

# Initial Results of Assessing Geostationary Lightning Mapper 'Stoplight Product' in Operations

Chris Schultz (NASA/MSFC)

Matt Smith (UAH)

Geoffrey Stano (UAH)

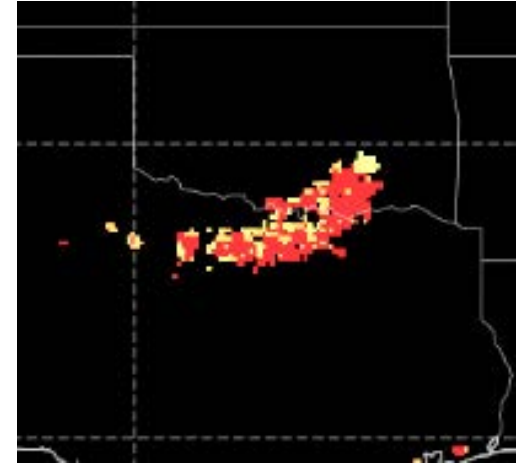
National Weather Association Annual Meeting

Huntsville, Alabama

7-12 September, 2019

# GLM Stoplight Product

- A very simple tool
  - LMA/LDAR partners (e.g., EMA) needed a quick-to-assess tool
  - Time is crucial, lives are at stake
  - Three tiered approach
    - Most recent (0-9 minutes old) in **red**
    - Next most recent (10-19 minutes old) in **orange**
    - Oldest (20-29 minutes old) in **yellow**
  - 2 minutes of data –updated every minute
- Not original – except in its satellite usage
  - Others have created similar color-coded lightning maps
  - But none using satellite-based detection
- NOT to indicate “all-clear” or “good-to-go”
  - The name is imperfect
  - Green would be misleading
  - Future versions will use another name



# Development and Evaluation of the GLM Stoplight Product for Lightning Safety

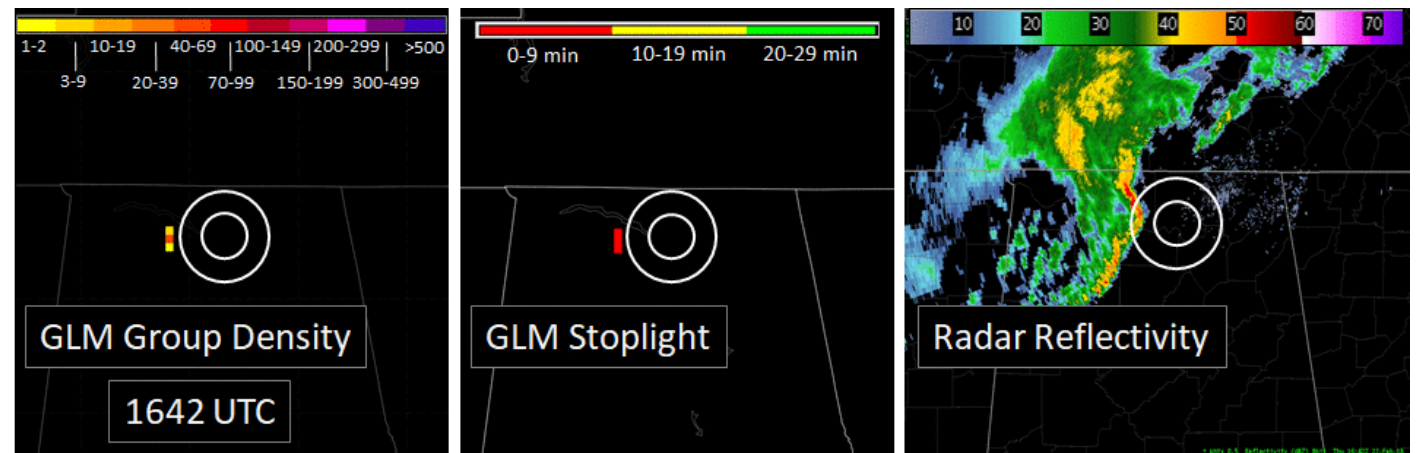
Geoffrey T. Stano (ENSCO/SPoRT); Matthew R. Smith (UAH/SPoRT); Christopher J. Schultz (MSFC/SPoRT)

<https://doi.org/10.15191/nwajom.2019.0707>

## Key Findings

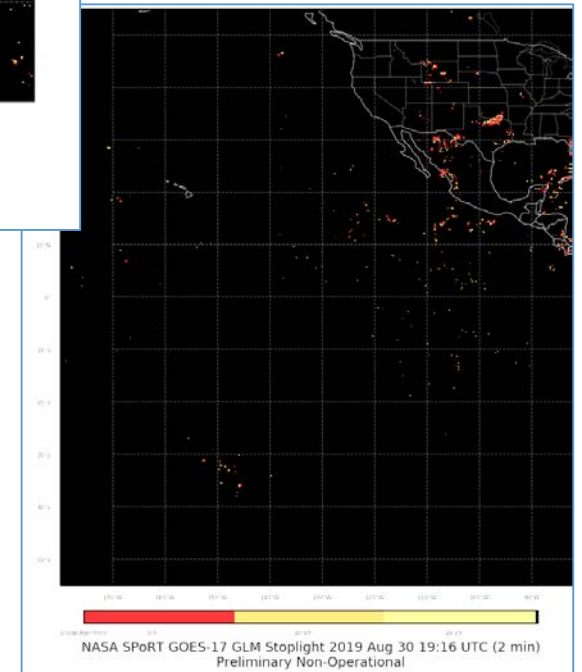
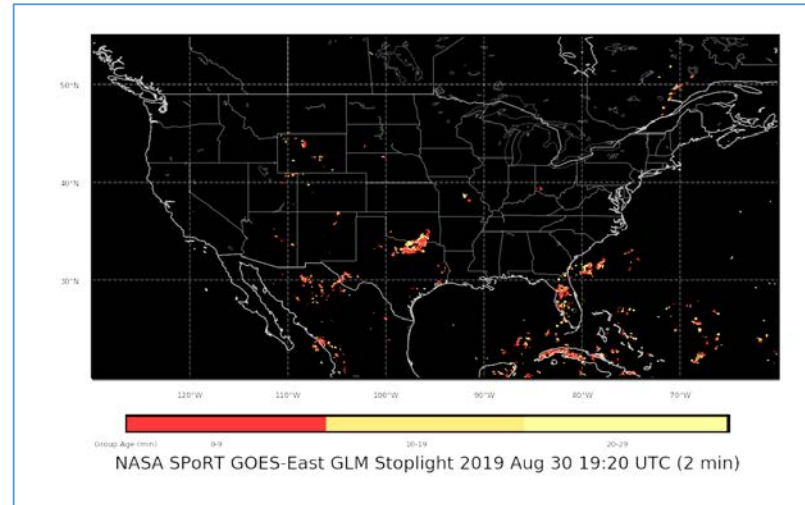
- Demonstrates how to utilize the two-dimensional areal information from the Geostationary Lightning Mapper (GLM) to map locations where lightning has been present in the last 30 minutes.
- The study examined 7 million flashes from the entire field of view of the GOES-16 GLM instrument during an 80 hour period from the 2017 checkout phase on an 8 km x 8 km grid.
- Evaluates the number of times lightning advisories using FAA, US Air Force, and NOAA's general 30/30 guidelines expire and another lightning flash is observed at the location of the flash that prompted the advisory using an 8 km radius from each grid point.
  - FAA: 9.5%, US Air Force 3.5%, 30/30 rule: 1.4%
- Impact: Operational tool to monitor recent lightning flashes for lightning safety at point locations within the GLM field of view for entities with outdoor activities/operations (e.g., NASA, NWS, EMA, DoD, state/local governments, and industry).

A sequence of lightning approaching the MSFC in Huntsville, AL on 22 February 2018. The white circles indicate 16- and 32 km (~10- and ~20- mile) radii around the MSFC and are used as the alert range for lightning.



# Stoplight Product - 2 GLMs

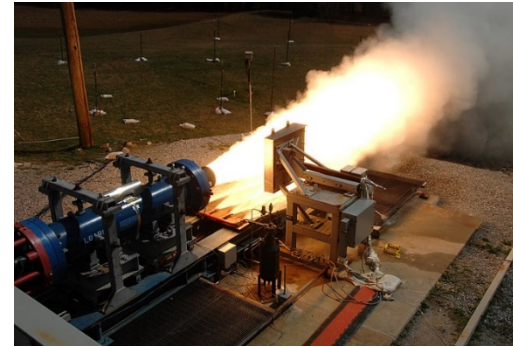
- Two GLMs
  - GOES-16 (East) since Jan. 2018
    - CONUS
    - Eastern US
    - Southeastern US
    - Tennessee Valley (here)
  - GOES-17 (West) since Jan. 2019
    - Full disk
    - CONUS
    - Guam
    - Hawaii
    - American Samoa



# Use of the GLM Lightning Safety product at MSFC

- MSFC's Emergency Operations Center (EOC) has used the GLM safety product since 2018 to support many of the outdoor and test stand operations as we move toward getting back to the moon and beyond.
- Early feedback was that the product was not only useful for determining the end of a lightning threat, but also that GLM provided a few minutes extra heads-up on a lightning threat vs their Baron (Earth Networks) and Vaisala systems.
  - In 52 events from 2018 and 2019 when a lightning warning was issued by the MSFC EOC, the GLM product averaged **an additional 2 minutes of lead time** over their traditional sources of lightning data.
    - EOC has fully adopted GLM data into their decision process.
  - Data disseminated through a Web Map Service with a latency of less than 2 minutes due to a direct connection to the GOES receiving station at MSFC.
- NASA is looking to expand the effort to other NASA centers now that both GOES GLM's are fully operational.

Solid Rocket Motor Test



SLS tank unloading from Pegasus Barge



Vehicle Assembly Building for testing



Construction of 2<sup>nd</sup> SLS test Stand

# Plans

- Revisit 30-min rule
- Create probability-based safety features
- Develop dynamic first-lightning and last-lightning notifications for any IDSS location; Saving:
  - Time
  - Money
  - Lives



NASA SPoRT website:

<https://weather.msfc.nasa.gov/sport/>

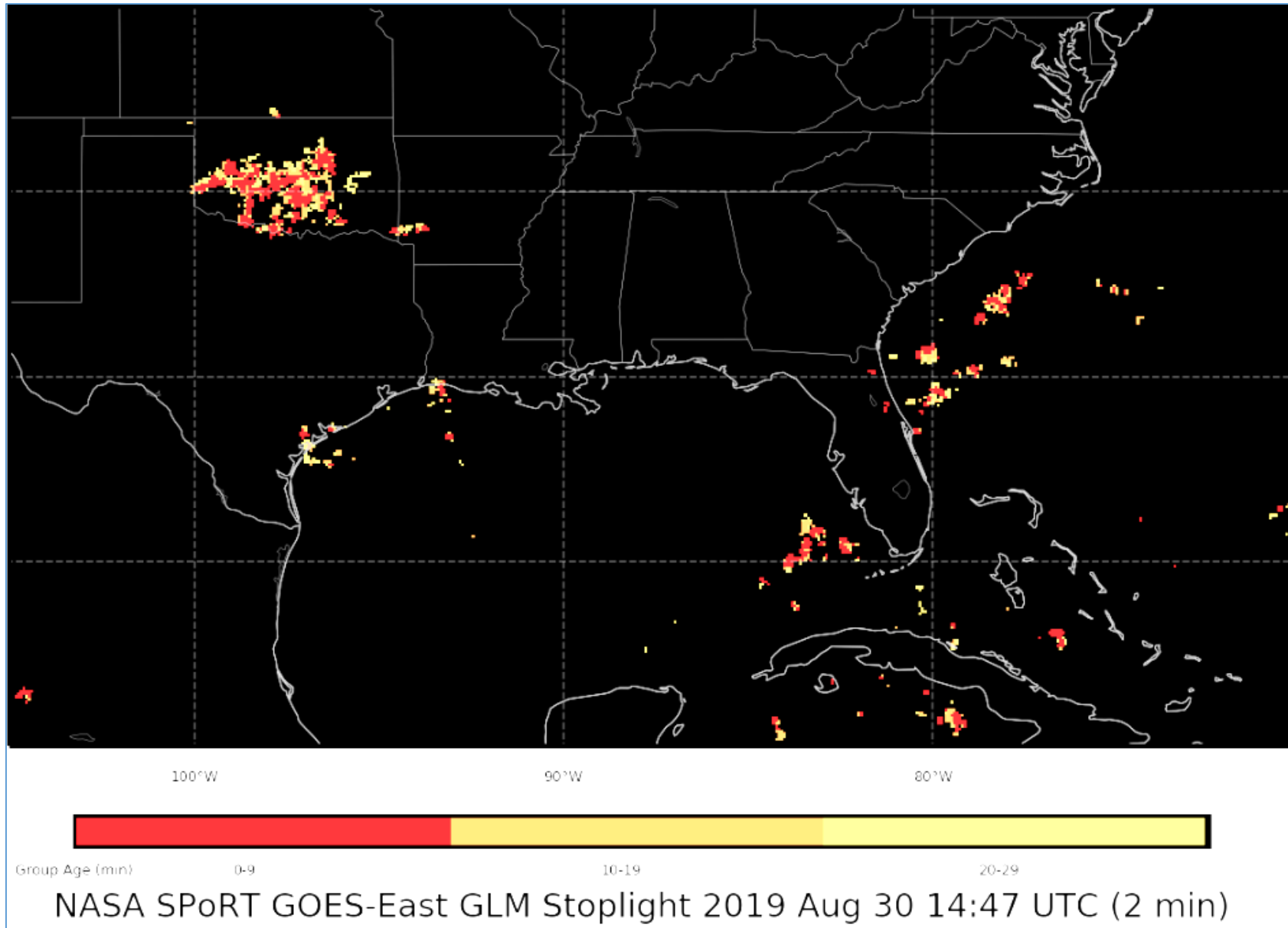
Authors:

[christopher.j.schultz@nasa.gov](mailto:christopher.j.schultz@nasa.gov)

[matthew.r.smith@nasa.gov](mailto:matthew.r.smith@nasa.gov)

[gstano0007@uah.edu](mailto:gstano0007@uah.edu)

Stoplight product from SPoRT internal website – used by MSFC EOC



9/16/2019

NWA Huntsville, AL 7-12 Sept. 2019