



A gamma-ray glow terminated by leader development of an inter-cloud discharge in Japanese winter thunderstorm

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Gamma-ray glows, long-duration gamma-ray enhancements originating from bremsstrahlung of electrons accelerated inside a thundercloud, have been observed by airborne, balloon and on-ground radiation measurements. Winter thunderstorms along the Japan Sea have low cloud bases and high activity, and such glows are frequently observed at sea level. On 2017 February 11th, our radiation detectors recorded a gamma-ray glow lasting for ~ 1 minute, abruptly terminated by an inter-cloud discharge. Low-frequency radio observations detected leader development of the inter-cloud discharge lasting for ~ 300 ms and extending up to 60 km wide. The timing of the gamma-ray termination matched well with the moment when one of the leaders passed 0.7 km from the radiation detectors. This is a direct evidence of an inter-cloud discharge leader terminating the electron acceleration in a thundercloud.