

The World of TGFs

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Surprisingly, the triggering mechanism for lightning is not known; thundercloud electric fields do not reach the value required for the conventional breakdown of air. Some models of the breakdown process involve acceleration of electrons to high energy, predicting X- and gamma radiation from bremsstrahlung. Millisecond flashes of gamma rays up to > 20 MeV have been seen from orbit to be associated with lightning, and have been called Terrestrial Gamma-ray Flashes (TGFs) since their discovery was reported by Gerald Fishman and collaborators in 1994. I will describe the TGF phenomenon and place it in the context of x- and gamma-radiation seen from the ground, aircraft and balloons in association with thunderstorms. I will discuss the correlation -- or lack of correlation -- between TGFs and visible phenomena (lightning and TLEs). I will conclude by summarizing some of the open questions. The most important is: are TGFs the cause (trigger) of the lightning strokes they are associated with, or a side effect occurring after the main discharge?