

Terrestrial Gamma-ray Flashes studies with AGILE

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The AGILE satellite detects more than 10 Terrestrial Gamma-ray Flashes (TGFs) per month in the latitude belt ± 2.5 deg, providing the largest TGF surface density observed and the largest TGF statistics in the equatorial region to date. The current TGF sample comprises more than 400 events with maximum energy lower than 30 MeV detected by the Minicalorimeter (MCAL) instrument on-board AGILE. The characteristics of the AGILE events are analyzed and compared to the observational framework established by the two other currently active missions capable of detecting TGFs from space, RHESSI and Fermi. Longitude and local time distributions are compatible with previous observations, while duration distribution is biased towards longer values. The intensity distribution is compatible with previous observations, pointing towards a true fluence distribution at satellite altitude that can be described with a power law with index -2.4 and a rolloff at low fluence values. The TGFs cumulative spectrum supports a low production altitude, in agreement with previous measurements. AGILE also provides a unique dataset of TGFs with photon energies extending up to 100 MeV, which challenge current production models and possibly represent a distinct class of atmospheric phenomena. In addition to TGF physics, our group is actively studying TGF effects on atmospheric and ground environments.

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