

Detection of VLF emissions from meteors

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The existence of electromagnetic emissions from bright meteors has been proposed for a long time, but there has been no clear detection of such emission. Here we report on a two years survey which uses both calibrated temporal and spatial correlations to examine VLF-meteor associations. We used continuous observations from the Atmospheric Weather Electromagnetic System for Observation Modeling and Education (AWESOME) system (Cohen et al., 2010) deployed at the Elginfield Observatory near London, Canada to monitor VLF radio signals from May 2017 to the present time. AWESOME VLF data correlated with bright fireballs detected by the Southern Ontario Meteor Network (Brown et al., 2010; Weryk et al., 2007) are scanned for signals. The GPS conditioned timing of the AWESOME system is continuously synchronized with video recordings directly in the video stream to ensure sub-frame VLF-optical time calibration. The AWESOME system uses two orthogonal VLF antennas which permits directional calculation of incoming VLF signals, which can be directly compared to the apparent paths of bright meteors. Possible VLF events are checked against the National Lightning Detection Network (NLDN) database for any lightning that match in time/direction. This temporal and spatial filtering, together with comparison against the NLDN database, provides us with confidence that any remaining correlations of VLF emission may truly be associated with fireballs. During the two years survey interval, over 125 bright meteors (apparent magnitude brighter than -5) were recorded and compared to VLF signals detected by the AWESOME system. Results from the survey will be presented.