

Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

©2011. Japan Geoscience Union. All Rights Reserved.



MIS026-02

Room:201B

Time:May 24 08:45-09:00

Energetic radiation associated with winter thunderstorm activity.

Tatsuo Torii^{1*}, Takeshi Sugita², Masashi Kamogawa³, Yasuyuki Watanabe³

¹Fugen Decommissioning Eng. Center, JAEA, ²SSL, ³Dpt. of Phys., Tokyo Gakugei Univ.

Intense gamma rays likely associated with lightning and/or thunderstorm activities have been detected in recent years, at various altitudes ranging from the ground level to the ionosphere. However, neither the source of this radiation nor its nature has been clarified. We have identified a migrating source of gamma rays lasting for several minutes attributed to a winter thunderstorm in Japan. Our findings indicate that the gamma rays were emitted continuously from a downward hemispherical surface, the bottom of which was about 300 m above sea level, and this source of gamma rays moved from north to south above the observation site at a speed of about 7 m/s. The radiation source probably moved along with the charged region of the cloud at a height of around 1 km, because the estimated migration of the radiation source was consistent with the observed movement of atmospheric electric field variation between ground-based observation sites and with the wind speed and direction at about 1 km altitude. This movement implies that the intense electric field produced by the charged region in the thundercloud generated a radiation source beneath the charged region. The observation helps explain not only the relation between the locations of the charged region and the radiation source, but probably also the lightning initiation urged by the radiation.