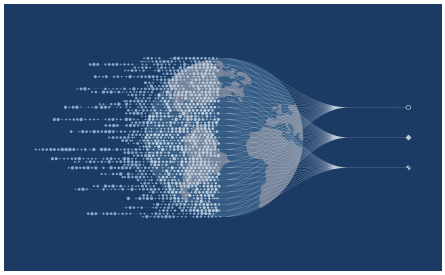

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energy estimation methods for bolides in atmospheric monitoring

Bolides, or exceptionally bright meteors resulting from the atmospheric entry of asteroids or meteoroids typically over 10 cm in diameter, provide significant infrasound sources for global monitoring efforts. Originating from cometary or asteroidal fragments, these objects enter Earth's atmosphere at hypervelocity, generating shockwaves that decay into low-frequency (<20 Hz) sound or infrasound, detectable globally. Bolide events offer valuable opportunities for refining infrasound-based energy estimation methods. Current empirical relations, initially developed for stationary anthropogenic explosions, are applied to estimate bolide energy, yet these methods are not specifically tailored for natural atmospheric entries. In this study, we take a systematic and holistic approach by analyzing nearly 1,000 bolides from the NASA JPL CNEOS database, focusing on ~300 cases with comprehensive velocity and light curve data. By examining a broad parameter space, we compare period- and amplitude-based methods and evaluate infrasound signal parameters in relation to physical characteristics. Our refined period-based energy relations aim to advance bolide yield estimation, contributing to capabilities in atmospheric monitoring and bolide characterization.
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