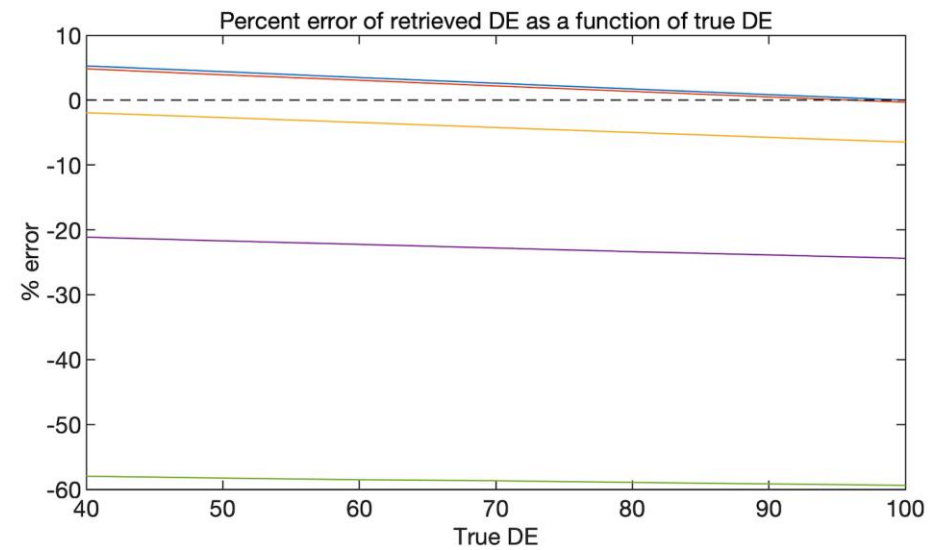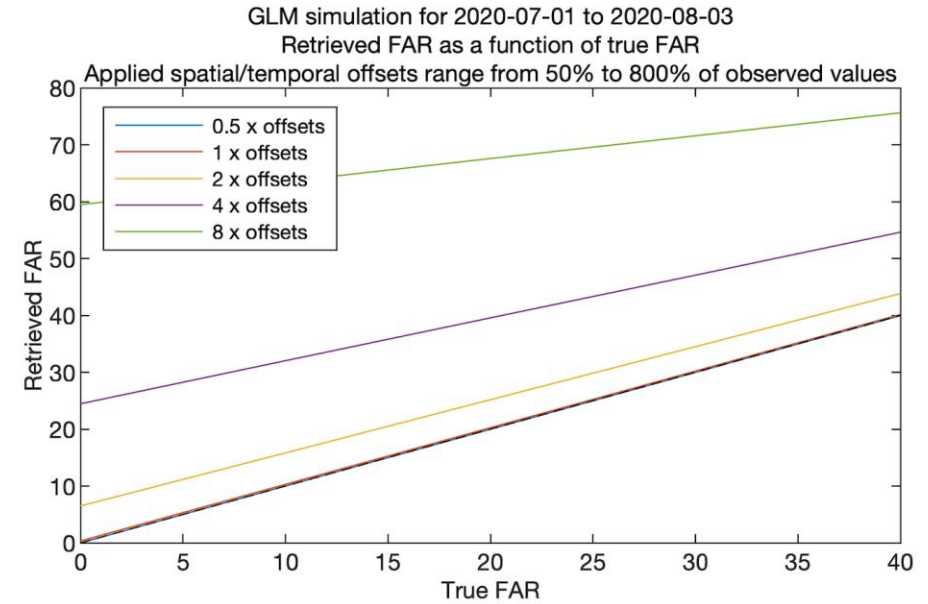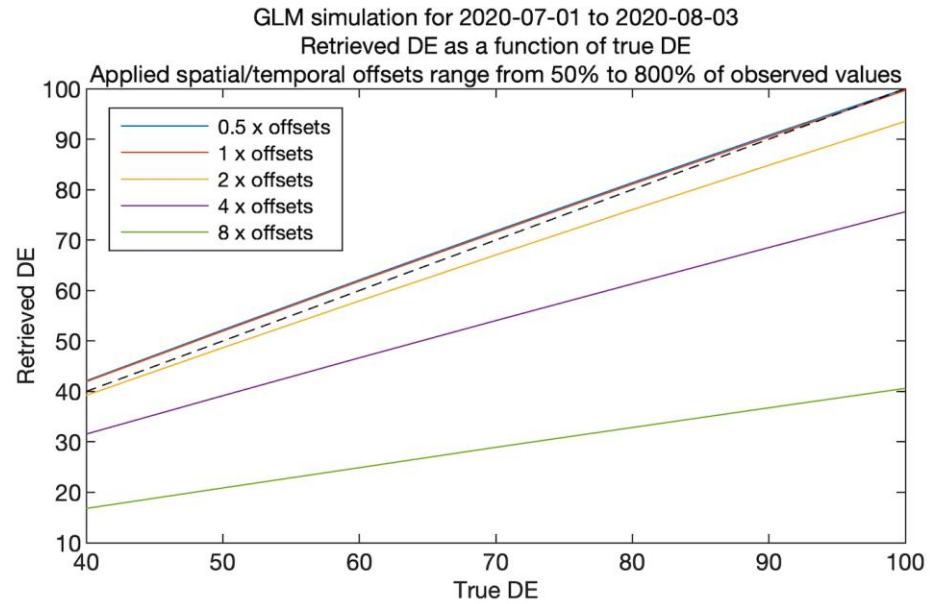
Simulation Procedure

Preliminary Results

GLM simulation for 2020-07-01 to 2020-08-03
Retrieved DE as a function of true DE
Applied spatial/temporal offsets range from 50% to 800% of observed values

GLM simulation for 2020-07-01 to 2020-08-03
Retrieved FAR as a function of true FAR
Applied spatial/temporal offsets range from 50% to 800% of observed values

Percent error of retrieved DE as a function of true DE

Absolute error of retrieved FAR as a function of true FAR

Future Work

- Via simulation, calculate the retrieved GLM DE and FAR as a function of:
  - The "true" (applied) DE and FAR of GLM
  - The "true" (applied) DE and FAR of the reference data
  - GLM location and timing errors
  - Reference location and timing errors
  - Spatiotemporal matching criteria
- Use simulation results to derive error bars (or error surfaces) for the calculated GLM DE and FAR
- Evaluate the performance of various spatiotemporal matching criteria