

Monitoring of lightning activity in the Maritime Continent based on electromagnetic measurement in ELF and VLF range

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Lightning observation has been focused on as a useful way for monitoring and nowcasting of thunderstorm activity which causes extreme weather, such as torrential rain. Torrential rainfall causes flood and damages to large cities especially in the Southeast Asia. Previous studies show that spatial distribution of lightning discharge has been used as an effective proxy of the presence or absence of atmospheric vertical convection which give rise to thunderstorm.

Recent lightning observation shows that there is extremely huge lightning whose scale is more than hundreds times bigger than that of averaged event. This result indicates that not only place but also scale of each lightning discharge should be estimated for quantitative evaluation of vertical convection.

In this study, lightning observation network in the Maritime Continent is introduced. This network is designed to estimate not only spatial distribution but also scale distribution of lightning activity. This network is consisted of sensors which make it possible to record the electromagnetic waveforms radiated from lightning discharges by multipoint observation. Geolocation is determined based on time of arrival method and its accuracy is evaluated as less than 10km. Furthermore, charge moment is evaluated as a scale of each lightning discharge by using electromagnetic waveform.

We have already constructed observation stations at Tainan in Taiwan (23.1N, 121.1E), Saraburi in Thailand (14.5N, 101.0E), Pontianak in Indonesia (0.0N, 109.4E) and Los Banos in Philippines (14.18N, 121.25E). Now, we plan to install the monitoring system at Hanoi in Viet Nam. Data obtained by multipoint observation is synchronized by GPS receiver installed at each station.

At the presentation, initial result of geolocation and derivation of charge moment value based on the measurement of ELF and VLF sferics are shown.

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