

A Radio-Based Search finds no evidence for intrinsically weak TGFs in the Fermi GBM Data

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We analyze gamma-ray data from the Fermi Gamma-ray Burst Monitor (GBM) around the times of VLF radio sferics. The gamma-ray photons are time-aligned to the times of radio sferics, with correction for the light travel time to Fermi, and accumulated. Gamma-ray photons from TGFs already known from the standard GBM TGF offline search are excluded from the accumulation. We use sferic signals from both the World Wide Lightning Location Network (WWLLN) and the Earth Networks Total Lightning Network (ENTLN). No excess signal is found in the accumulation of the gamma-ray data for sferics within 400 km of the Fermi nadir. However, an excess of gamma-rays is found in the co-aligned signal for sferics between 400 and 800 km of the Fermi nadir. Our interpretation of this distance-dependent non-detection / detection pattern is that the standard GBM offline search for TGFs is missing some TGFs that are weak at Fermi due to distance from Fermi and that there is no evidence for a population of TGFs that are intrinsically fainter than the threshold of the search.