

EGU2020-19320

<https://doi.org/10.5194/egusphere-egu2020-19320>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



Modeling terrestrial gamma-ray flashes observed by ASIM

Joseph Dwyer

University of New Hampshire, EOS, Physics, Durham, United States of America (joseph.dwyer@unh.edu)

The Atmosphere-Space Interactions Monitor (ASIM) on the International Space Station is providing important observations of terrestrial gamma-ray flashes (TGFs), including new measurements of optical emissions associated with TGFs and new measurements of multi-pulsed TGFs. TGFs are thought to be produced by bremsstrahlung emissions from relativistic runaway electrons accelerated inside thunderstorms. However, the exact mechanisms for generating the large number of runaway electrons required to account for the observed TGF luminosities remains an active area of debate. Two mechanisms being considered are cold-runaway electron production by streamer heads or leader tips in the high-field regions near lightning, and the self-sustained production of runaway electrons by relativistic feedback involving backward propagating runaway positrons and backscattered x-rays. Because both mechanisms may require the presence of lightning leaders inside thunderstorms -- for the cold-runaway mechanism to emit the runaway electrons and for the relativistic feedback mechanism to drive the electric field above the feedback threshold -- it has been challenging to test which TGF production mechanisms are occurring. The new ASIM TGF observations should help constrain TGF models and possibly identify which mechanisms are primarily responsible for the runaway electron production. In this talk, I will present new TGF modeling results and compare them with available ASIM observations.