



Radio emissions from terrestrial gamma ray flashes and compact intracloud discharges

Joseph Dwyer and Ningyu Liu

Department of Physics, University of New Hampshire, Durham, NH, United States (Joseph.Dwyer@unh.edu)

Terrestrial gamma ray flashes (TGFs) are intense bursts of gamma rays that originate from the mid to upper levels of thunderstorms. They usually occur during the initial upward propagation of +IC lightning leaders and have durations from a few tens of microseconds up to about a millisecond. Compact Intracloud discharges (CIDs) also originate from the mid to upper levels of thunderstorms and produce powerful bursts of HF-VHF radio emission, lasting about 10 microseconds. CIDs often appear as either isolated discharges or at the beginning of lightning flashes. Both short-duration TGFs and CIDs produce large VLF-LF sferics with peak current moments of tens of kA-km. The sferics associated with CIDs are called narrow bipolar events (NBEs), and there is evidence that the largest sferics associated with TGFs are the same as the recently discovered energetic incloud pulses (EIPs), which are also observed in the VLF-LF range. Although TGFs and CIDs often originate from similar locations inside thunderstorms, near the start of lightning flashes, and both produce large sferics on the time scale of tens of microseconds, it is not clear whether or not the production mechanisms for these two energetic phenomena have anything in common. In this presentation, we shall discuss possible production mechanisms for TGFs and CIDs and compare the VLF-VHF radio emissions expected to be produced from each.