Analysis of new RHESSI TGFs

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Terrestrial Gamma-ray Flashes (TGFs) are short burst of high energy gamma radiation originating from the earths thunderstorms. They typically last less than 1 ms and they may contain photons with energy up to several tens of MeV. Since the discovery of TGFs in the early 1990-ties, several observations of these energetic gamma ray events have been made by orbiting satellites. Among them is the Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI). The original RHESSI search algorithm to identify TGFs uses a 1 ms trigger window and a fairly strict signal to noise criterion to avoid false triggers, and it has been suggested that there are more TGFs in the raw RHESSI data than presented in the catalog paper. We have therefore developed a new search algorithm to identify TGFs in the raw RHESSI data. The algorithm is based on Poisson statistics with search windows 0.3 ms, 1 ms and 3 ms. Also the possible events had to pass five selection criteria which are based on properties of TGFs from the RHESSI catalog and other measurements. The algorithm has identified more than twice as many TGFs as previously reported for the period 2002 - 2011. The new TGFs follow the same geographical and seasonal variations as the previously reported TGFs, and they have a comparable match percentage between TGFs and sferics from the World Wide Lightning Location Network (WWLLN) data as the catalog TGFs. In this paper we will present the most recent identified RHESSI TGFs and the first analysis of these new TGF events.