

# Comparing eyewitness-derived trajectories of bright meteors to ground truth data

**D. E. Moser**

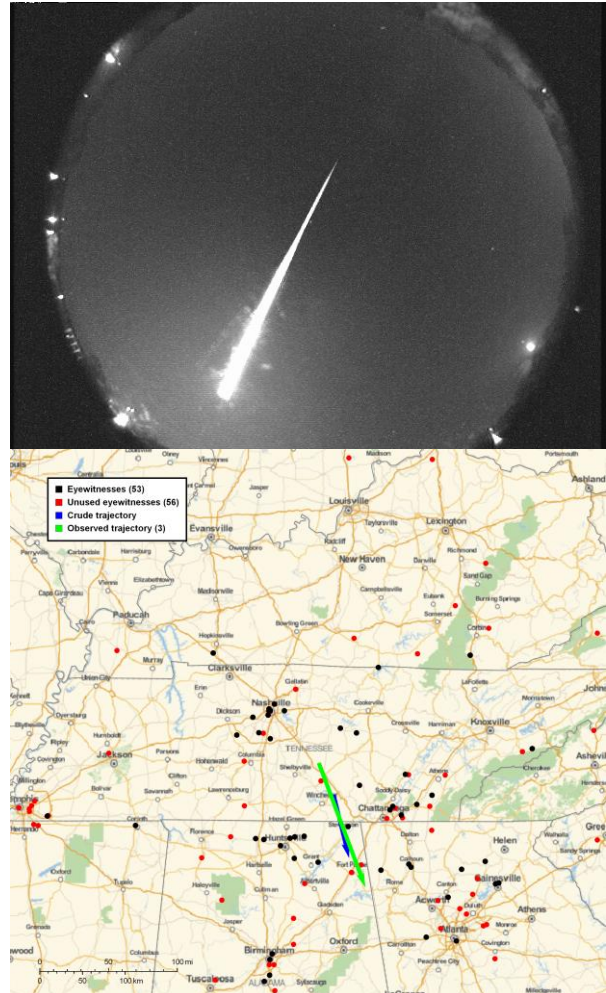
Jacobs, ESSSA Group, Marshall Space Flight Center, Meteoroid Environment Office, EV44 Natural Environments Branch, Huntsville, Alabama 35812 USA (danielle.e.moser@nasa.gov)

The NASA Meteoroid Environment Office (MEO) is the only US government agency tasked with analyzing meteors of public interest. When queried about a meteor observed over the United States, the MEO must respond with a characterization of the trajectory, orbit, and size within a few hours. Using observations from meteor networks like the NASA All Sky Fireball Network [1] or the Southern Ontario Meteor Network [2], such a characterization is often easy. If found, casual recordings from the public and stationary web cameras can be used to roughly analyze a meteor if the camera's location can be identified and its imagery calibrated. This technique was used with great success in the analysis of the Chelyabinsk meteorite fall [3].

But if the event is outside meteor network coverage, if an insufficient number of videos are found, or if the imagery cannot be geolocated or calibrated, a timely assessment can be difficult if not impossible. In this situation, visual reports made by eyewitnesses may be the only resource available. This has led to the development of a tool to quickly calculate crude meteor trajectories from eyewitness reports made to the American Meteor Society [4]. The output is illustrated in Figure 1. A description of the tool, example case studies, and a comparison to ground truth data observed by the NASA All Sky Fireball Network will be presented.

## References

- [1] Cooke, W.J. and Moser, D.E., *Proceedings of the IMC, Sibiu, Romania, 15-18 September 2011*, pp. 9-12, 2012.
- [2] Weryk, R.J., Brown, P.G., Domokos, A., Edwards, W. N., Krzeminski, Z., Nudds, S.H., and Welch, D.L., *Earth, Moon, and Planets*, Vol. 102, pp. 241-246, 2008.
- [3] Borovička, J., Spurný, P., Brown, P., Wiegert, P., Kalenda, P., Clark, D., and Shrbený, L., *Nature*, Vol. 503, pp. 235-237, 2013.
- [4] Hankey, M., Perlerin, V., Lunsford, R., and Meisel, D., *Proceedings of the IMC, Poznan, Poland, 22-25 August 2013*, pp. 115-119, 2014.



**Fig 1** (top) Meteor observation by the NASA All Sky Fireball Network. (bottom) Ground track of the crude eyewitness-derived trajectory compared to the observed ground track.