

Future Observations of Lightning-exciting ELF Waves in Asian Region for the Nowcasting of Severe Weather Development

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We analyzed the characteristics of the electromagnetic waves in the ELF range measured near the lightning discharges (~300 km distance) and compared them to the lightning current waveform measured by Rogowski coils. From these data analyses, it is found that the shape of the ELF magnetic field waveforms is highly correlated with that of the lightning current waveform, which implies that the measured ELF magnetic field is not the radiative magnetic field but the induction magnetic field. By appropriately scaling the ELF magnetic field waveform and by integrating the waveform, we can estimate the lightning current waveform and the charge amount of any lightning discharges occurring within ~1000 km range from the observation site. Recently, it is shown that the charge amount of the lightning discharges derived from the ELF waveform data and its temporal variation may become a good proxy to nowcast severe weather development [Shimizu *et al.*, 2015; presented at this meeting]. The estimation of the lightning charge amount is also useful to evaluate the damage on the urban information and communication technology (ICT) systems caused by lightning discharges. From these reasons, we have installed ELF observation system at two observation sites in Japan. In Asian region, the VLF observation system (AVON) was already installed to continuously monitor the lightning activities. However, the ELF observation system has not been installed in Asian region, yet. At the presentation, the importance of the measurements of the ELF magnetic field waveforms will be presented. In addition, the future plan of the ELF magnetic field waveform measurements in Asian region will be discussed.

Keywords: lightning, ELF waves, severe weather, nowcasting