The first AGILE low-energy (<30 MeV) TGF catalog


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We present the first catalog of Terrestrial Gamma-ray Flashes (TGFs) detected by the Minicalorimeter (MCAL) instrument on-board the AGILE satellite: Marisaldi et al., JGR (2014), DOI: 10.1002/2013JA019301

- 308 TGFs detected during the period March 2009 - July 2012 in the +/- 2.5° latitude band
- maximum photon energy up to 30 MeV

The characteristics of the AGILE events are analysed and compared to the observational framework established by the two other currently active missions capable of detecting TGFs from space, RHESSI and Fermi.

1. A detailed model of the MCAL dead time is presented, which is fundamental to properly interpret our observations, particularly concerning duration, intensity and correlation with lightning sferics detected by the World Wide Lightning Location Network (WWLLN).
2. The TGFs cumulative spectrum supports a low production altitude, in agreement with previous measurements.
3. The AGILE TGF catalog below 30 MeV is publicly accessible online at the website of the ASI Science Data Center (ASDC) http://www.asdc.asi.it/mcaltgfcat/

2. Cumulative spectrum

- Good fit with a cutoff power law model
  \[ F(E) = KE^{-\alpha}e^{-E/E_c} \]
  \[ \alpha = 0.2 \pm 0.1 \quad E_c = 5.5 \pm 0.6 \text{ MeV} \]
- Unfolded model matches quite well simulations by Dwyer & Smith (2005) BUT a harder spectrum is observed
- This may be due to different energy ranges and selection cuts adopted (hardness ratio)

3. The on-line AGILE TGF catalog: http://www.asdc.asi.it/mcaltgfcat/