



Observation of successive TGFs produced by the same thunderstorm systems throughout their lifetime

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Since their discovery in early 1990s, Terrestrial Gamma-ray Flashes (TGFs) exhibited a clear correlation with thunderstorm activity. The elusive nature of these events and the strong absorption of gamma-rays in the lowest layers of the atmosphere dramatically limits our observation of this phenomenon: the few missions currently detecting TGFs are probably revealing just the tip of the iceberg of a much wider population. Theoretical models, radar measurements and cross-correlations with radio waves emitted by lightning strokes suggest every storm could, in principle, produce a large number of gamma flashes throughout its entire lifetime: however, observation of more TGFs from the same thunderstorm system, even after several hours, is difficult to perform, because successive passes on the same latitude region by high-inclination orbit satellites are shifted westward by $\sim 25^\circ$. In this perspective, the AGILE mission has a privileged role, thanks to its unique quasi equatorial (2.5° inclination) orbit, that allows for the follow-up of the same geographic region on the equator at each orbital passage. In more than 8 years activity, we identify tens of cases of more TGFs coming from the same thunderstorm system, either during the same passage, or in the successive passages. We take advantage of data acquired by meteorological satellites to characterize the meteorological scenario associated to these events.