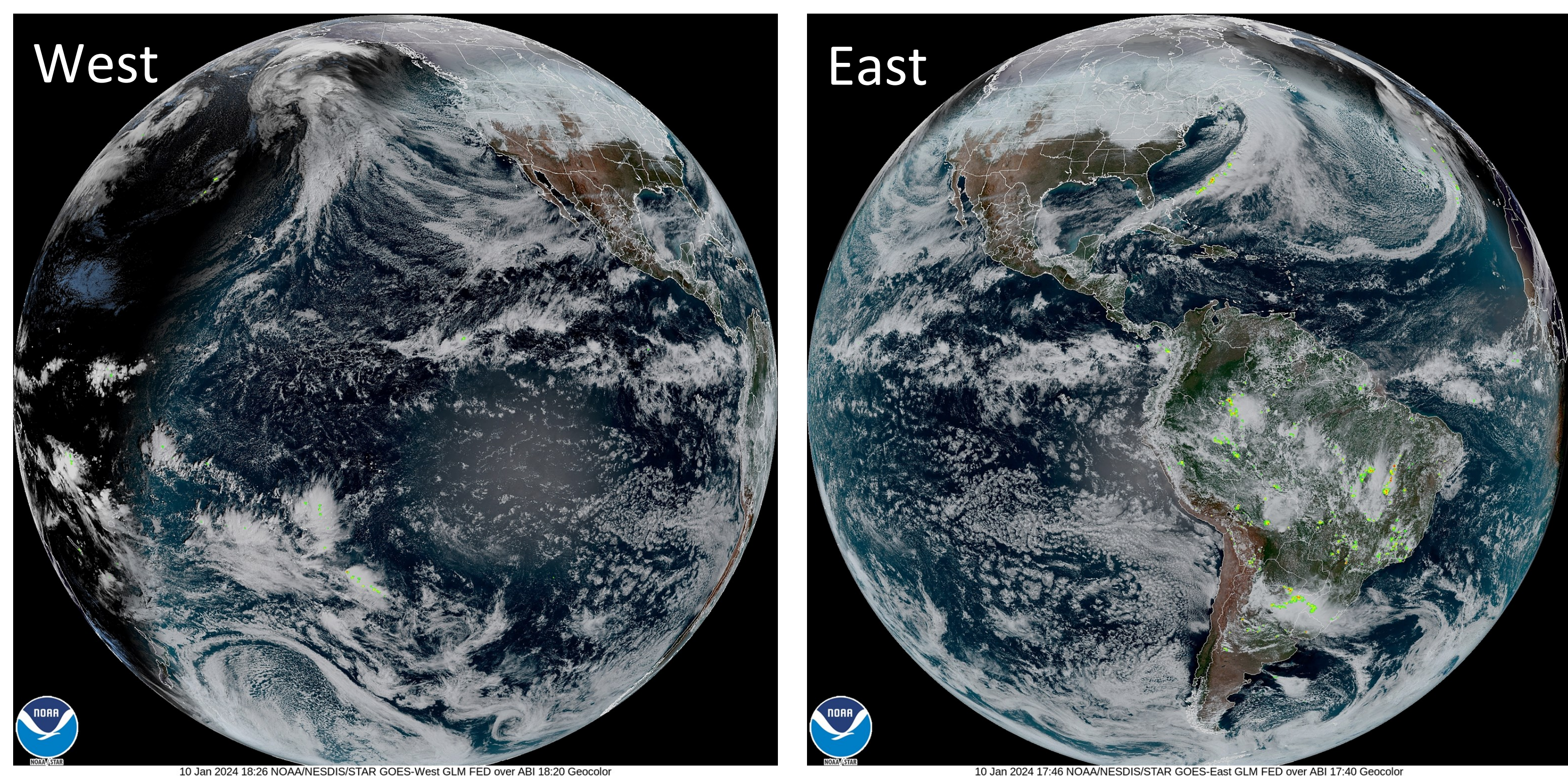


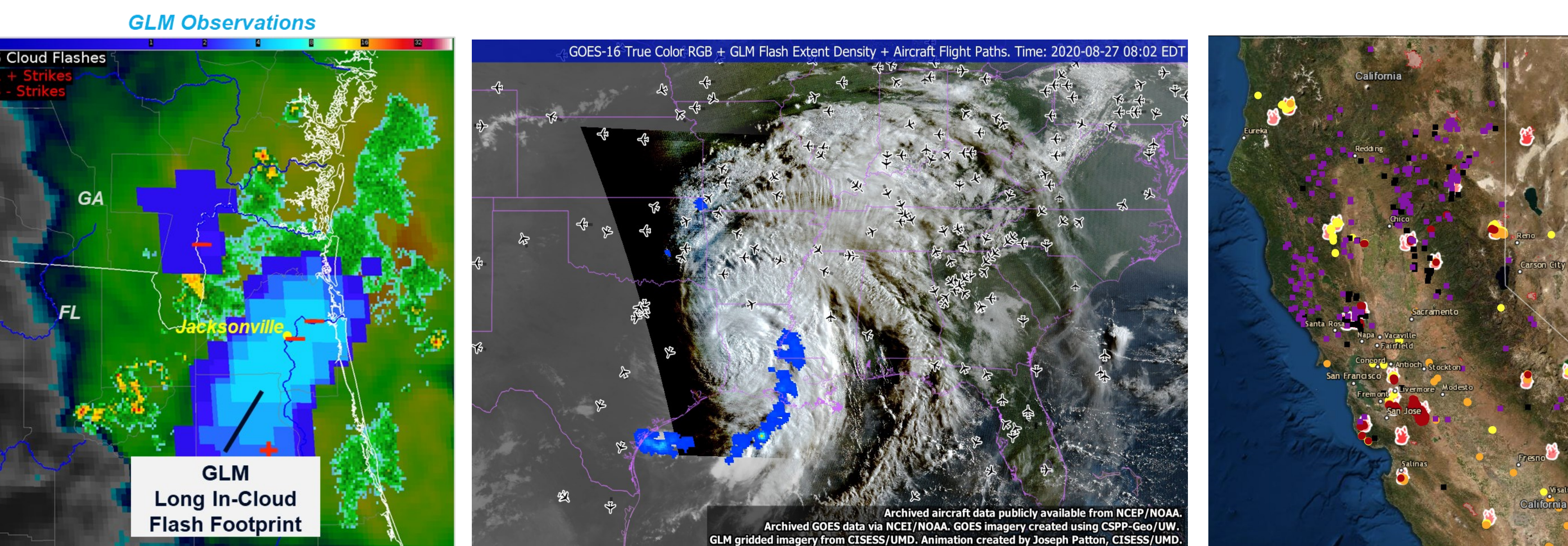
# U.S.

## Geostationary Lightning Mappers (GLM)

- The U.S. has launched 3 geostationary satellites with lightning sensors (2 in operation).
- First time to see lightning activity throughout the storm evolutions from the space.
- Help us better detect and understand lightning – continuous observations
- Have widely used in various applications: severe weather nowcasting and forecasting, airport safety, wildfire early warnings, lightning-produced NOx (nitrogen) estimation, etc.



## GLM Lightning Observation Applications

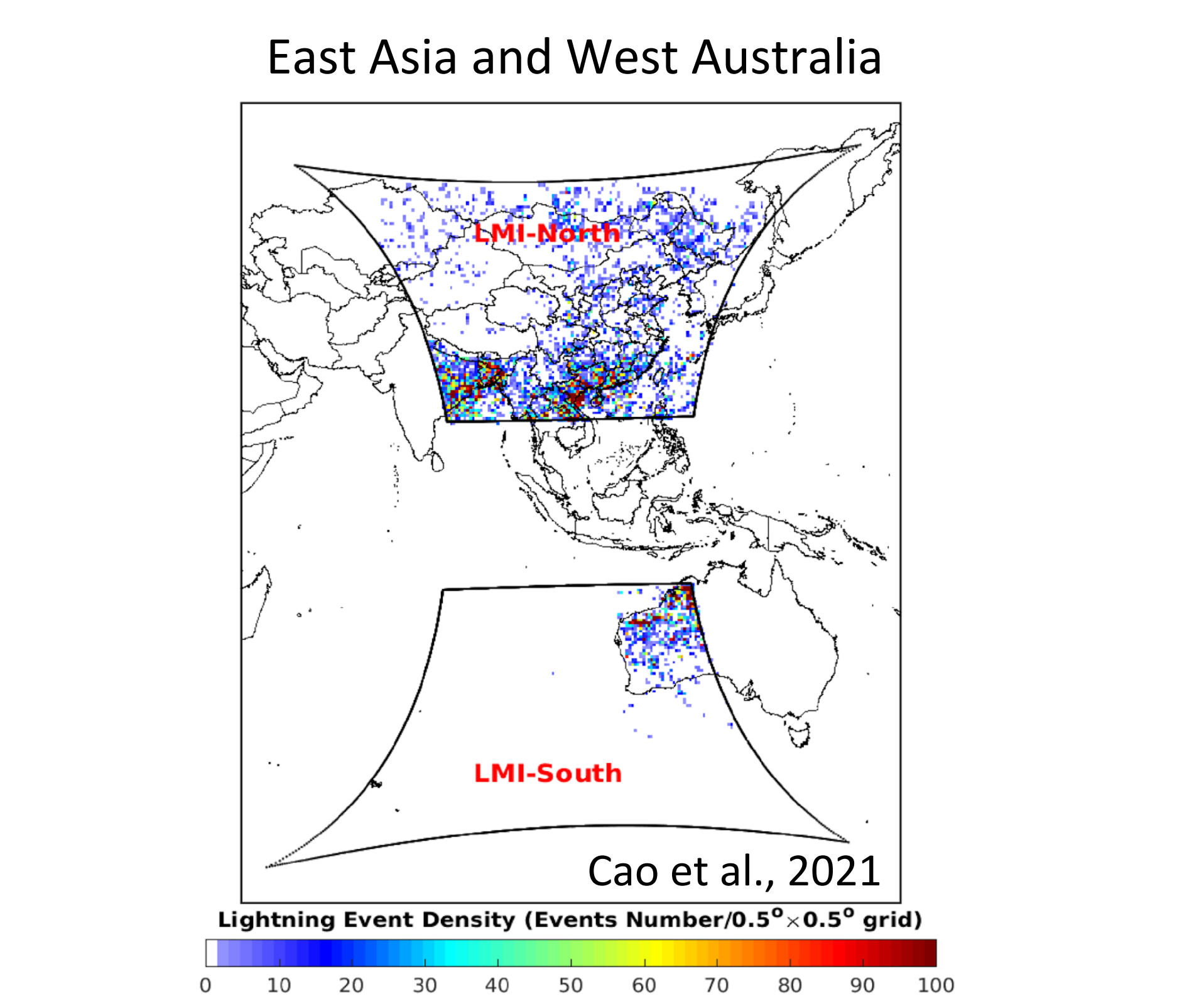
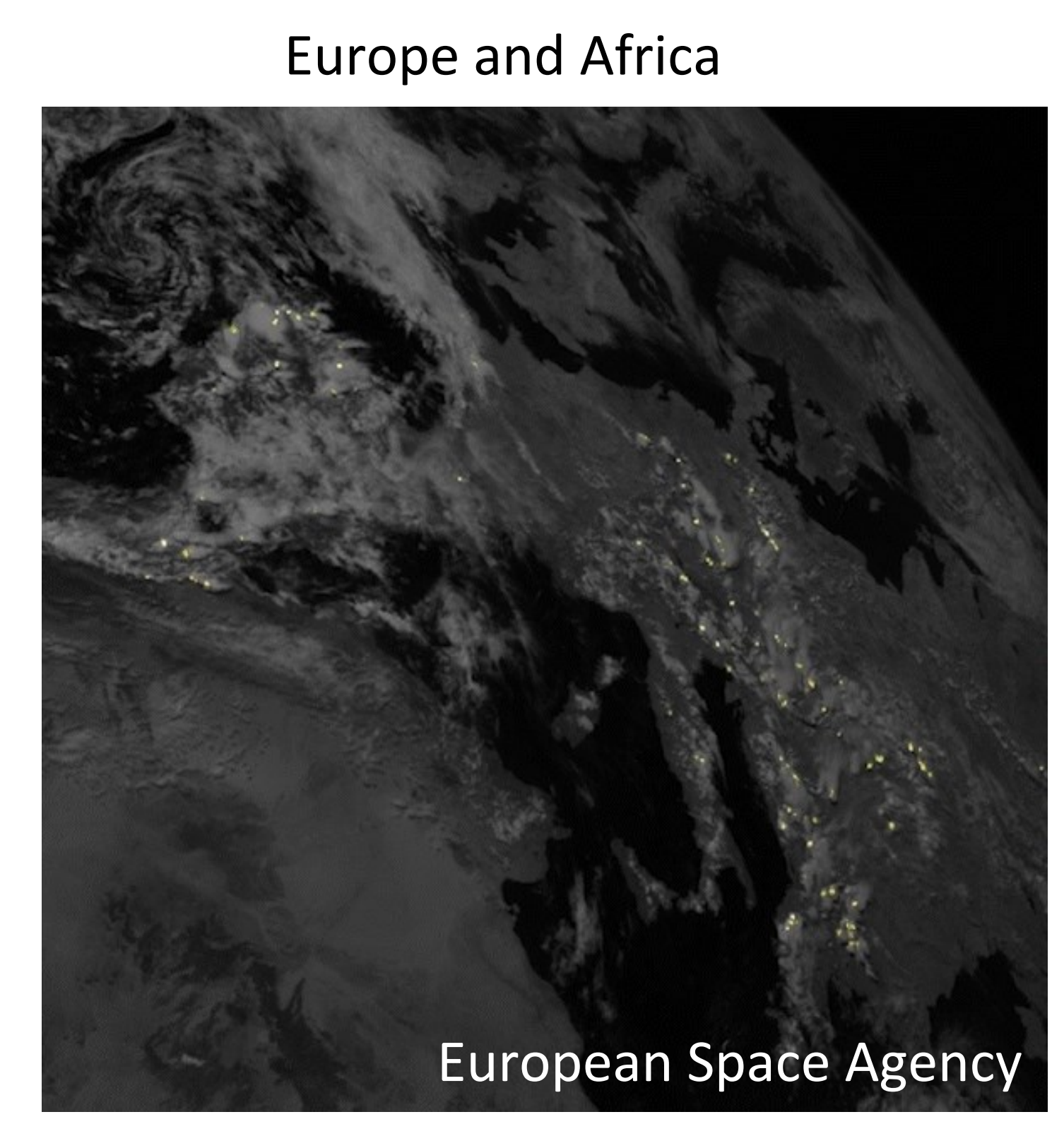


GLM depicts the entire flash footprint, revealing a connection between these distant storm cores

GLM helps better characterize the lightning risk and increase confidence/certainty when suspending ramp operations, leading to enhanced safety, improved efficiency, and cost savings.

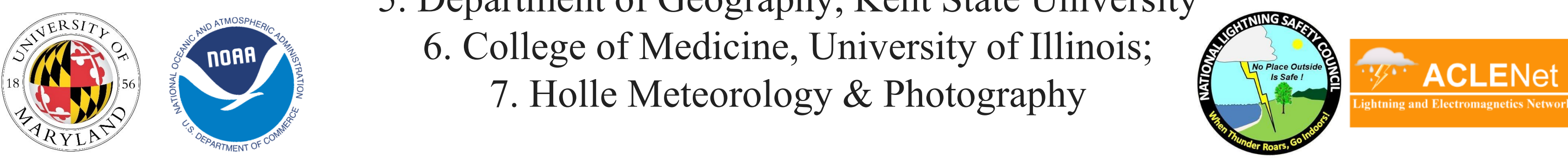
GLM increases the awareness of the lightning threat through enhanced detection of lightning strikes most likely to ignite fires

What's next? - Geostationary lightning mapping around the globe!

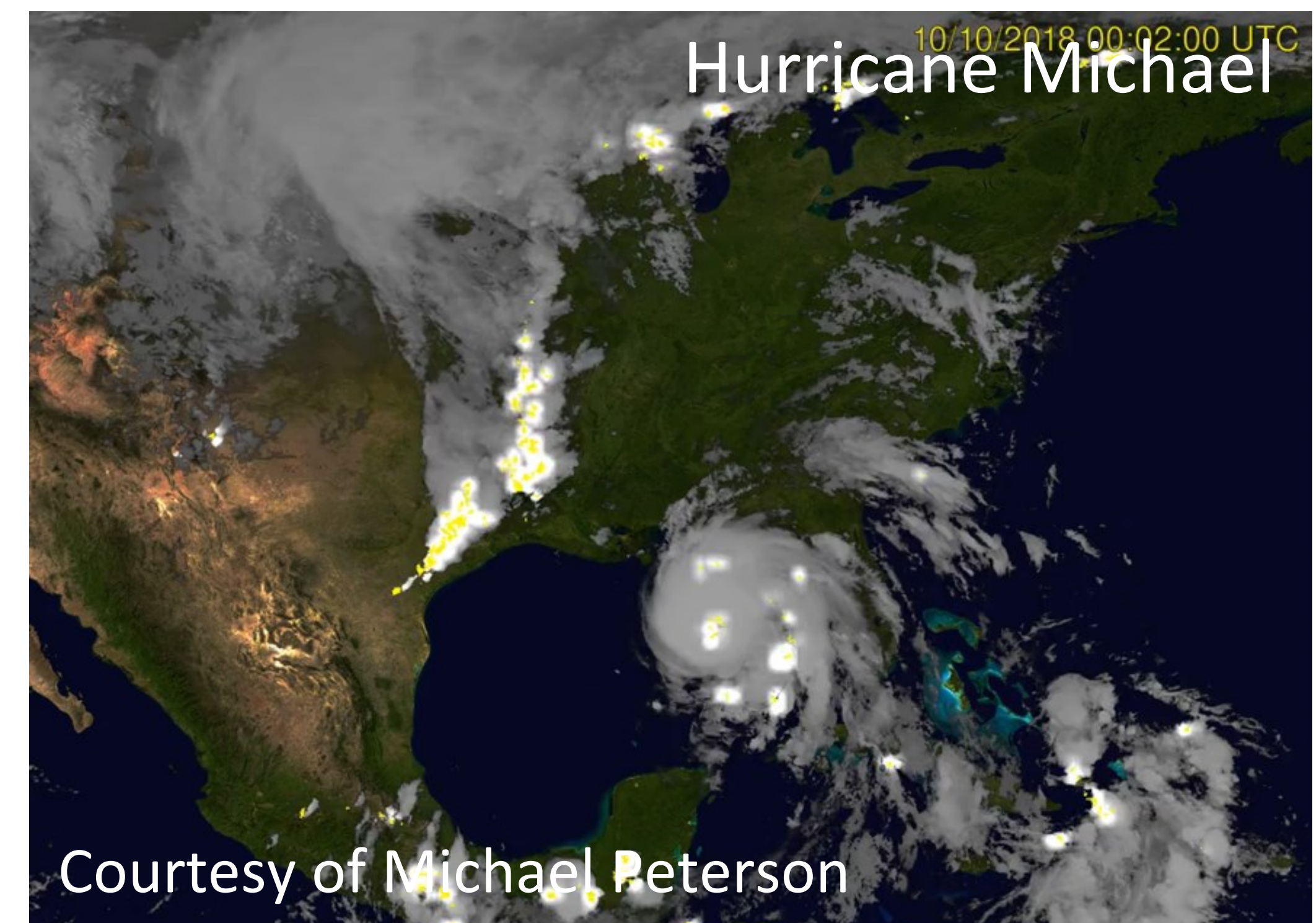


# Lightning Climatology, Casualties and Impacts in the U.S. and Africa

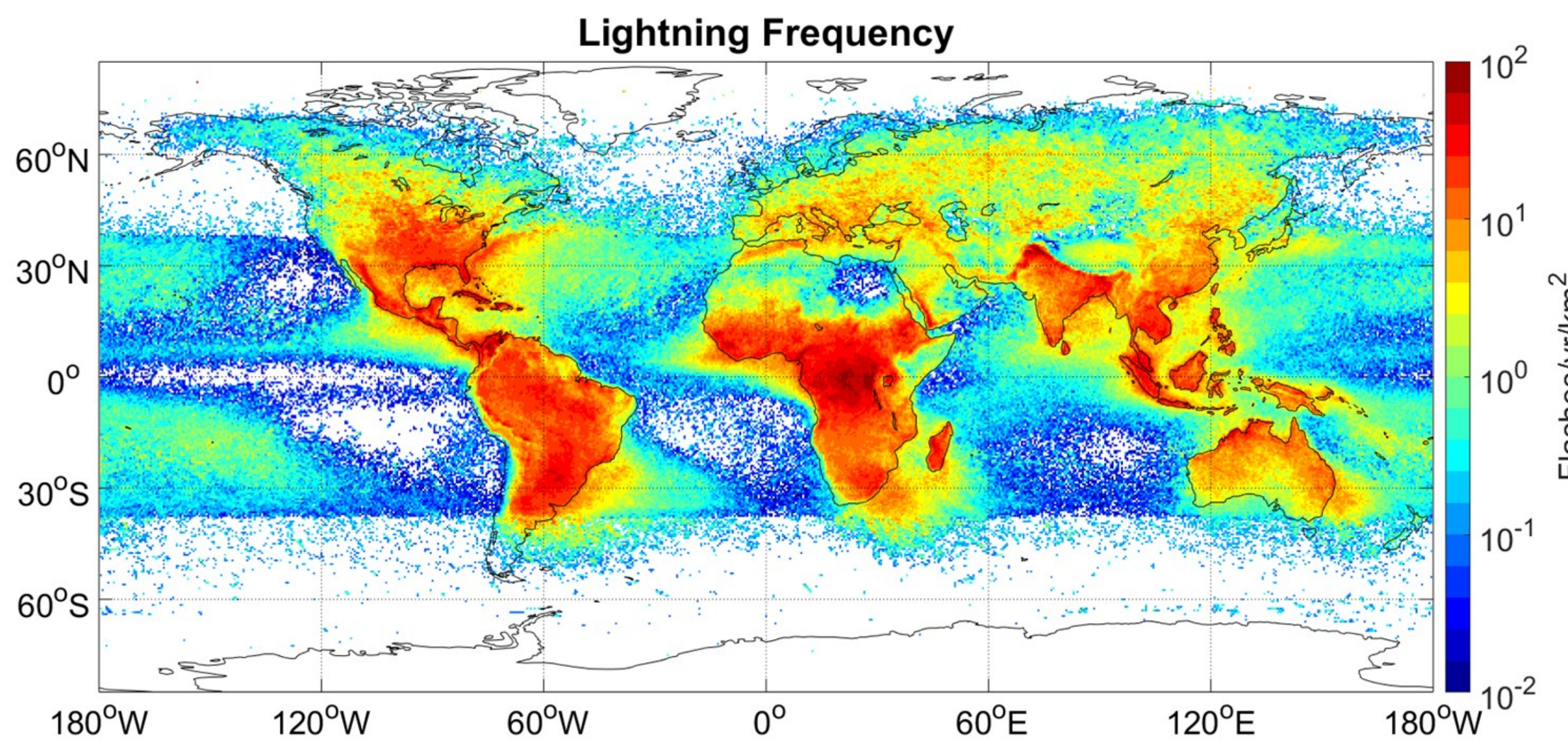
- Daile Zhang<sup>1,2,3</sup>, Scott Rudlosky<sup>1,4,5</sup>, Mary Ann Cooper<sup>2,3,6</sup>, and Ron Holle<sup>2,3,7</sup>
- Cooperative Institute for Satellite Earth System Studies (CISS), University of Maryland
  - African Centres for Lightning and Electromagnetics Network (ACLENet)
  - U.S. National Lightning Safety Council
  - NOAA National Environmental Satellite, Data, and Information Service (NESDIS)
  - Department of Geography, Kent State University
  - College of Medicine, University of Illinois;
  - Holle Meteorology & Photography



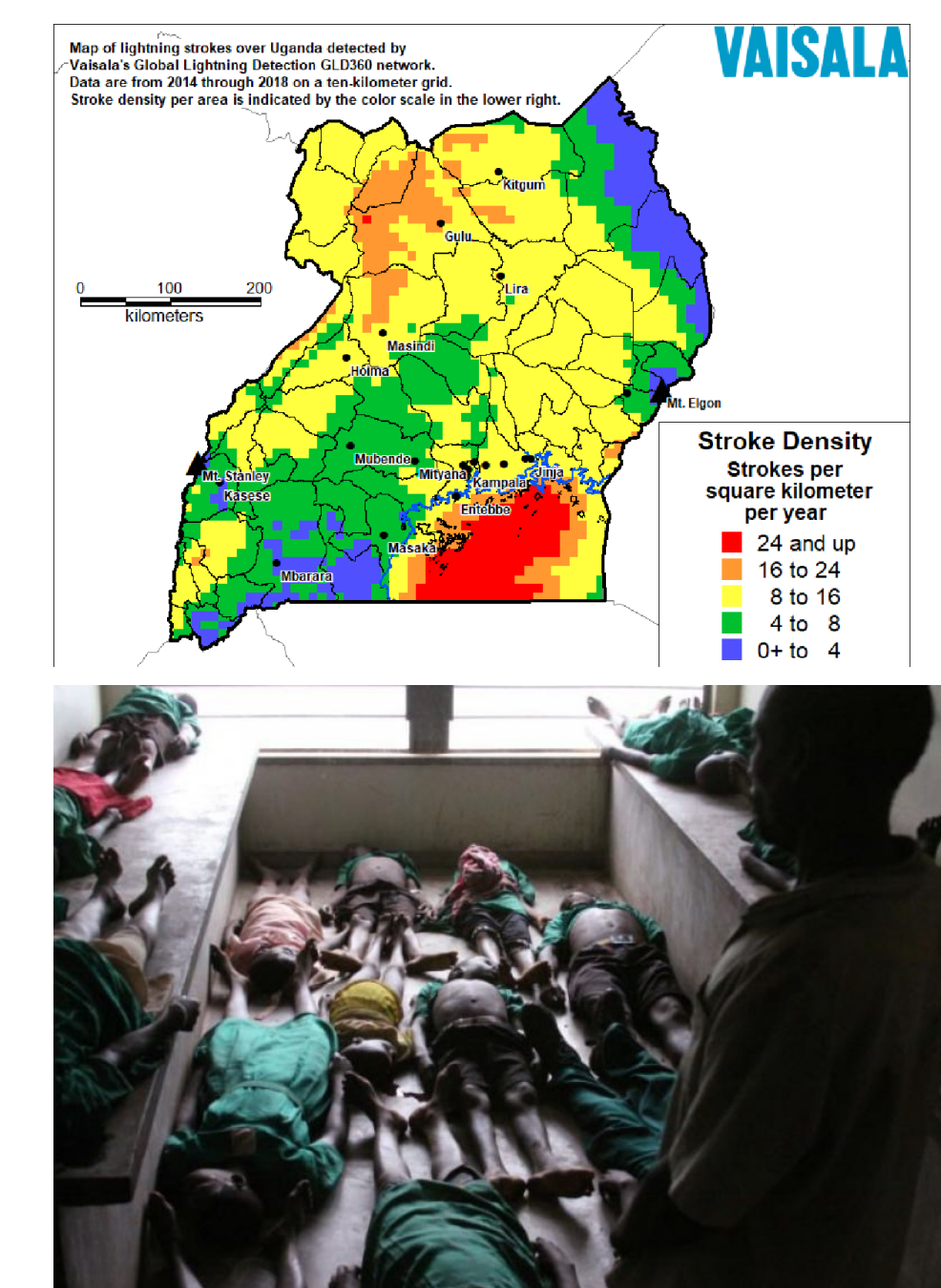
Lightning kills, injures, and damages. With advanced technology, we will be able to mitigate lightning-related disasters.



Lightning: A New Essential Climate Variable We need to better understand how lightning affects climate change and vice versa.



# What and why?



- 2 million lightning strikes to Uganda every year!
- Holle, R.L., and M.J. Murphy, 2017: Lightning over three tropical lakes and the Strait of Malacca: Exploratory analyses. *Monthly Weather Review*, 145, 4559-4573.
- Students are the most reported injuries
- 18 children killed, 38 injured from one lightning strike at Runyanya Primary School in Uganda
- The World remembers these children every June 28 as International Lightning Safety Day
- Total of 94 deaths and 554 injuries in school lightning casualties in Uganda during 2007-2020
- 19 school events had 11 or more lightning casualties

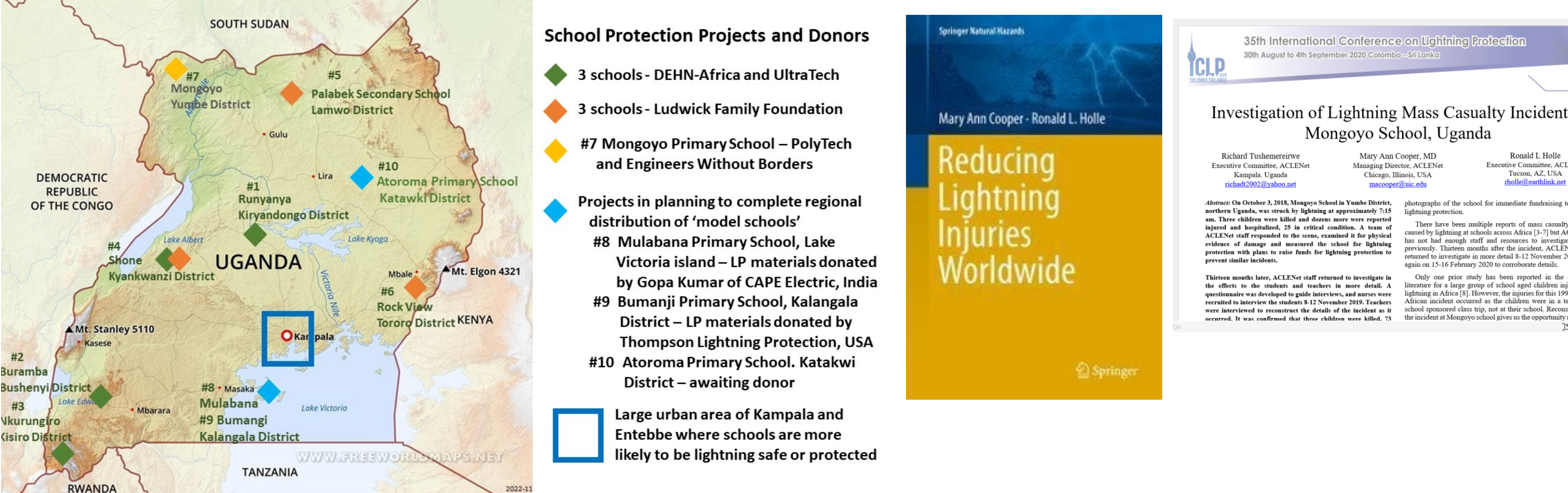
All events in Uganda 2007-2020

Schools	55
Under trees	6
Church	4
Tending animals	4
Funeral	3
Playing	3
Soccer	3
Collecting rainwater	2
Inside bar (hut)	2
Other single events	13

Holle, R.L., et al., 2021

## What have we accomplished?

- Installed lightning protection systems in 7 schools in Uganda – over 11,000 students and teachers protected
- Lightning safety education seminars for students, parents, teachers, officials, etc.
- Largest lightning casualties database – 41 African countries
- Research on lightning disaster, medical effects, etc. with publications and talks
- Newsletter in 5 languages - English, Spanish, French, Portuguese, and Arabic



## What are we doing now?

- Two schools in Uganda are underway



Volunteer or donate!



<https://achenet.org/>

Help us protect more schools!