ELF VLF

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Construction and expansion of Asian CG observation network based on measurement of ELF/VLF sferics

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Monitoring for thunderstorm activity is considered as an effective method for the forecast of severe disaster, such as concentrated heavy rain. One of the most efficient ways to monitor thunderstorm activity is the measurement of electromagnetic field radiated from lightning discharges.

Based on measurements of electromagnetic waves in ELF (Extremely Low Frequency) range, we can derive not only spatial distribution but also charge moment (Qdl) distribution for cloud-to-ground lightning discharges over a wide area. In the preceding study, global distribution of relatively huge scale events whose Qdl are greater than 1000 C-km has been derived with few stations. However, the majority of lightning activity is small Qdl event whose Qdl is less than 1000 C-km.

One of the most efficient ways to monitor the activity of those small Qdl events is the observation in VLF (Very Low Frequency) sferics. Preceding studies made it possible to estimate the spatial and temporal distribution of relatively small events on a regional scale. However, the methodology to estimate Qdl for VLF sferics has not been established.

In this study, we have constructed lightning observation network in the Maritime Continents based on the electromagnetic measurement in the 100 Hz &#8211; 40 kHz range. We have already installed observation system at Tainan in Taiwan (23.1N, 121.1E), Saraburi in Thailand (14.5N, 101.0E), and Pontianak in Indonesia (0.0N, 109.4E). Furthermore, we plan to construct new observation stations at Philippines and Viet Nam. Waveform of electromagnetic field obtained by this network makes it possible to achieve high detection efficiency and derivation of Qdl for VLF sferics.

At the presentation, we will discuss about a plan for network expansion and the initial results for the derivation of Qdl based on the measurement of our network.