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NASA'S METEOROID ENVIRONMENTS OFFICE'S RESPONSE TO THREE SIGNIFICANT BOLIDE EVENTS OVER NORTH AMERICA

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ABSTRACT

Being the only U.S. Government entity charged with monitoring the meteor environment, the Meteoroid Environment Office has deployed a network of all sky and wide field meteor cameras, along with the appropriate software tools to quickly analyze data from these systems. However, the coverage of this network is still quite limited, forcing the incorporation of data from other cameras posted to the internet in analyzing many of the fireballs reported by the public and media. A procedure has been developed that determines the analysis process for a given fireball event based on the types and amount of data available. The differences between these analysis process will be explained and outlined by looking at three bolide events, all of which were large enough to produce meteorites.

The first example is an ideal event - a bright meteor that occurred over NASA’s All Sky Camera Network on August 2, 2014. With clear video of the event from various angles, a high-accuracy trajectory, beginning and end heights, orbit and approximate brightness/size of the event are able to be found very quickly using custom software. The bolide had the potential to have dropped meteorites, so dark flight analysis and modeling was performed, allowing potential fall locations to be mapped as a function of meteorite mass. The second case study was a bright bolide that occurred November 3, 2014 over West Virginia. This was just north of the NASA southeastern all-sky network, and just south of the Ohio-Pennsylvania network. This case study showcases the MEO's ability to use social media and various internet sources to locate videos of the event from obscure sources (including the Washington Monument) for anything that will permit a determination of a basic trajectory and fireball light curve The third case study will highlight the ability to use doppler weather radar in helping locate meteorites, which enable a definitive classification of the impactor. The input data and analysis steps differ for each case study, but the goals remain the same - a trajectory, orbit, and mass estimate for the bolide within hours of the event, and, for events with a high probability of producing meteorites, a location of the strewn field within a day.

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