Observation of the fluctuation of energetic radiation during winter thunderstorms

Tatsuo Torii[1]; Takeshi Sugita[2]; Yasushi Muraki[3]

[1] JAEA-Tsuruga; [2] SSL, Inc.; [3] STEL, Nagoya University

Fluctuations of the energetic radiation at the thunderstorm activity are observed also on the ground. Such fluctuations during the winter thunderstorms were observed by using two long proportional counters (2.5m in length, diameter 10cm, X 4) in this research to investigate a more detailed fluctuation, besides the observation by the environmental radiation monitors set up around the nuclear facility Monju. In the observation from December, 2005 to January, 2006, the intense radiation thought to originate in the winter thunderstorm activity is observed four times. As a result, the followings have been obtained. (1) There were events that it increased gradually before several 10 seconds in which the rapid radiation burst is occurred. (2) When the transient increases of radiation intensity generated, the electric field strength was not fluctuated rapidly though the field strength fluctuate according to the lightning discharge had been occurred about 10-30 seconds after such radiation increases. (3) From the sensitivity evaluation of the long proportional counter by using RI sources and by a Monte Carlo calculation, the electron sensitivity was one order of magnitude higher than the gamma ray sensitivity in the energy region over 3 MeV. As the results, it increased radiation intensity by the emission of the energetic electrons caused by the generation of runaway electrons in the thundercloud electric field.