Abstract Submitted
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Observations and Analysis of Downward Terrestrial Gamma-ray Flashes at Telescope Array[1] JACKSON REMINGTON, JOHN BELZ, University of Utah, PAUL KREHBIEL, MARK STANLEY, Langmuir Laboratory for Atmospheric Research, RASHA ABBASI, Loyola University Chicago, RYAN LEVON, University of Utah, WILLIAM RISON, DANIEL RODEHEFFER, Langmuir Laboratory for Atmospheric Research, KIERAN SMOUT, University of Utah, TELESCOPE ARRAY COLLABORATION — Lightning investigations at Utah's Telescope Array have accelerated in recent years with the addition of broadband interferometers and fast sferic sensors. These upgrades allow precise tracking of the initial breakdown in lightning flashes and of the source of TGFs. We report on the study of 4 events from 2018 in which 1–2 bursts of gamma-rays were detected at ground in association with the first couple milliseconds of downward negative lightning flashes. Three of these terminated in cloud-to-ground strokes with currents between –21 and –37 kA, while the fourth was an intracloud flash that did not trigger the NLDN. The (pre-expansion) Telescope Array covers $\simeq$700 km^2, enabling a full measurement of the 'footprint' of TGFs. In addition, the surface detectors can place lower limits on their energies; one such signal was produced by a gamma photon of at least 6.4 MeV. Careful analysis of the array's difficult geometry has linked the TGFs' sources with strong initial breakdown pulses and fast negative breakdown on the order of a microsecond or better, shedding light on TGF production in general.

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