

ELF トランジェントとシューマン共振の計測に基づいた全球落雷活動の評価

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Evaluation for the global lightning activity based on the measurements of ELF transient and Schumann resonance.

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Electromagnetic measurements in ELF (Extremely Low Frequency) range have been focused on as the most efficient tool to evaluate the global activity of cloud-to-ground (CG) lightning discharge.

One of the remarkable points in ELF measurements is the derivation of electrical properties, such as polarity and charge moment (Qdl), for the huge CG events in addition to the estimation of CG position. These calculations are based on the observation of ELF transient which is detected as the transient waveform whose peak amplitude exceeds the background noise. In the preceding works of this study, we have developed the new algorithm to geolocate the events whose charge moment is over 470 C-km with 670 km accuracy.

However, the majority of global CGs activity is the small Qdl events whose Qdl are less than 470 C-km and which cannot be detected as the ELF transient. To consider the global activity of those small events, the measurement of Schumann resonance (SR) is one of the most effective ways. This is the resonance phenomenon in the Earth-ionosphere cavity (E-I cavity) caused by the global CGs activity. The observation of SR would be the proxy of global observation of CGs activity although it would be affected by the variation for the height of E-I cavity.

The quantitative comparison between the measurement of ELF transients and that of Schumann resonance has not been done. In this presentation, we will introduce the initial results of the comparison between them. This comparison would provide us the relationship between the activity of huge CG events derived by the detection of ELF transients and that of small Qdl events estimated by Schumann resonance. The result would contribute to not only the investigation of global CG activity but also the clarification of global electric circuit which is driven by the global thunderstorm activity.