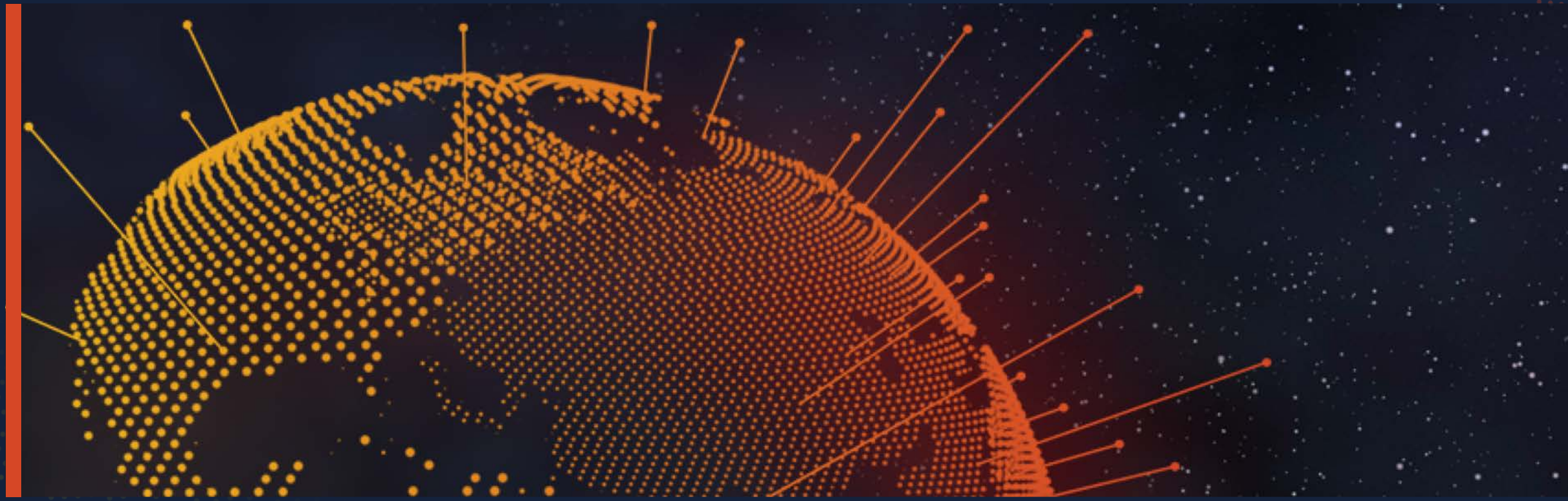
EARTH NETWORKS



WEATHER SAFETY WARMUP

WEBINAR SERIES

HOUSE KEEPING

- This webinar is being recorded and will be sent out shortly after the webinar.
- Have a question? Use the chat box and we will get to it at the end of the session.
- The **Weather Safety Warmup** airs on the 3rd Wednesday of every month.
- Want to learn more? We have additional sessions every month!

EARTH NETWORKS

HOW SHOULD YOU BE MONITORING LIGHTNING?

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AGENDA

- JMU introduction
- Lightning: What is it?
- The science behind lightning
- Understanding the risk
- Monitoring options
  - Flash to bang
  - 30/30 rule
  - Free apps
  - Hand held devices
  - Prediction technology
  - Detection technology
- How it all looks in real time
- Prediction vs. Detection solution
- Takeaways

PRESENTERS

JEFF LAPIERRE	*Postdoctoral Researcher at Earth Networks*
TY PHILLIPS	*Assistant Athletic Director at James Madison University*

EARTH NETWORKS

JAMES MADISON UNIVERSITY

DETAILS

- Located in the Harrisonburg, VA
- Over **22k students** enrolled
- **18 men & women NCAA Division 1 sport programs** including:
  - **Soccer, Basketball, Football, Tennis, Baseball, Golf, Lacrosse, Track & Field**, etc.
- Has multiple festivals, concerts and outdoor events
- Also has a very active recreation program with intramural sports and outdoor activities
- Has lots of visitors every day
- Weather safety is a collaborative effort between the **Athletic, Facilities Management** and **Emergency Management** departments.

LIGHTNING

An atmospheric discharge of electricity when positively-charged particles in one area meet negatively-charged particles in another area.

TYPES OF LIGHTNING

CLOUD-TO-GROUND (CG) LIGHTNING

Lightning that extends from the cloud to the ground.

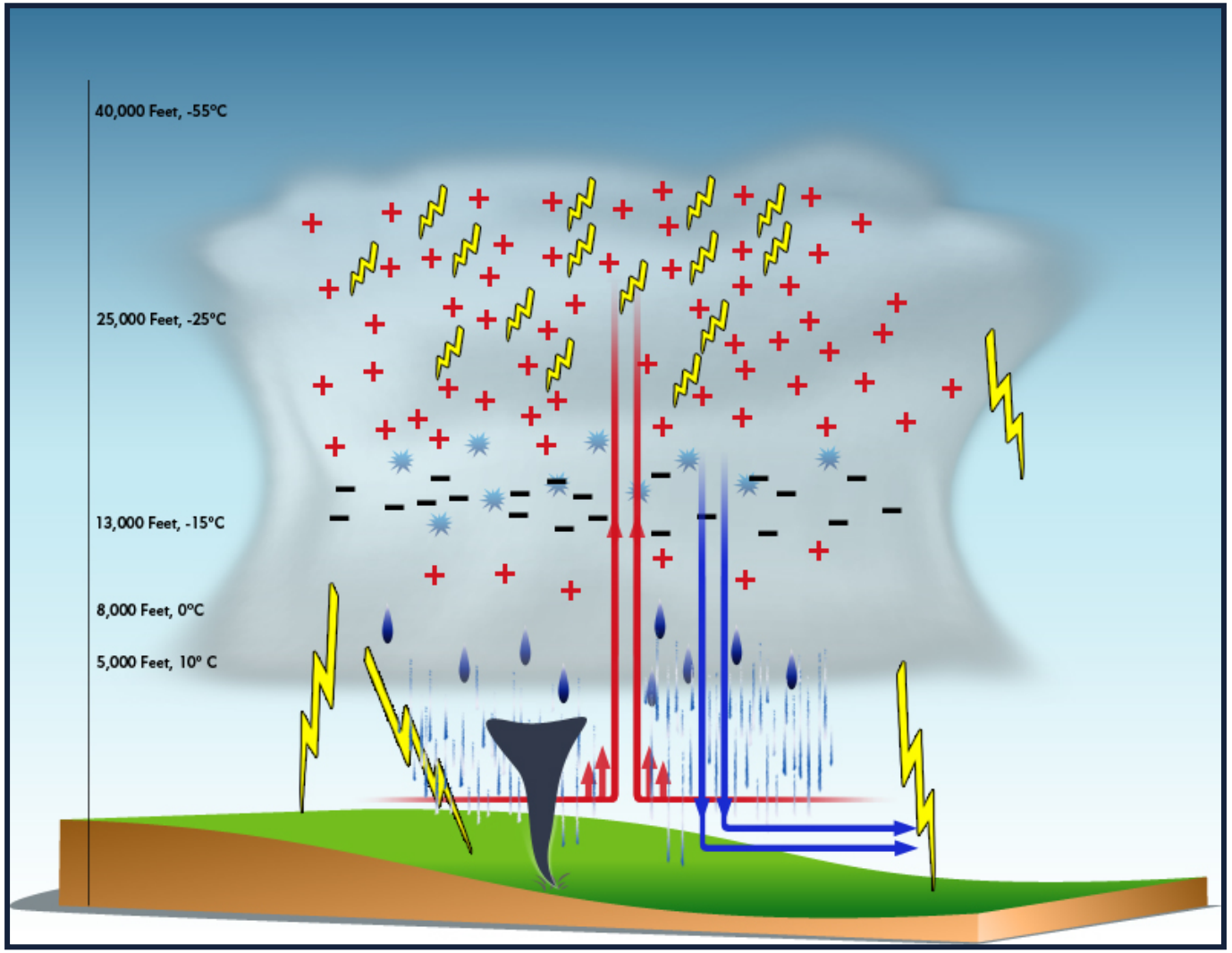
IN-CLOUD (IC) LIGHTNING

Lightning that does not make contact with ground; sometimes referred to as intra-cloud and inter-cloud lightning.

BOLT FROM THE BLUE

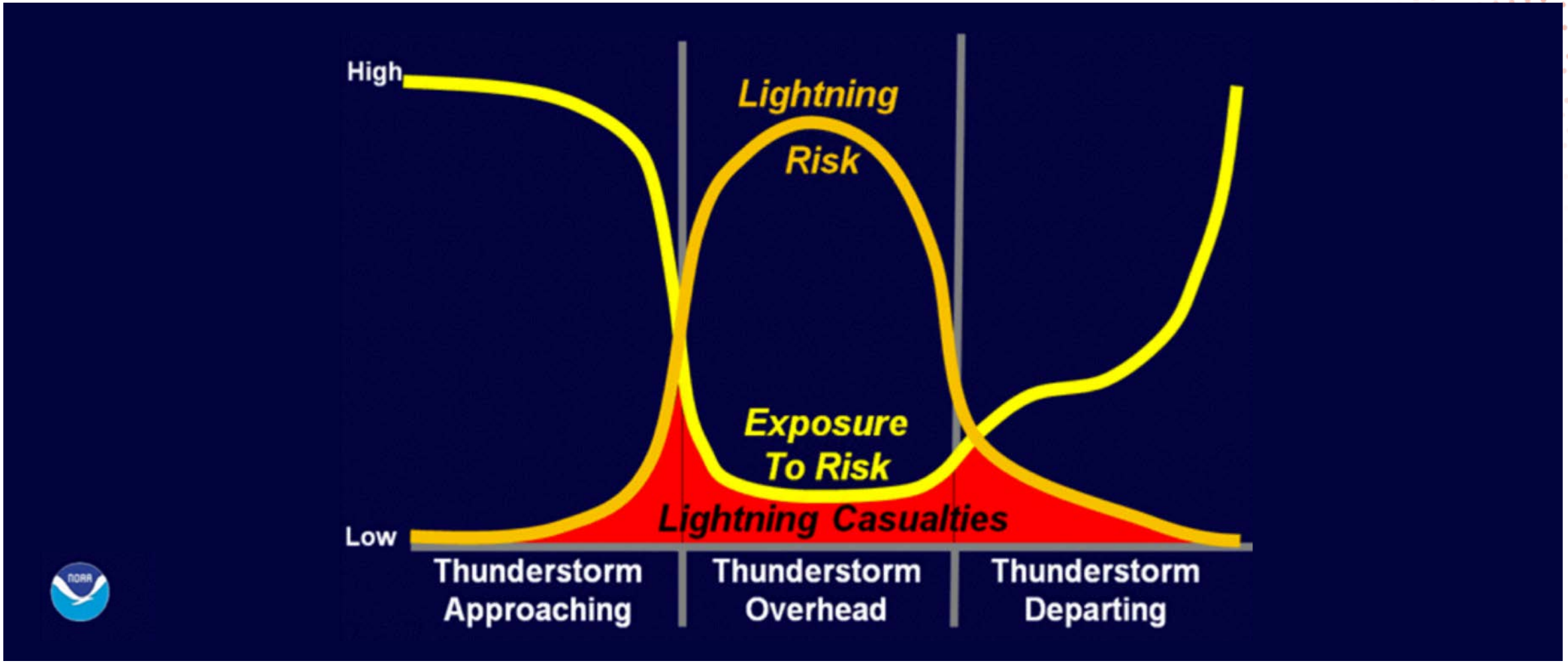
A cloud-to-ground lightning flash which typically comes from the back or front side of the thunderstorm cloud and can travel up to 12 miles in clear air away from the storm cloud, and then angles down and strikes the ground.

LIGHTNING DEVELOPMENT

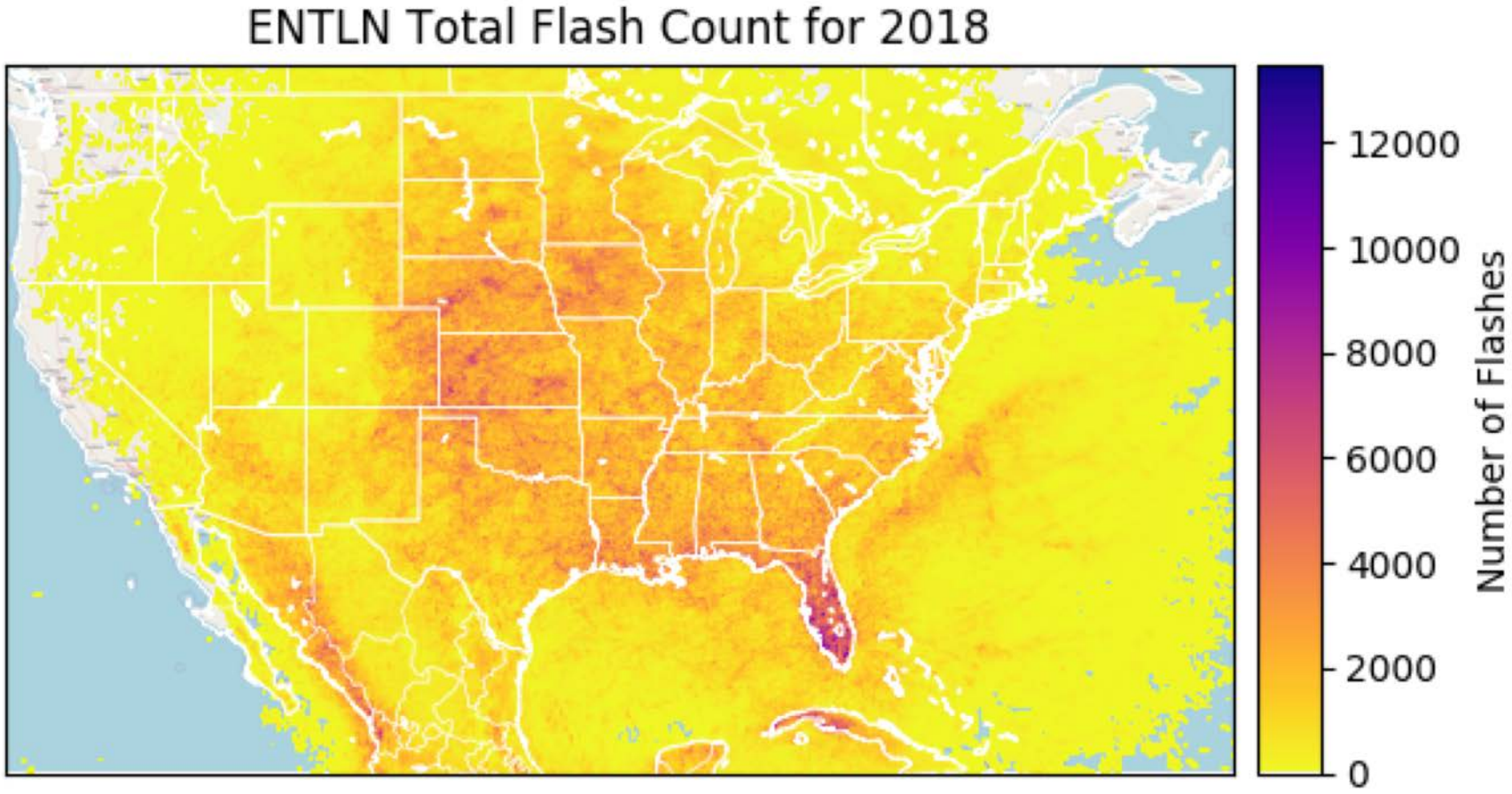


EARTH NETWORKS

THREAT OF LIGHTNING CASUALTIES



HERE IS THE REALITY



In 2018, Earth Networks detected **157,506,621** total lightning strikes in the U.S.

THE POWER AND DANGER OF LIGHTNING

Did you know?

Two-thirds of all lightning deaths in the U.S. are associated with outdoor recreational activities.

Did you know?

There are 50 to 100 cloud to ground lightning strikes every second worldwide; that's over 3 million strikes per day!

Did you know?

More than 400 people are struck by lightning in the U.S. every year.

Did you know?

Each lightning strike can carry over 1 billion volts of electricity and is 5 times hotter than the sun.

http://www.lightningsafety.noaa.gov/fatalities/analysis03-17.pdf | https://www.nationalgeographic.com/environment/natural-disasters/lightning/
https://www.outsideonline.com/1912401/lightning-deaths-and-injuries-numbers | https://www.seeker.com/is-lightning-hotter-than-the-sun-1765058578.html

SO HOW SHOULD YOU BE

MONITORING LIGHTNING?

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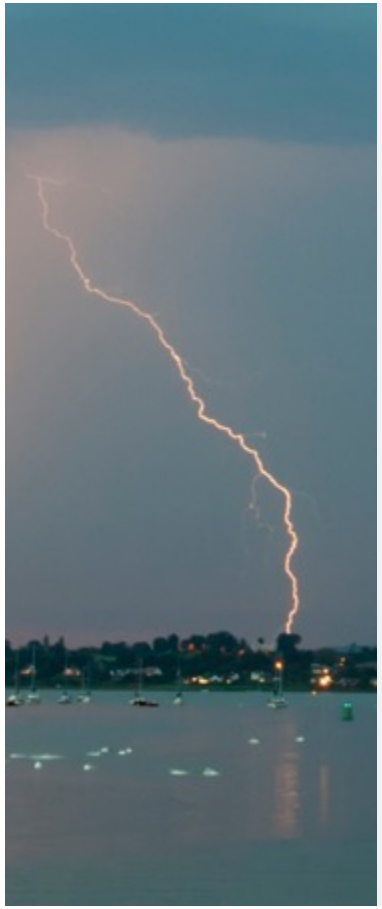


FLASH TO BANG METHOD

When you see lightning, count until you hear thunder and divide # of seconds by 5 resulting the distance of lightning in miles.

LIGHTNING 30/30 RULE

If it takes less than 30 seconds to hear thunder after seeing the flash, lightning is near enough to pose a threat.

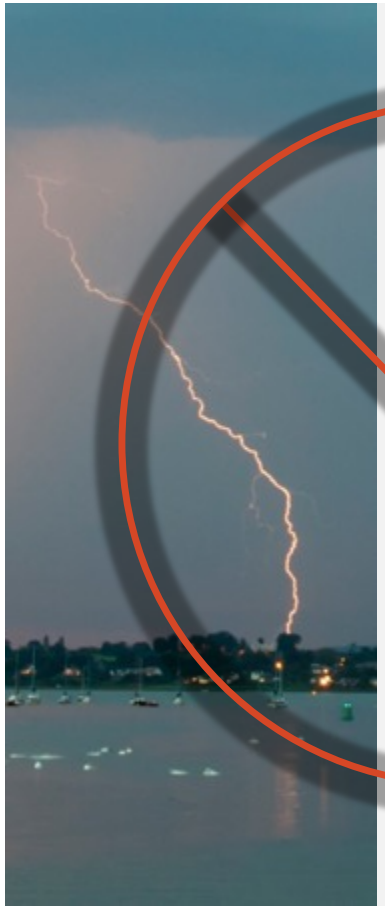
HANDHELD LIGHTNING DEVICES

- Battery-dependent
- Very short range of coverage
- No logical or scientific basis for these units to be able to provide distance or direction
- No scientific validity
- Limited data sharing

FREE APPS

- Not hyperlocal
- Not real-time
- No single source of truth
- Not consistent
- Not licensed for commercial use

HOW SHOULD YOU BE MONITORING LIGHTNING?



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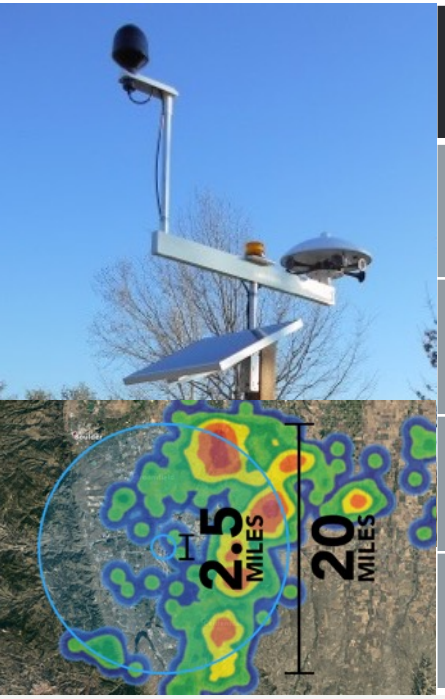
POPULAR LIGHTNING SOLUTIONS - PREDICTION VS. DETECTION



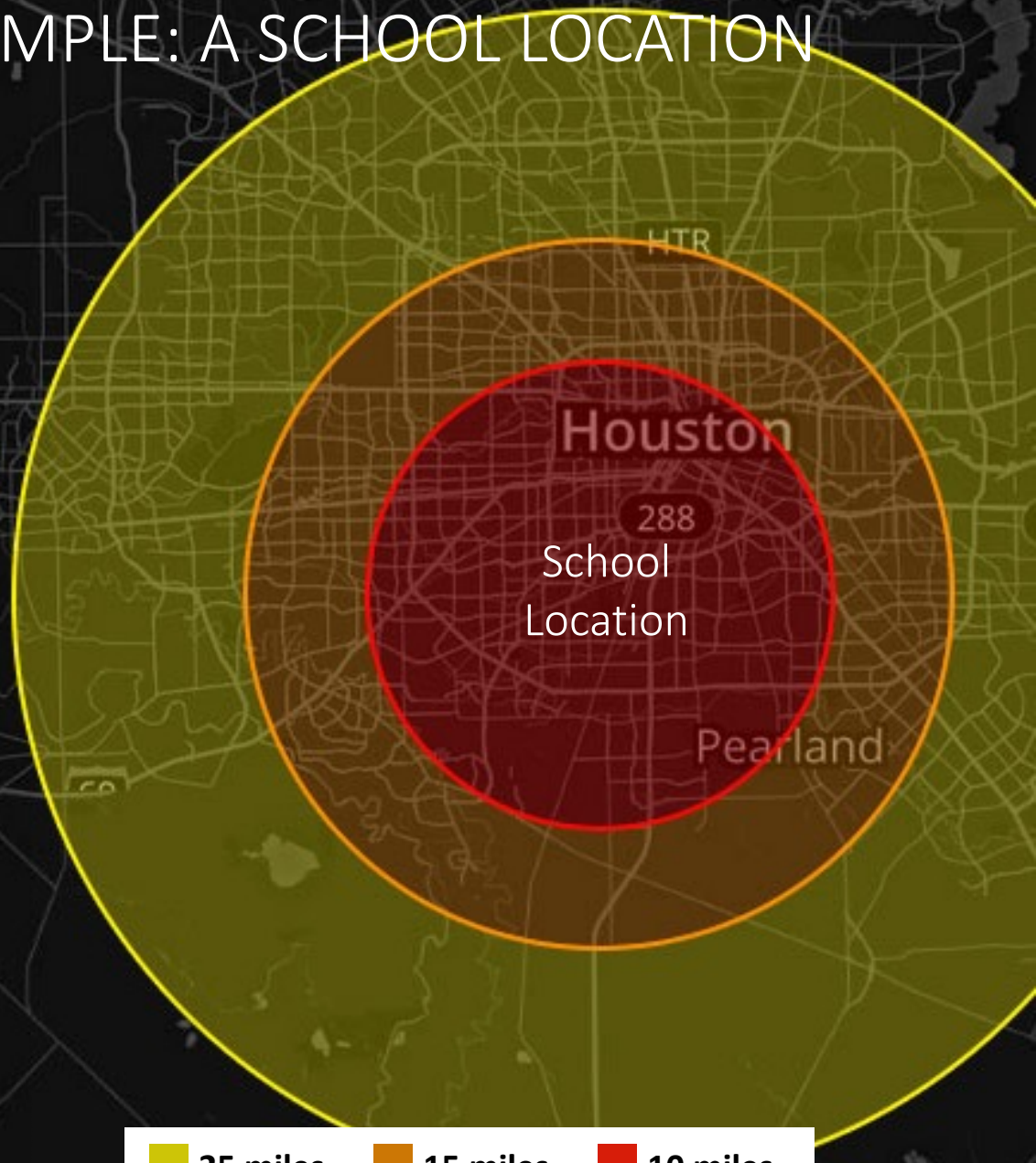
Single-Node Lightning Prediction	Network-Based Lightning Detection
Measure slow changing static electric field from thundercloud	Measure fast change EM radiation from lightning
Estimates potential for lightning	Detects actual lightning
Maximum distance of a few miles	Global coverage
No information on lightning location or characteristics	Provide lightning time, location, IC or CG, and peak current

LIGHTNING DETECTION & ALERTING EXAMPLE: A SCHOOL LOCATION

OUTER – 25 Miles	
ALERT	**Email warning sent to key admin: Public Safety Director / AD**
ACTION	Monitor the situation (Take note of potential severe weather movement)

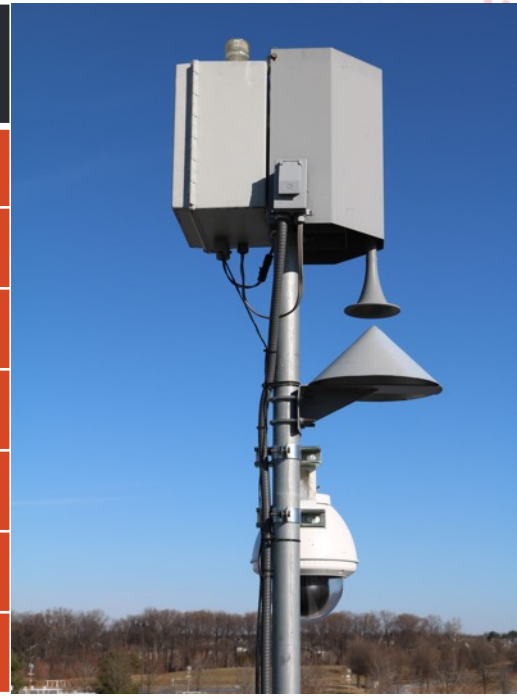
MIDDLE – 15 Miles	
ALERT	**Text & email alerts are sent to key stakeholders: Safety team, ADs, Key Admins**
ACTION	Monitor direction of storm
ACTION	Prepare to halt the game

INNER – 10 Miles	
ALERT	**Outdoor horn and strobes are activated**
ACTION	All outdoor activities are halted
ACTION	Staff and students head to designated indoor area for safety until all clear is given



GUESSING VS. FACTS – EVER-EVOLVING ADVANCED TECHNOLOGY

Single-Node Lightning Prediction	Network-Based Lightning Detection
✖ Sounds alert based off possibility of a storm	✔ Real-time, lowers false alarms
✖ Only identifies electrostatic discharges	✔ Exact locations of storms
✖ Can trigger false alarms or no alarms at all	✔ Accurate lead-times
✖ Sole weather monitoring asset	✔ A network of lightning sensors
✖ Only about a 20 mile range	✔ Can span across states
✖ Generally poor accuracy	✔ Higher accuracy
✖ Typically only detects CG	✔ Detect both IC & CG



TAKEAWAYS

Lightning remains a major safety threat for any outdoor venue.

Outdated lightning management methods, hand held devices and free apps should be avoided.

Real time advanced weather detection, not prediction, is needed to assist human risk decision making.

THANK YOU

QUESTIONS AND COMMENTS?

Contact us at info@earthnetworks.com