



## **The brightest TGF ever observed? - New results from the RHESSI satellite**

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Terrestrial gamma-ray flashes (TGFs) are sub-millisecond bursts of gamma rays originating from thunderstorms. They were first discovered in 1994 by the BATSE instrument aboard the Compton Gamma-ray Observatory (CGRO). Since their discovery, thousands of TGFs have been detected by other gamma-ray satellites. A new class of super-bright terrestrial gamma-ray flashes has been found in the data from the Reuven-Ramaty High Energy Solar Spectroscopic Imager (RHESSI). These events are so bright that they cause the RHESSI instrumentation to become paralyzed during the peak of the TGF. While the instrument is paralyzed, all information about the TGF is lost. A new modeling method using the Compton tail of these TGFs is used to find their brightness. These events are modeled by using the relativistic feedback model and then propagating the gamma rays through the atmosphere and then through RHESSI. The TGFs are placed at different altitudes and distances from the spacecraft. Three TGFs were modeled using this method, one of which may be the brightest TGF ever observed. The range of possible luminosities for this event will be shown. For the other two events, a World Wide Lightning Location Network (WWLLN) lightning spheric match has been found so the distance from RHESSI is known. Using infrared (IR) data, the cloud top height can be estimated which, in the context of current in-cloud TGF models, places an upper limit on the altitude of the TGF. The brightness for these events, where the distance and altitude is known, will be reported. The benefits and limitations of this novel approach of using the Compton tails of TGFs will be discussed. Notably, the results obtained for the TGF luminosity at the source are nearly independent of the (unknown) original angular distribution of the bremsstrahlung radiation.