# Tools for Responding to Meteors of Public Interest

Aaron Kingery[1] Danielle Moser[2]

[1]ERC / Jacobs Space Exploration Group/ NASA Meteoroid Environment Office

[2]Jacobs Space Exploration Group / NASA Meteoroid Environment Office

Meteoroids 2019

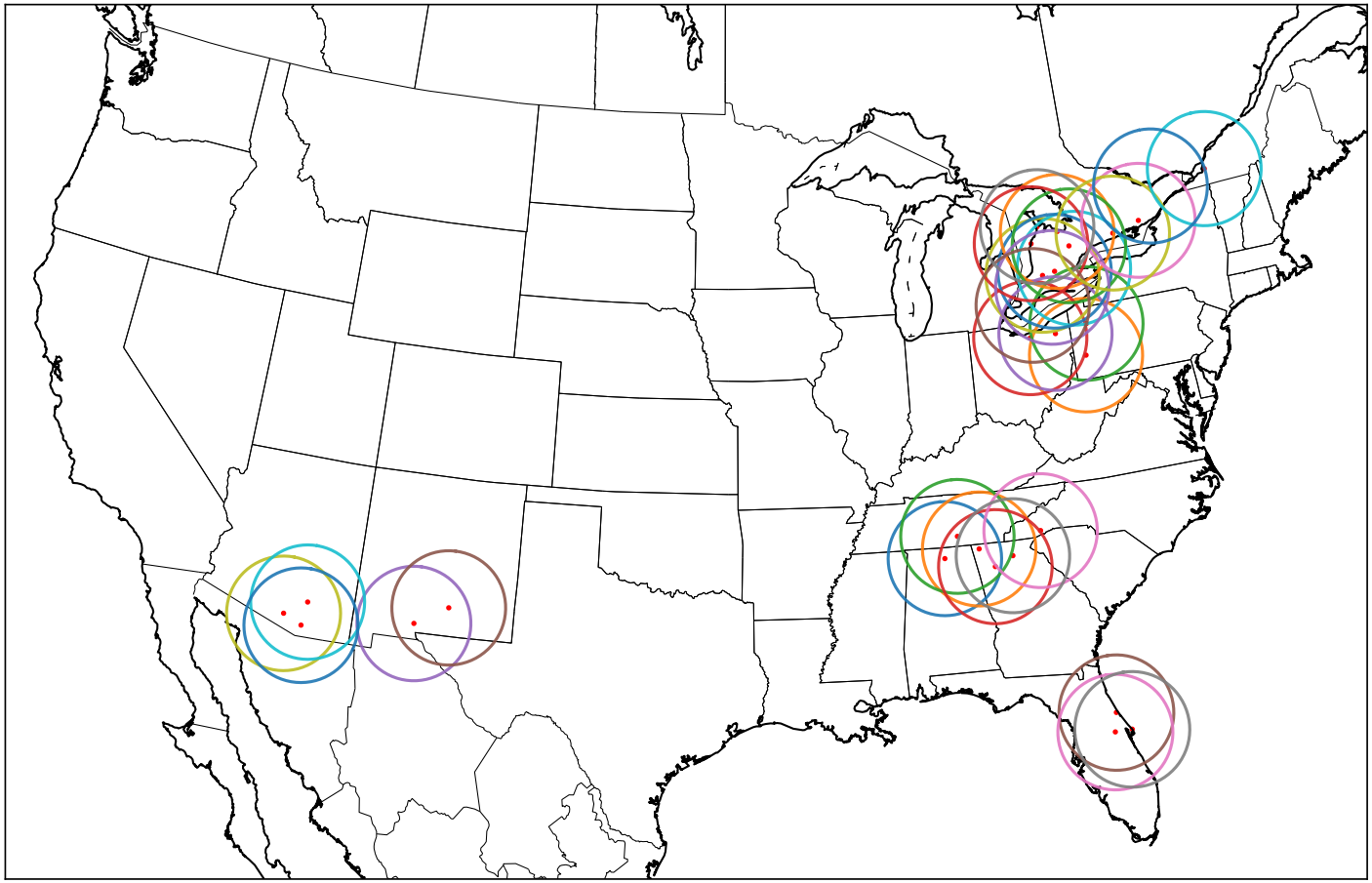
ERC JACOBS

# Purpose

Quickly respond to bright meteors

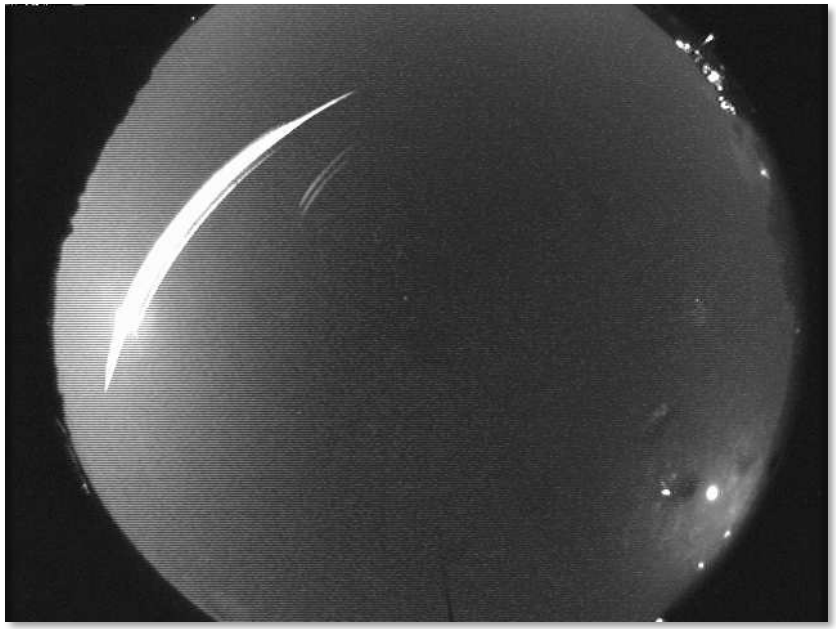
- Meteor?
- Imagery
- Trajectory
- Height
- Speed
- Mass

# Ideally, over our camera network

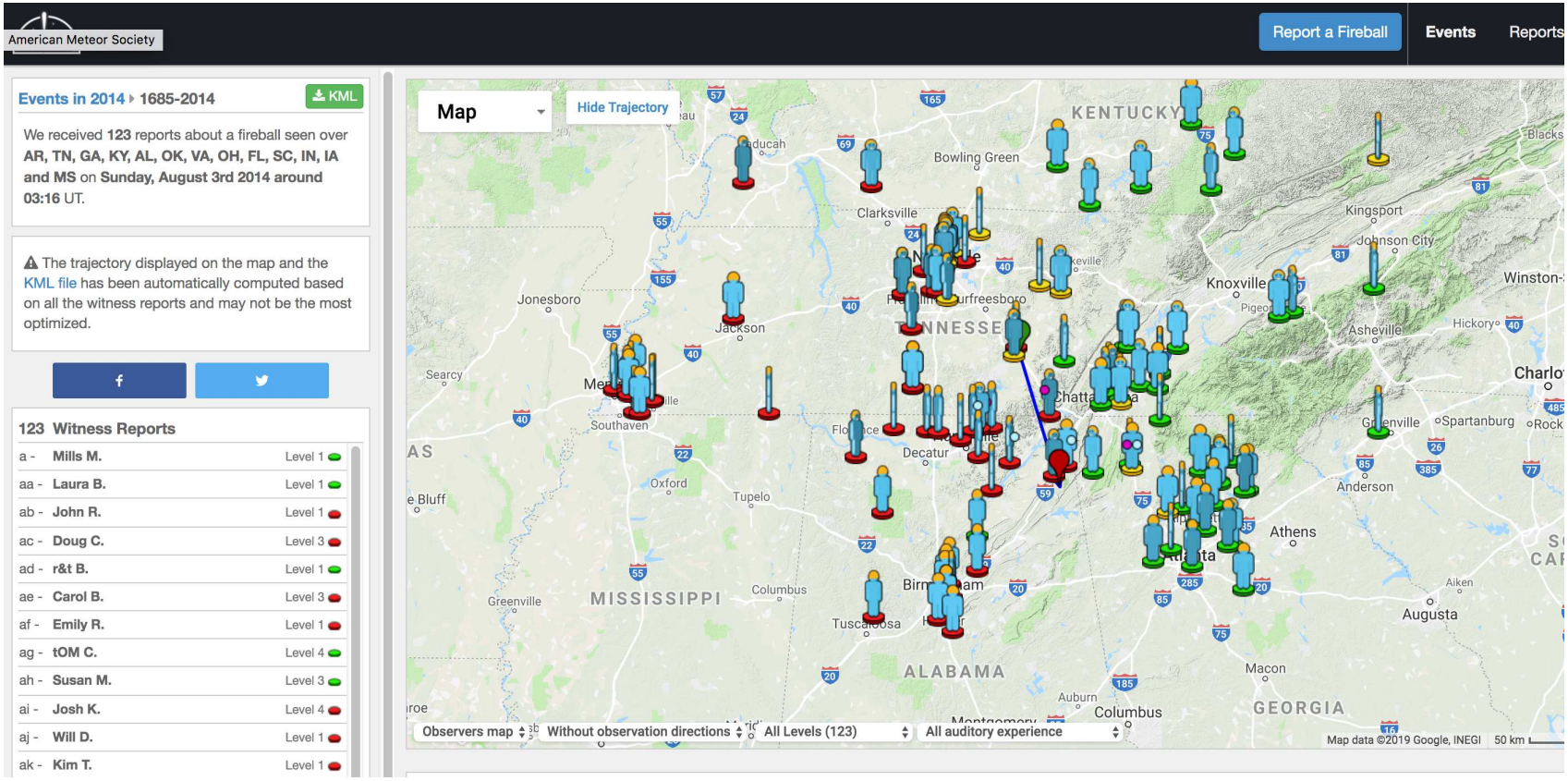


# Ideally, Meteor over our camera network

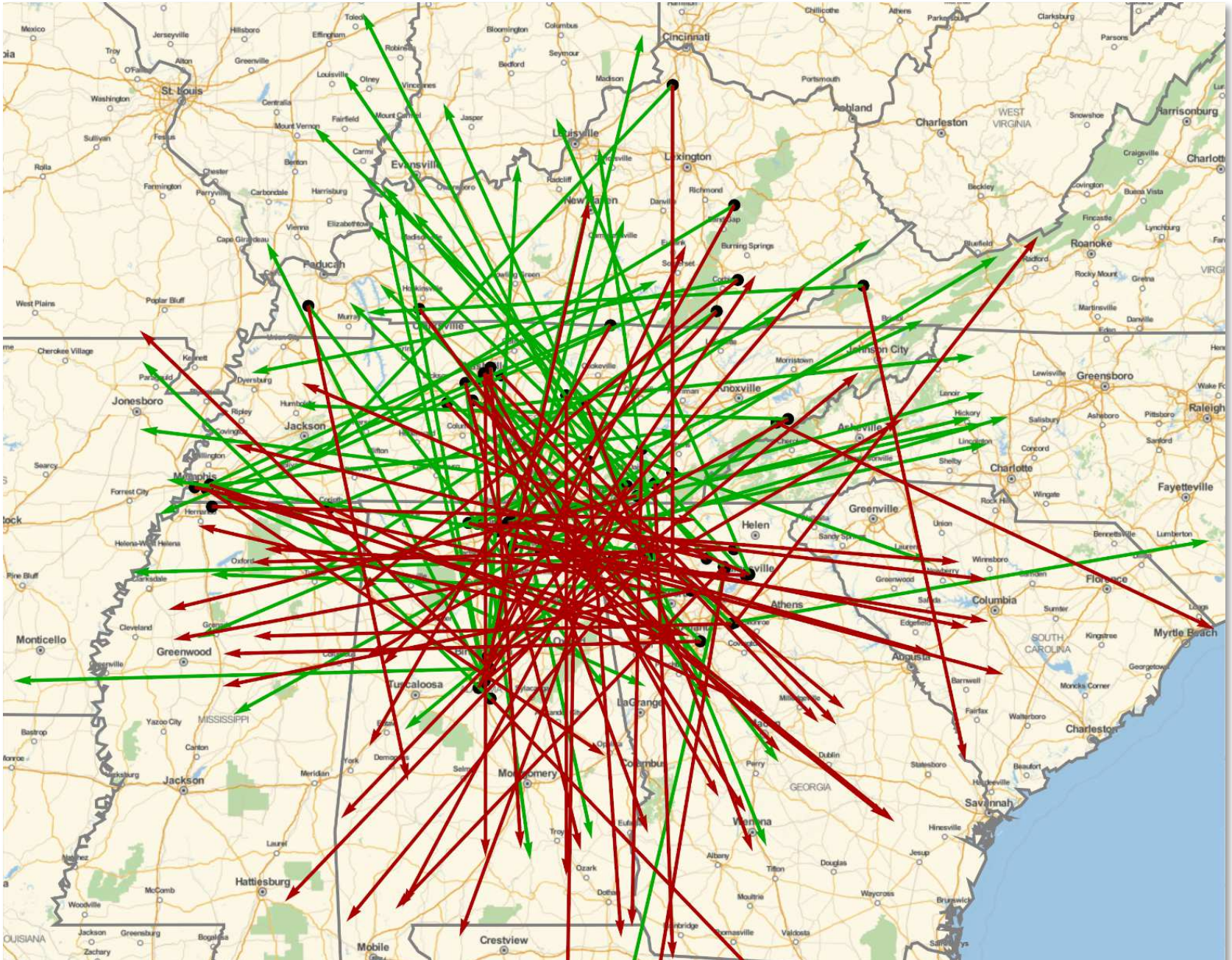
- ✓ Meteor
- ✓ Images/Videos
- ✓ Trajectory
- ✓ Height
- ✓ Speed
- ✓ Mass



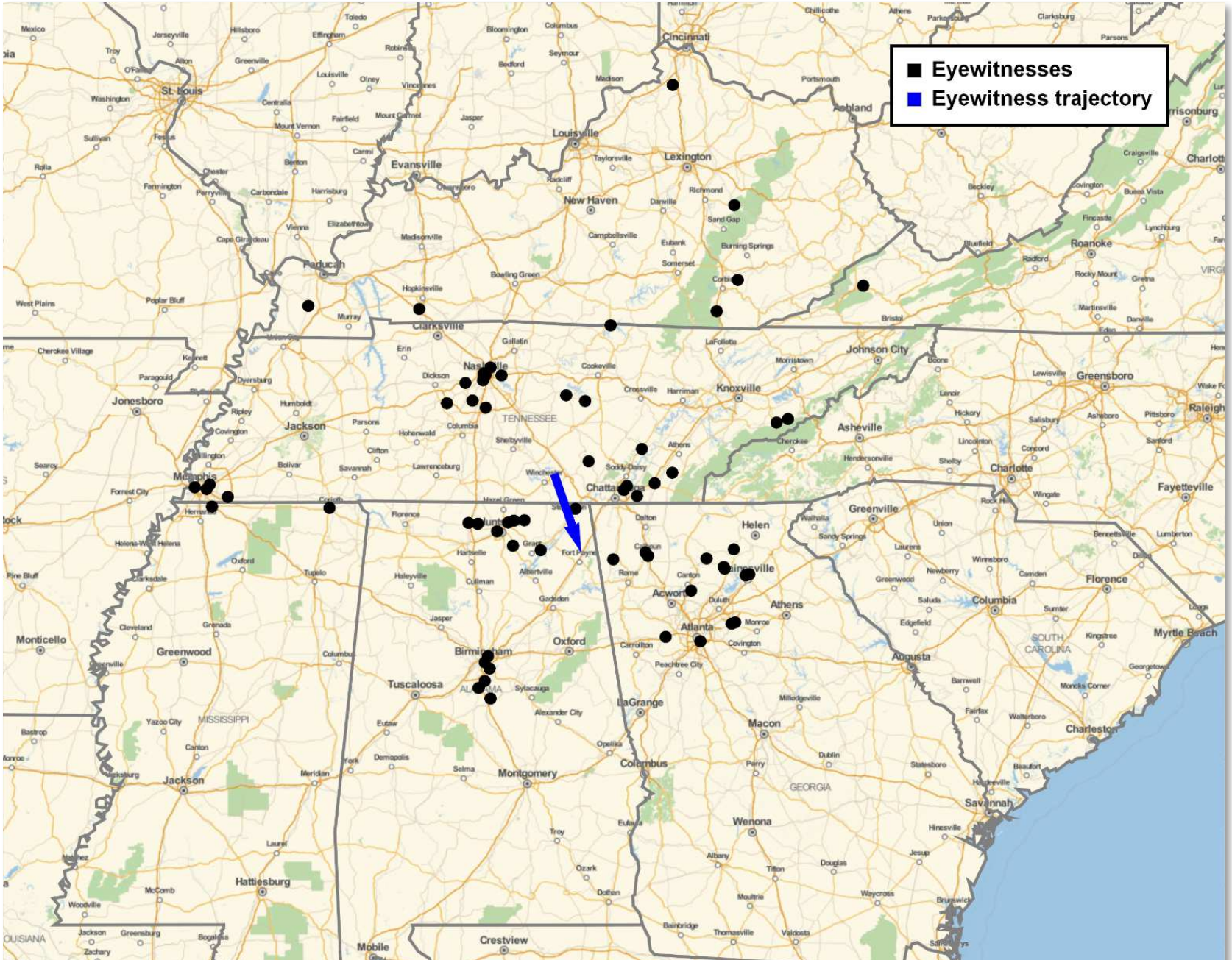
# What if not ideal?



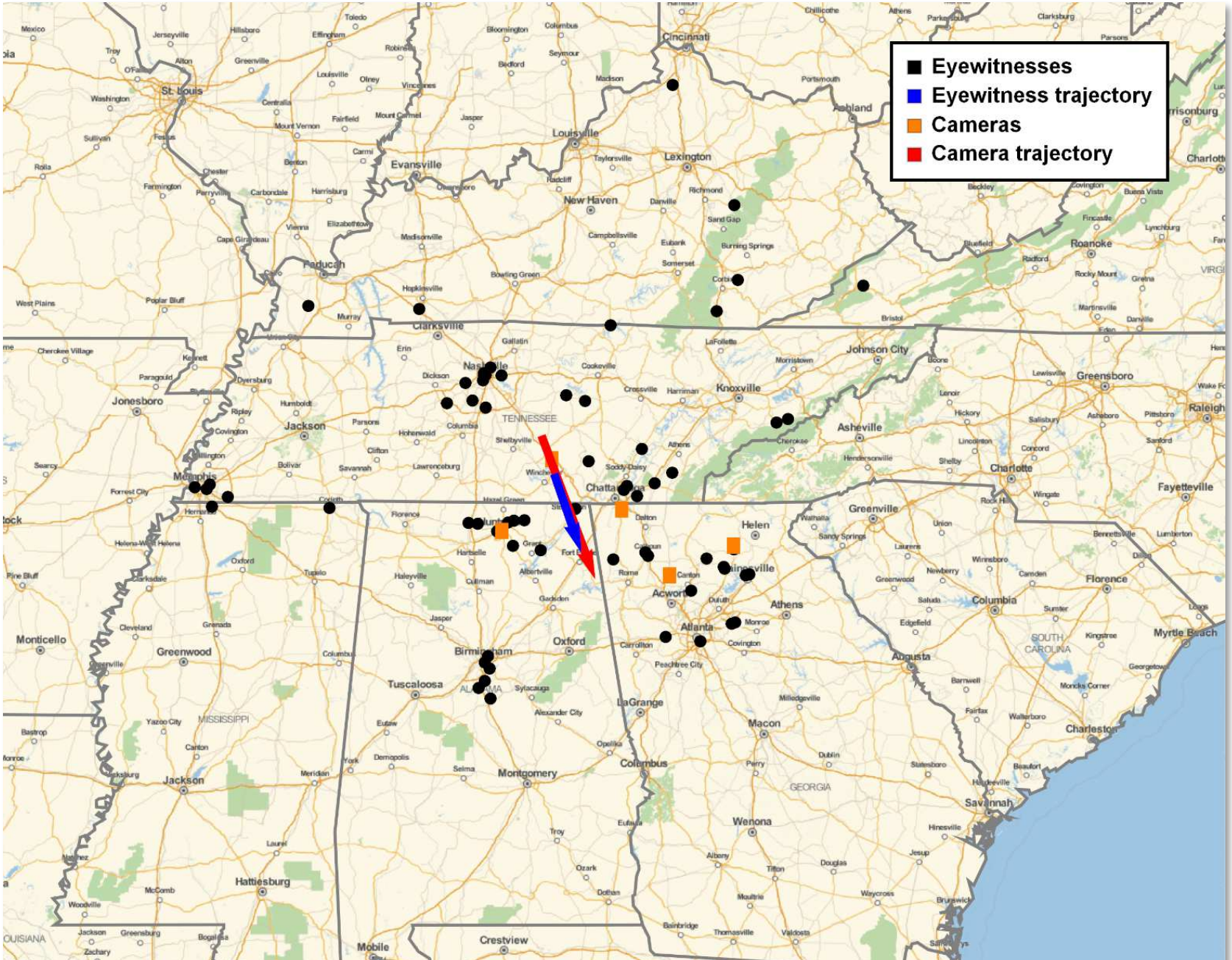
# Chicken Little



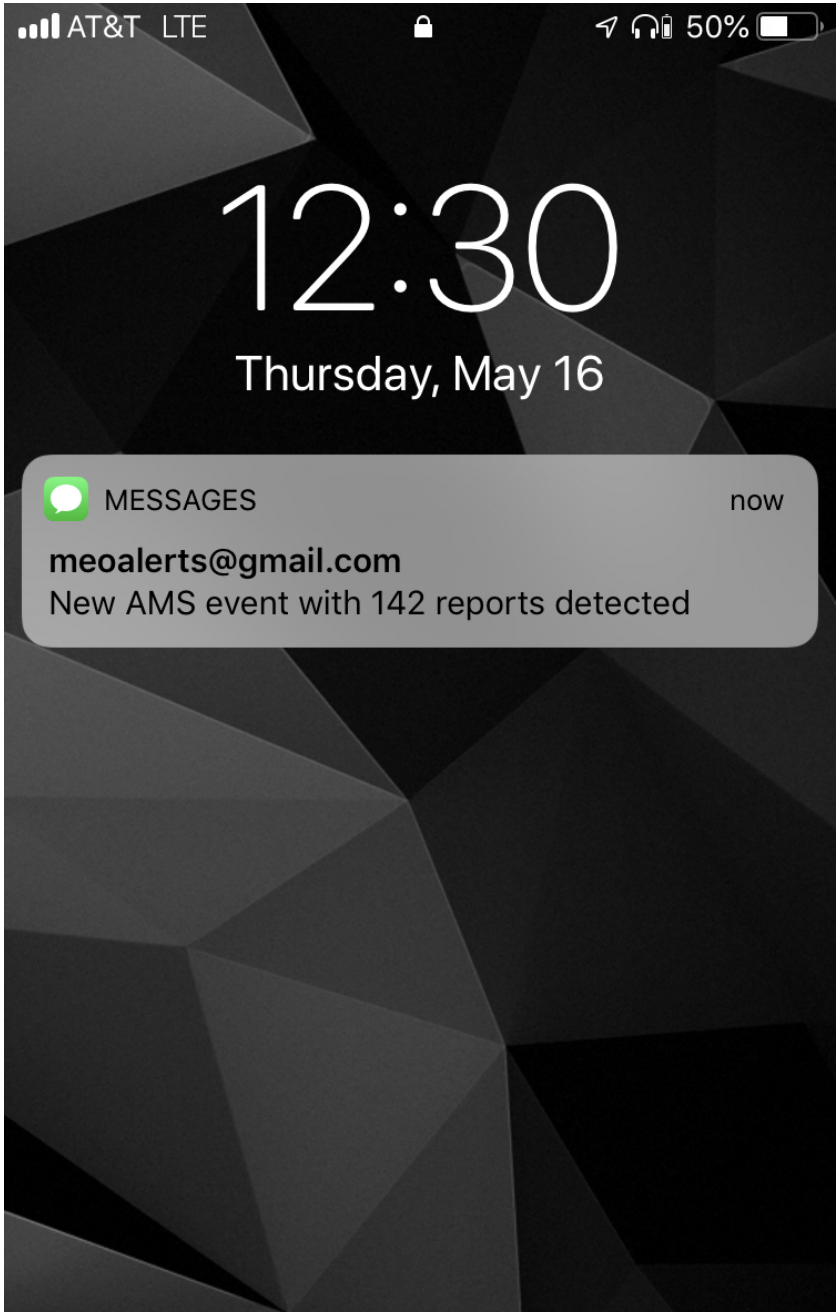
# Chicken Little

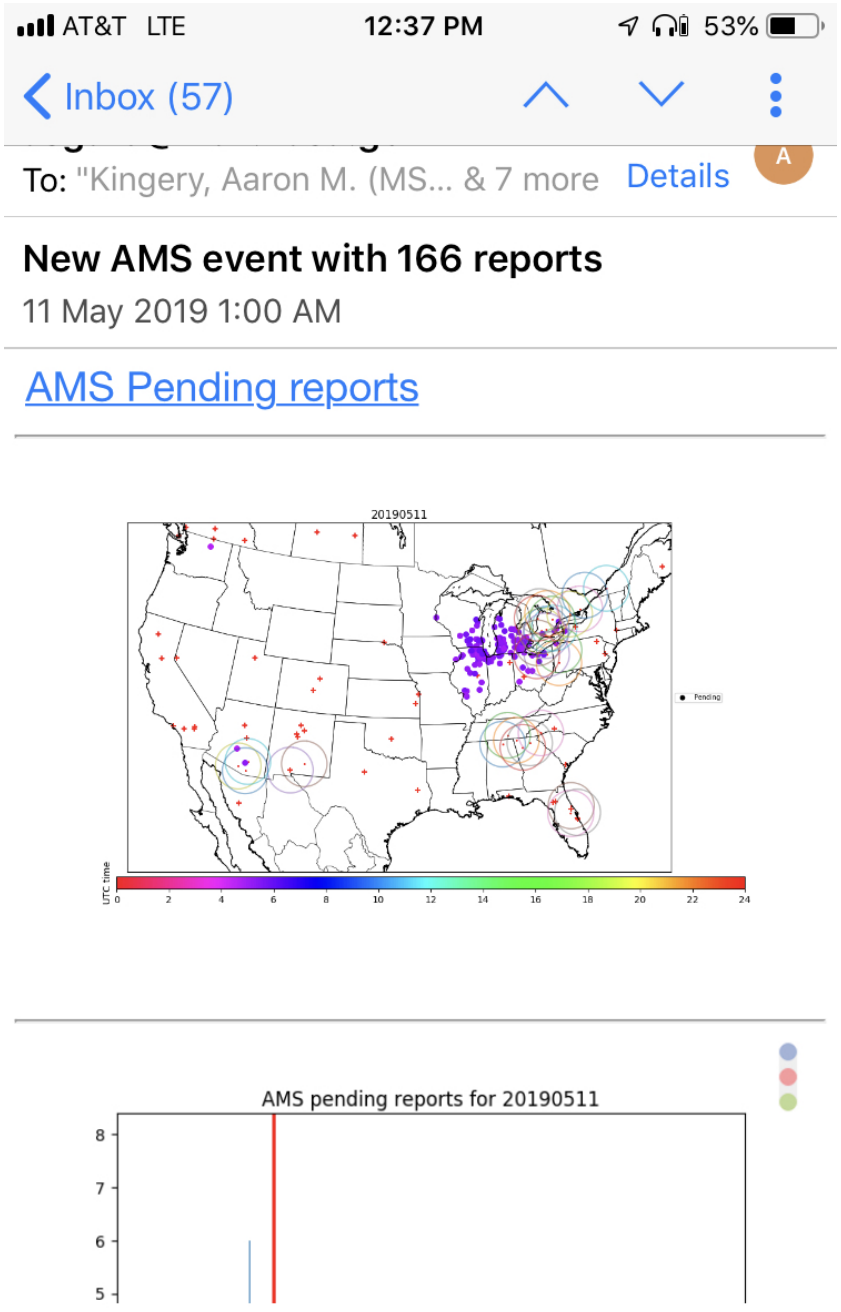


# Chicken Little

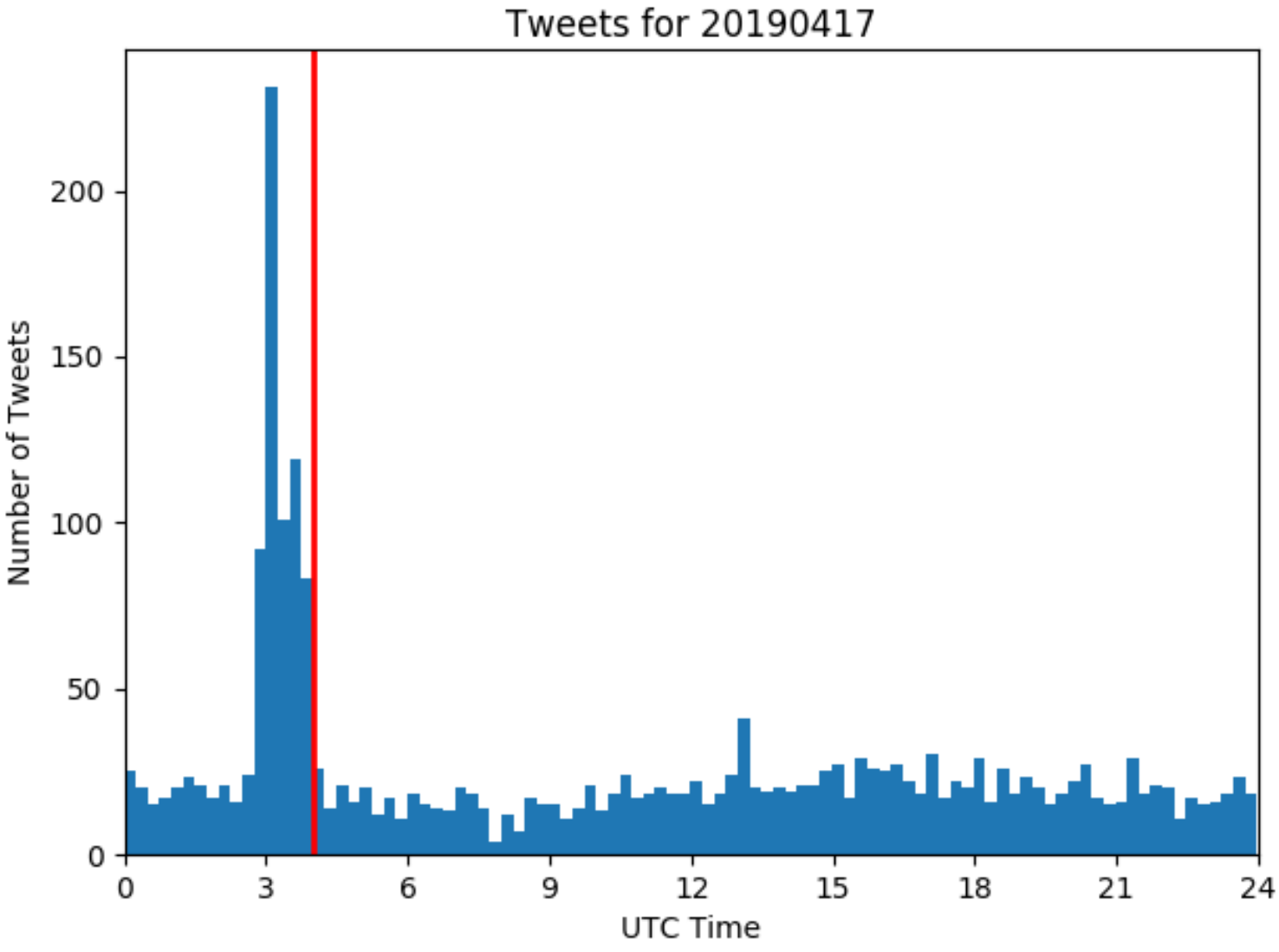


# Alerts


AT&T LTE
50%
12:30
Thursday, May 16
MESSAGES
now
meoalerts@gmail.com
New AMS event with 142 reports detected


AT&T LTE
12:37 PM
53%
Inbox (57)
To: "Kingery, Aaron M. (MS... & 7 more
Details
New AMS event with 166 reports
11 May 2019 1:00 AM
AMS Pending reports
20190511
Pending
UTC time
0
2
4
6
8
10
12
14
16
18
20
22
24
AMS pending reports for 20190511
8
7
6
5

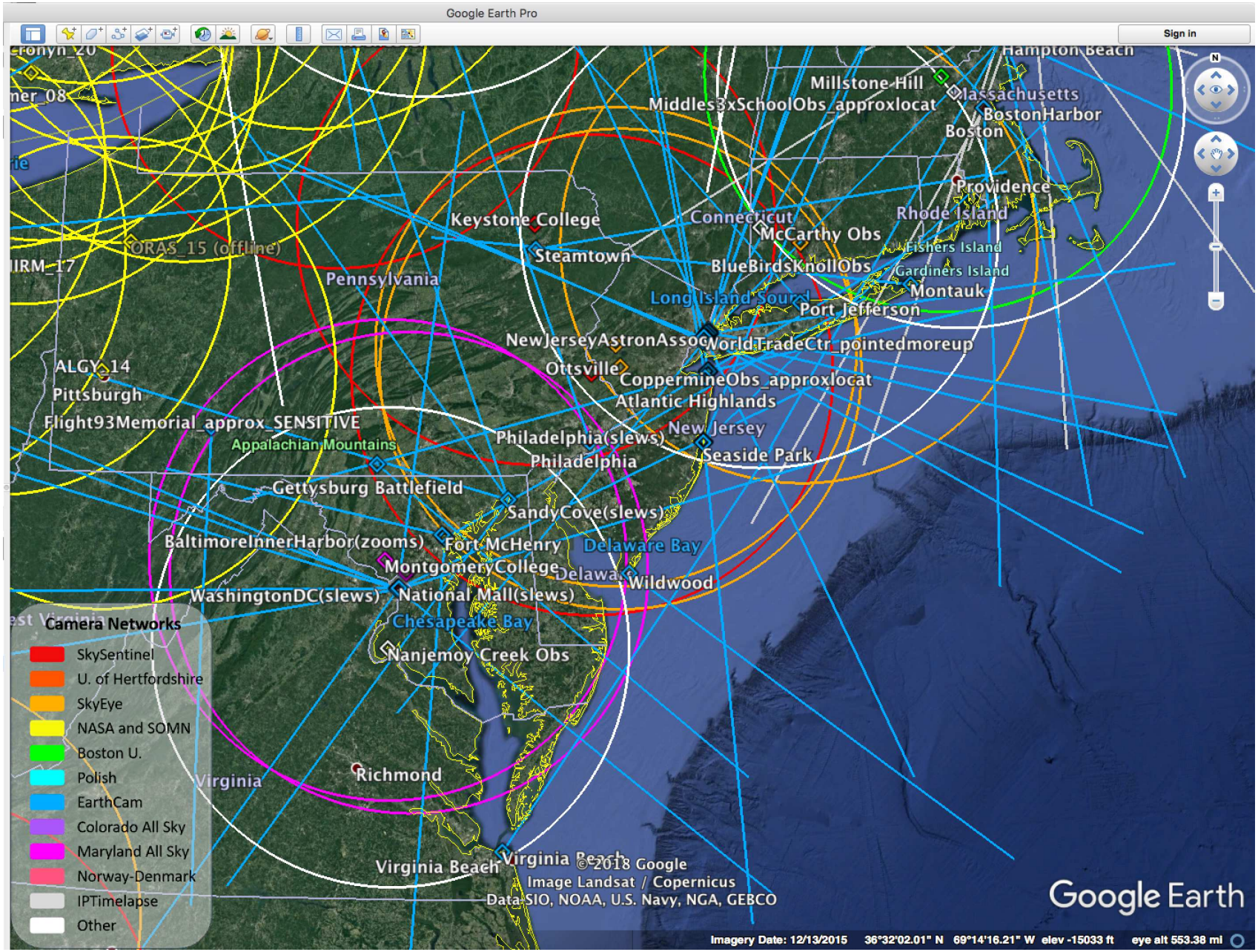
# Twitter


Tweets for 20190417
Number of Tweets
0
50
100
150
200
0
3
6
9
12
15
18
21
24
UTC Time

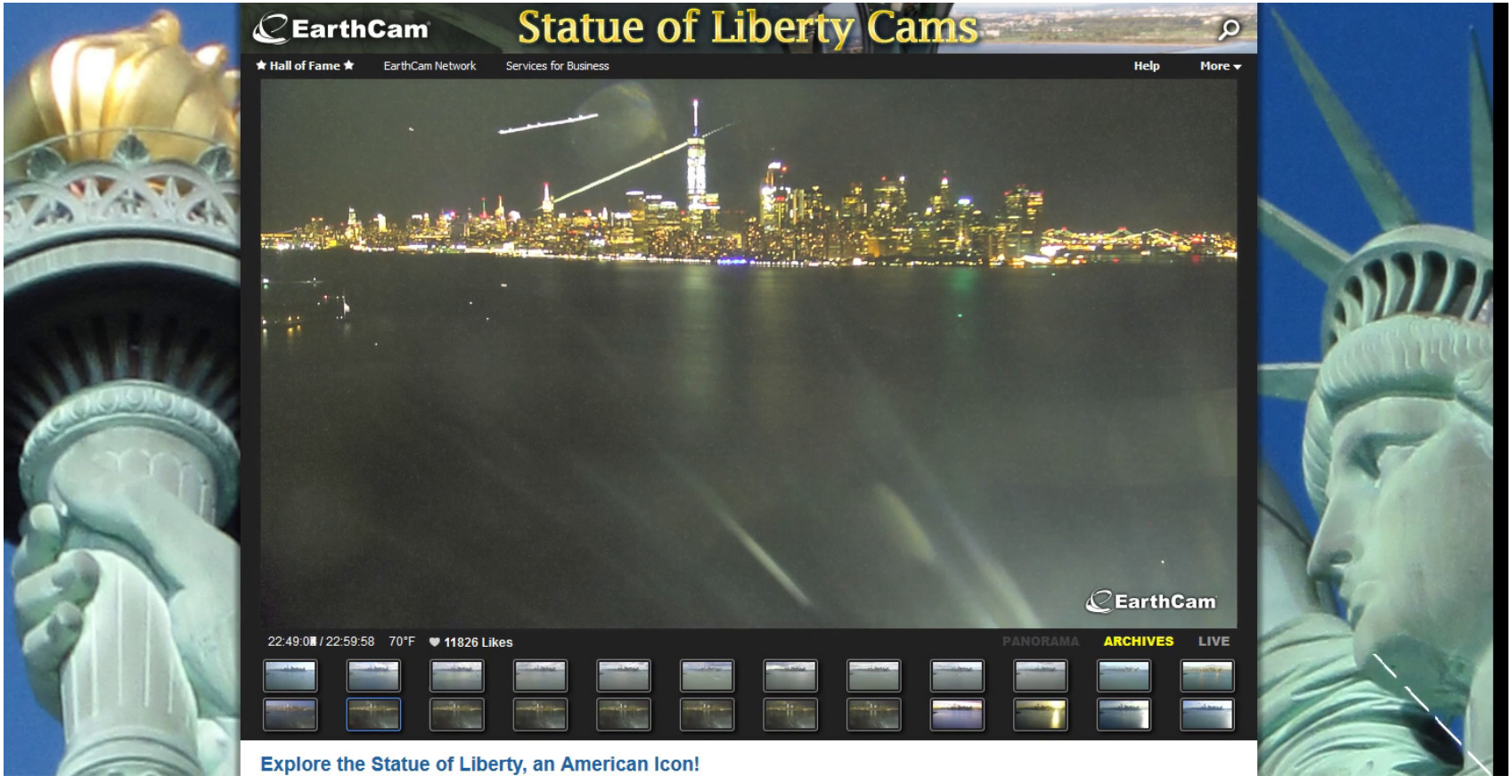
# Timing from tweets

02:55:15 The moon has water?!?
02:56:39 If you had to fall, be a meteor...
02:57:55 I just seen some meteor fly across the sky
02:57:56 Did anyone else see the shooting star
02:58:01 I JUST SAW A SHOOTING STAR

# Other Cameras



# EarthCams

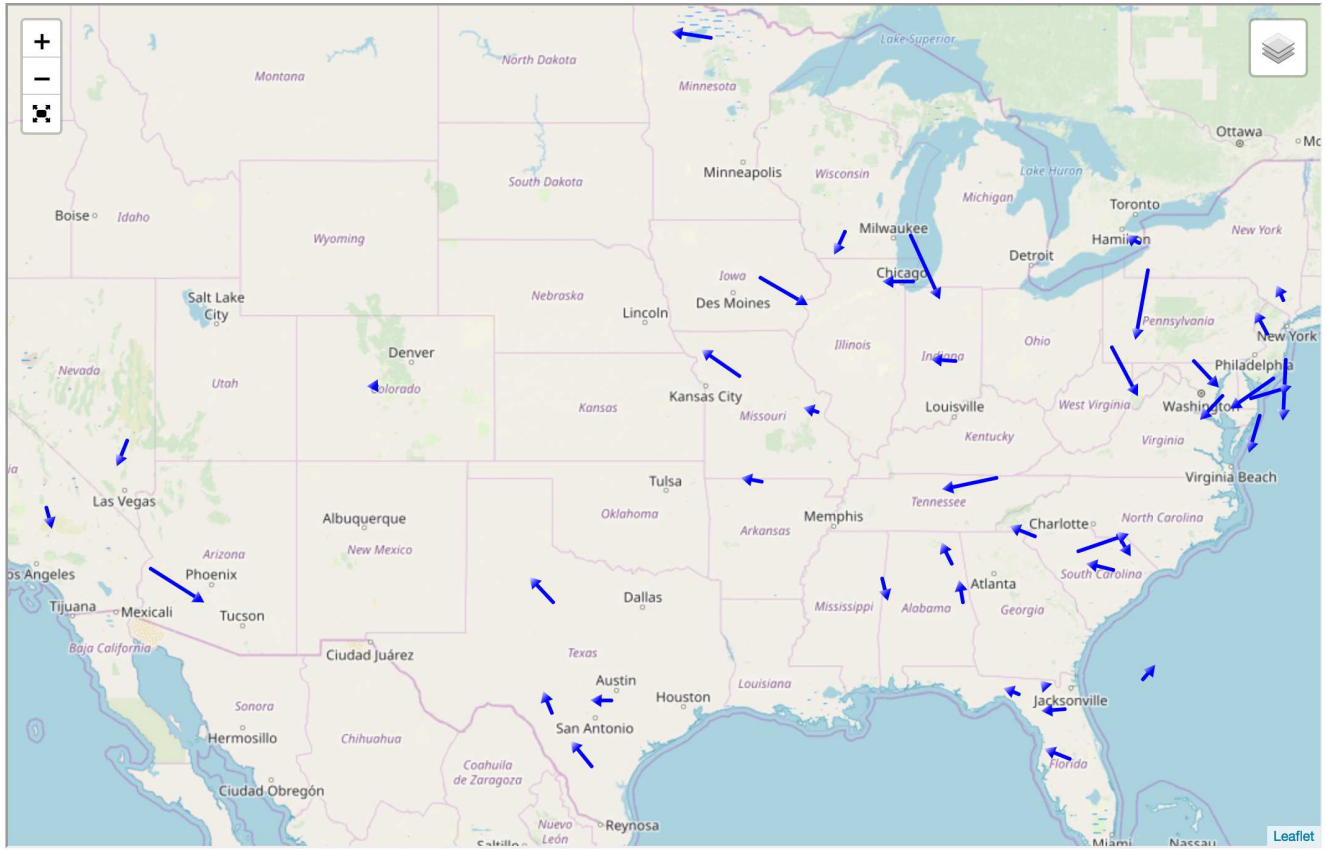

EarthCam
Statue of Liberty Cams
★ Hall of Fame ★
EarthCam Network
Services for Business
Help
More
EarthCam
22:49:0 / 22:59:58
70°F
11826 Likes
PANORAMA
ARCHIVES
LIVE
Explore the Statue of Liberty, an American Icon!

# https://fireballs.ndc.nasa.gov/skyfalls

## NASA Skyfall Database

Supporting data supplied by the American Meteor Society

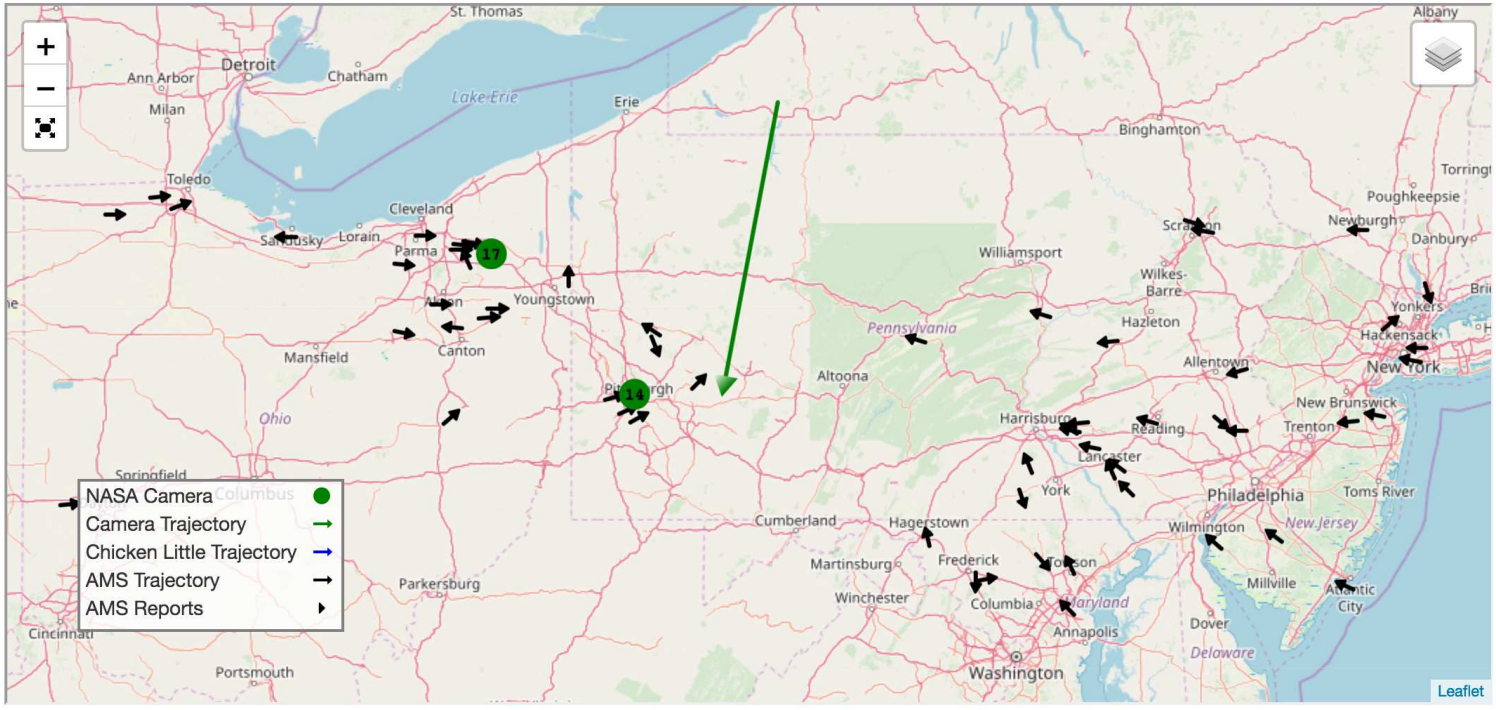
American Meteor Society
amsmeteors.org




| Event ID | Date (UTC) | Time (UTC) | Location | AMS Event |
|---|---|---|---|---|
| 20190511-044439 | 05/11/2019 | 04:44 | Michigan | 2070-2019 |
| 20190417-025700 | 04/17/2019 | 02:57 | Delaware | 1775-2019 |
| 20190411-041415 | 04/11/2019 | 04:14 | Texas | 1671-2019 |

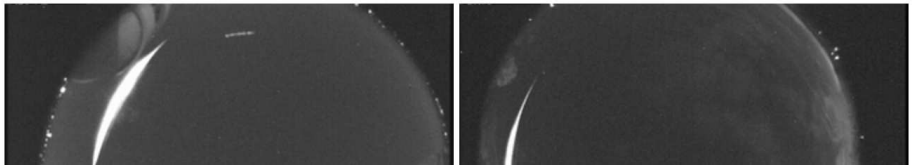
# https://fireballs.ndc.nasa.gov/skyfalls

## Event: 20190410-044852



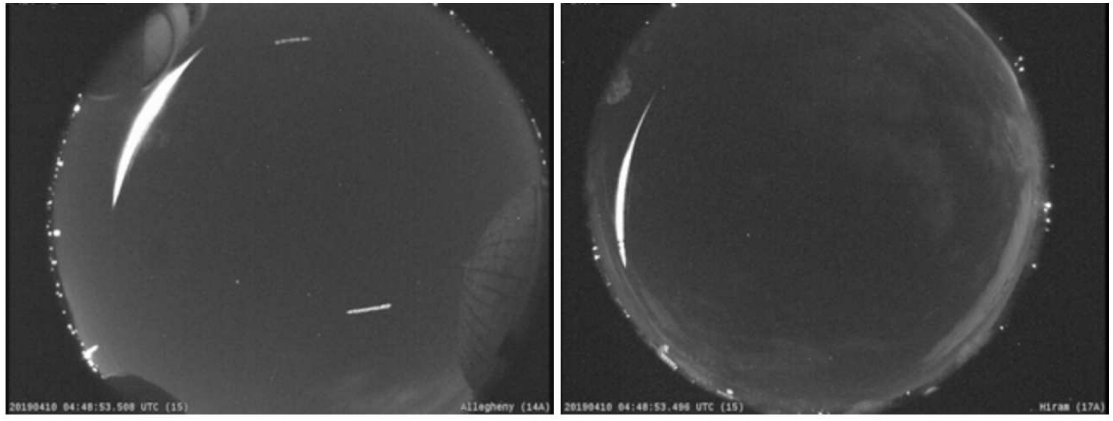

Over 60 eyewitnesses in the states of Maryland, Ohio, Pennsylvania, Indiana, New Jersey and New York reported seeing a very bright fireball that lasted 9 seconds at 12:49 AM Eastern Daylight Time (2019 April 10 00:49 UTC). It was also observed by three all sky meteor cameras in the region – 2 belonging to the NASA network (Hiram College in Ohio and Allegheny Observatory near Pittsburgh) and 1 belonging to the Southern Ontario Meteor Network (Tavistock, Ontario). Analysis of data from these systems show that the meteor first became visible at an altitude of 57 miles above Napoli, New York moving slightly west of south at 40,700 miles per hour. It managed to travel over 115 miles through the atmosphere before fragmenting 17 miles above the Pennsylvania town of Clarksburg, at which point the speed had slowed to 11,200 miles per hour. The data indicate that the fireball was produced by an asteroidal fragment roughly 2 feet in diameter with a weight around 750 pounds; the low end height and slow final speed leave open the possibility that this event may have produced small meteorites to the west of Pittsburgh – more data is needed to confirm this.

## NASA Images and Videos

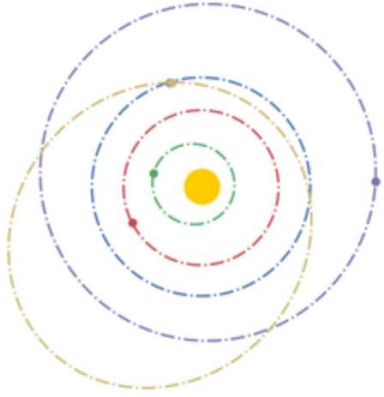


# https://fireballs.ndc.nasa.gov/skyfalls

## NASA Images and Videos




## Meteoroid Orbit



## Event Data

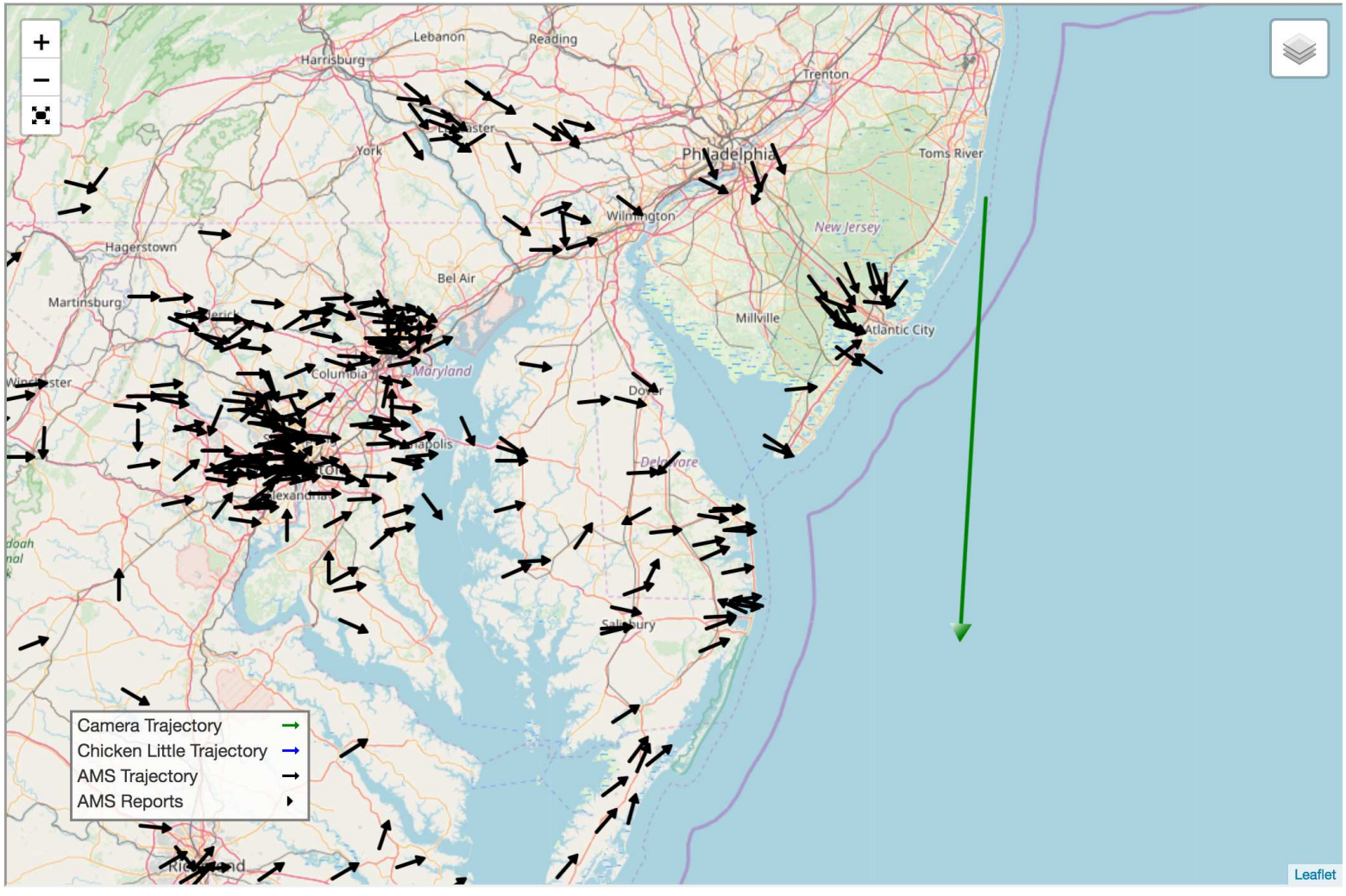
# https://fireballs.ndc.nasa.gov/skyfalls

## Event Data

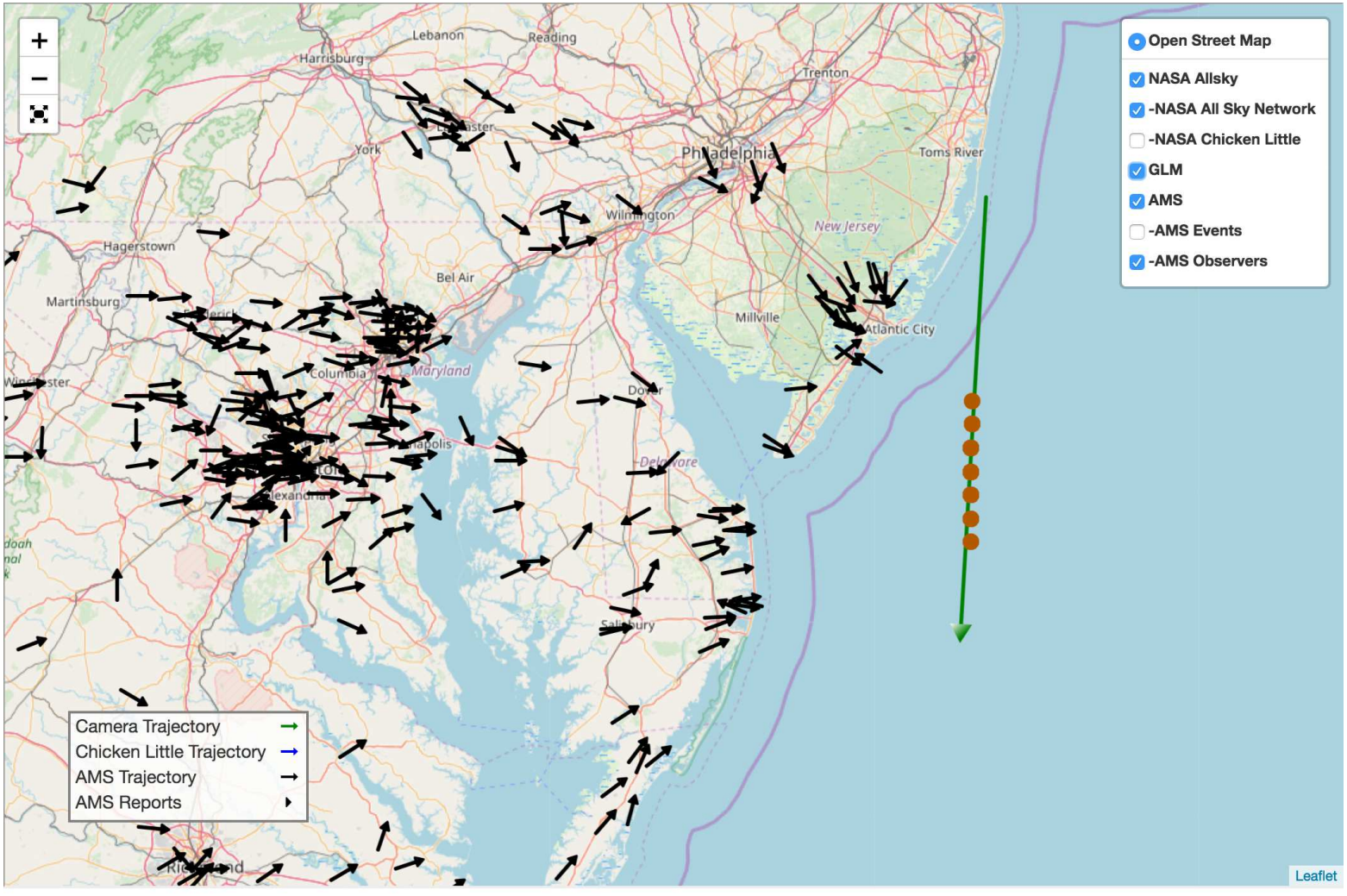
| | |
|---|---|
| Event ID | 20190410-044852 |
| Date (UTC) | April 10, 2019 |
| Time (UTC) | 04:48:52 |
| AMS Event | 1664-2019 |
| NASA Camera Start Lat/Lon | +42.186, -78.908 |
| NASA Camera End Lat/Lon | +40.542, -79.325 |
| NASA Camera Altitude | 91.6 km → 26.6 km ( 56.9 miles→ 16.5 miles) |
| NASA Camera Speed | 18.2 km/s (40,800 mph) |

For more information, please email MSFC-fireballs@mail.nasa.gov

# https://fireballs.ndc.nasa.gov/skyfalls



# https://fireballs.ndc.nasa.gov/skyfalls

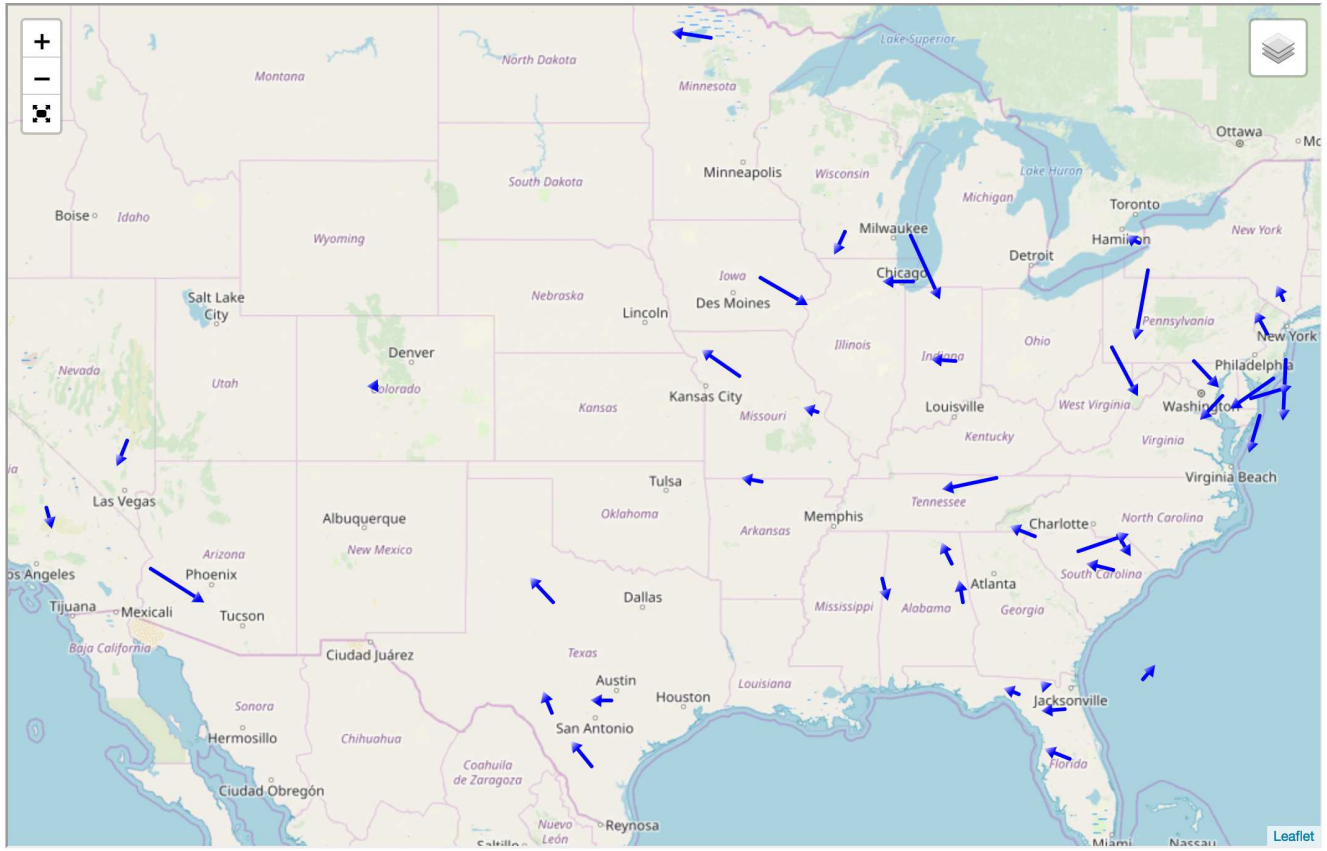


# https://fireballs.ndc.nasa.gov/skyfalls

## NASA Skyfall Database

Supporting data supplied by the American Meteor Society

American Meteor Society
amsmeteors.org




| Event ID | Date (UTC) | Time (UTC) | Location | AMS Event |
|---|---|---|---|---|
| 20190511-044439 | 05/11/2019 | 04:44 | Michigan | 2070-2019 |
| 20190417-025700 | 04/17/2019 | 02:57 | Delaware | 1775-2019 |
| 20190411-041415 | 04/11/2019 | 04:14 | Texas | 1671-2019 |