

Estimation of lightning current waveform from ELF magnetic induction field

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New project to estimate lightning current waveform from ELF magnetic field observation is introduced. A positive GC lightning event in winter was detected by a Rogowski coil at Mt. Ogami, Niigata Prefecture, Japan on Jan. 2010. The peak current and the electric charge were 26 kA and about 1 kilo-coulomb, respectively. Electromagnetic radiation from the lightning was measure by Lightning Location System (LLS) in Tohoku district and ELF magnetic field observation at Onagawa observatory, Miyagi Prefecture. Although only pulse series' were radiated in LF, a horizontal magnetic field waveform resembling the current waveform was observed in ELF. At the distance of Onagawa (296 km apart from Ogami), the ELF waveform should resemble that of the source current because the ELF signal is mostly composed of the induction components. This means the ELF signal has potential to use direct estimation of current waveform of any lightning discharge as well as the amount of electric charge causing damage to grounded structures. Comparisons of waveforms between the current and ELF have done for several lightning events to find the statistical properties. New observation site is planned in Kyushu distinct with a cooperation of ICSWSE, Kyushu University.