

## Deducing Locations and Charge Moment Changes of Lightning Discharges by ELF/LF Network Observations in Japan

Ryohei Nakamura<sup>1\*</sup>, Yasuhide Hobara<sup>1</sup>, Kazuo Shiokawa<sup>2</sup>, Masashi Hayakawa<sup>1</sup>

<sup>1</sup>The University of Electro-Communications, Tokyo, japan, <sup>2</sup>Solar-Terrestrial Environment Laboratory, Nagoya University, Aichi, Japan

The electromagnetic radiations from lightning discharges have been intensively studied for a long time in different frequency ranges. Recent observations of electromagnetic radiations from lightning in the ELF (extremely low frequency) frequency range so-called ELF transients are recognized as a powerful tool to obtain one of the most important properties of lightning discharges ; the charge moment changes (Qds). In this paper we demonstrate the spatio-temporal distributions of lightning discharges together with their a charge moment change (CMC) around Japan by using our newly developed domestic ELF observation network. This is the first time to obtain such type of distribution by using only ELF observations in the spatial scale of Japan (a few thousands km). We found that the obtained lightning source distributions both over the Pacific Ocean and the Sea of Japan are originated from the thunderstorm active regions confirmed by other measurements such as WWLLN and LF (JLDN). Statistical properties of the charge moment changes indicate that both number and CMC of positive CGs are superior to those of negative CGs. Moreover, considerably large CMC with both polarities are identified for the CGs over the Pacific Ocean as well as those with positive polarity over the Sea of Japan.

Keywords: Lightning, ELF, LF, Charge moment change