724 Preliminary Assessment of Detection Efficiency for the Geostationary Lightning Mapper Using Intercomparisons with Ground-based Systems

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Abstract

As part of the calibration/validation (cal/val) effort for the Geostationary Lightning Mapper (GLM) on GOES-16, we need to assess instrument performance (detection efficiency and accuracy). One major effort is to calculate the detection efficiency of GLM by comparing to multiple ground-based systems. These comparisons will be done pair-wise between GLM and each other source. A complication in this process is that the ground-based systems sense different properties of the lightning signal than does GLM (e.g., RF vs. optical). Also, each system has a different time and space resolution and accuracy. Preliminary results indicate that GLM is performing at or above its specification.

What is shown

Depicted are 4 time periods, corresponding to software patches in the GLM processing code. These are:

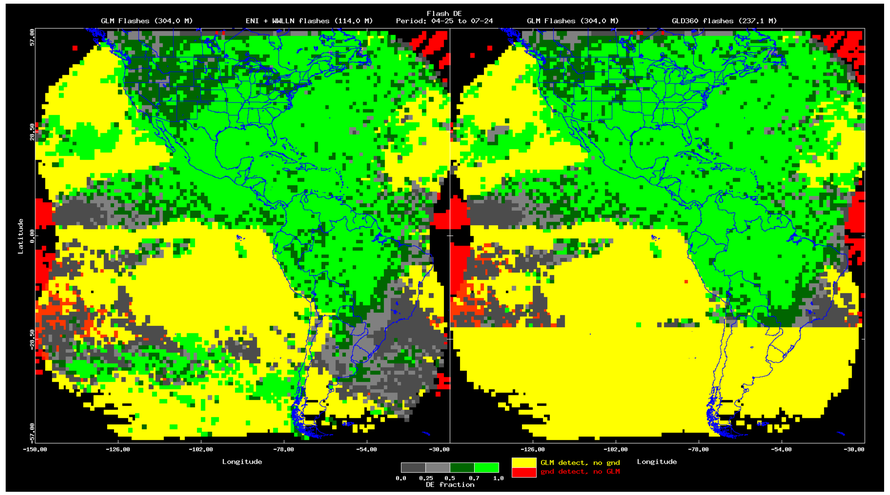
- D0 04.04: 4/25 to 7/24
- D0 05.00: 7/25 to 10/31
- D0 06.00: 11/01 to 11/28
- D0 06.02: 11/29 to 12/31

Each plot has 2 maps of the Western hemisphere. The left map is GLM flashes compared to Earth Network + WWLLN flashes. The right map is GLM flashes compared with GLD360 flashes.

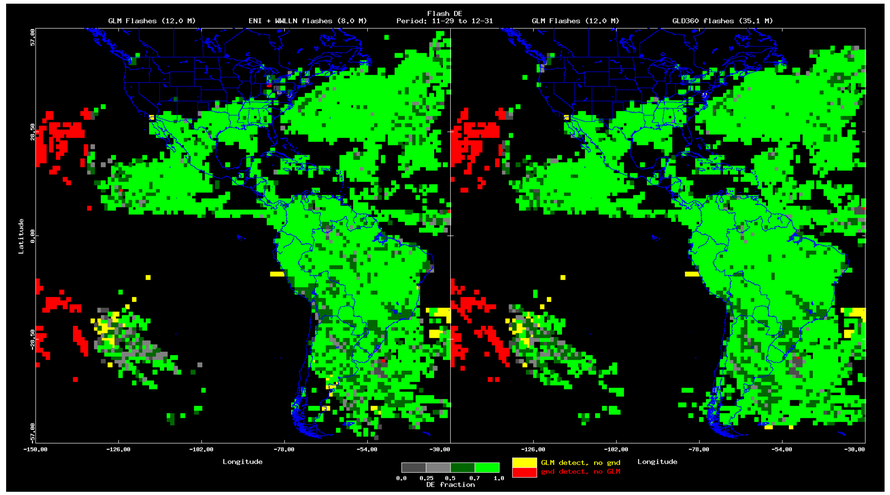
The pair-wise comparisons were counted as a coincidence if GLM and the ground system saw their own flashes within ±0.5 s and distance < 50km.

The coincidences (or not) were binned into a 2-D histogram, with a grid size of 1° x 1° lat/lon.

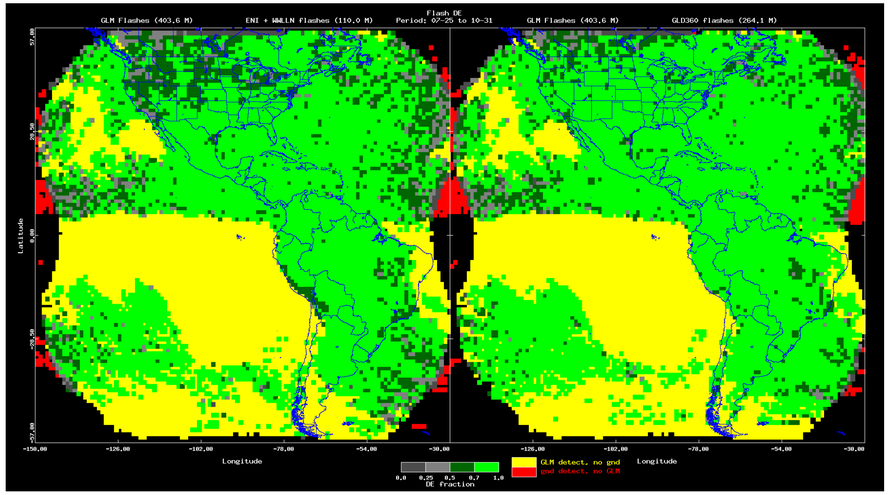
D0 04.04 — 4/25 to 7/24



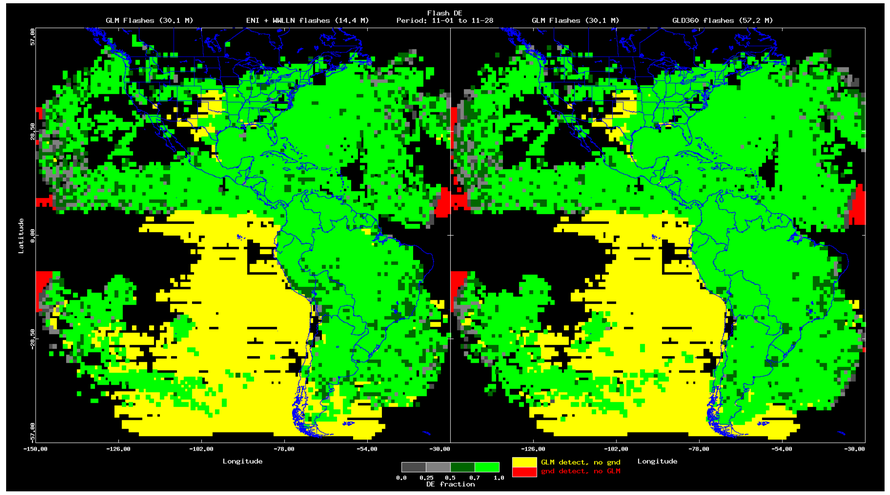
D0 06.02 — 11/29 to 12/31



D0 05.00 — 7/25 to 10/31



D0 06.00 — 11/01 to 11/28



Legend

The color scale, based on a stoplight chart, is defined as:

- Ground detect with no GLM — red
- GLM detect with no ground detect — yellow
- Coincidence -- green (or gray). These coincidences were scored as to the detection efficiency:
  0 – 25% — dark gray
  25 – 50% — light gray
  50 – 70% — dark green
  70 – 100% — light green
- 70% is the defined performance spec for GLM.

Summary

- With each software patch level, the performance improved.
- Lots of green in each plot
- Amount of yellow decreased
- GLM easily meets the > 70% requirement