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Modeling the radiation doses from terrestrial gamma-ray flashes

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Terrestrial gamma-ray flashes (TGFs) are intense bursts of gamma-rays that originate from thunderclouds, from altitudes that commercial aircraft fly. Based upon the fluence of gamma-rays measured by the RHESSI spacecraft, Dwyer et al. [2010] inferred radiation doses to individuals inside aircraft in the 0.001 – 0.1 Sv range, depending upon the assumed size of the TGF source region. The largest doses occur when an aircraft is directly struck by the energetic electron beam that produces the TGF. The relativistic feedback discharge model is a self-consistent model that includes the generation of runaway electrons via the positron and x-ray feedback mechanisms and the electric field changes due to the resulting ionization and low-energy electron and ion currents. This model has successfully explained many properties of TGFs, including the gamma-ray intensities, durations, multi-pulsed structures as well as discharge currents and radio emissions. In this presentation we discuss new radiation dose calculations based upon the relativistic feedback discharge model and compare these calculations to previous work.