

Latest TGF Results from ADELE and RHESSI

The frequency of terrestrial gamma-ray flashes (TGFs) is still unknown. It is possible that there are many weaker TGFs that cannot escape to space to be detected by gamma-ray satellites or that the events are difficult to find in the satellite data. Both the Airborne Detector for Energetic Lightning Emissions (ADELE) and the Ramaty High-Energy Solar Spectroscopic Imager (RHESSI) satellite aim to solve this question. ADELE flew as a piggyback on the NASA Hurricane and Severe Storm Sentinel (HS3) mission during the peak of the 2013 hurricane season. The goal of ADELE was to measure TGFs, gamma-ray glows and high-energy emission from blue jets and sprite streamers. This is the first time a gamma-ray experiment has looked for high-energy events over hurricanes from directly above the hurricane. Along with the first results from this campaign, we will show detailed models of TGFs, glows and leaders along with the propagation of these events' gamma-rays through the plane and the ADELE instrument allowing us to determine the sensitivity of our instrument.

We introduce a new catalog of TGFs from the RHESSI satellite. This catalog includes many events not detected by either the original algorithm (Grefenstette et al. 2009 JGR 114, A02314) or the more sensitive algorithm of Gjesteland et al. 2012 (GRL 39, L05102). The new algorithm allows for searches of TGFs on varying timescales and we shall discuss the differences between these TGFs in terms of geographical distribution, detailed radio sferics observed by Duke University and the match rate with sferics detected by the World Wide Lightning Location Network. We will discuss detailed modeling of two bright TGF electron-beam events and rare TGFs occurring where the expected height of the tropopause is generally lower than the expected production height of TGFs detected from orbit.