



Real-time Lightning 3D Imaging and Forecasting Project for Sustainable and Reliable Supply of Energy and Storm Disaster Early Warning
~SATREPS Project in Malaysia~

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A joint research project “Real-Time Lightning 3D Imaging and Forecasting Project for Sustainable and Reliable Supply of Energy and Storm Disaster Early Warning” has been selected for Science and Technology Research Partnership for Sustainable Development (SATREPS) program. Conducted in the coastal area of the Straits of Malacca in Malaysia, which suffers from serious lightning disasters with more than 200 lightning days per year, this research aims to contribute to disaster prevention by forecasting lightning strikes by constructing the world's highest lightning observation network.

This research project is to conduct the field campaigns associated with artificial rocket-triggered lightning in the coastal area of the Straits of Malacca, Malaysia, where the thunderstorm activity is very high and there are many positive cloud-to-ground flashes that may damage electric, communication and other equipments. Radio waves in various frequency bands and Gamma ray measurements, and several Rogowski coils are set up surrounding the strike points. It is planned to realize an electromagnetic field observation network in VHF and LF bands to observe the progress in detail from the initiation of discharge and entire lightning channels in a wider area, respectively. 3D charge distribution in the thundercloud and the amount of neutralized charges estimated from the information where the lightning discharge begins, how it progresses, and where it ends. Then, it is examined by the lightning current waveform measured directly with the high structure and rocket-triggered lightning. By comprehensively grasping the charge behavior in the air related to lightning discharge, it is possible to estimate the charge distribution in the cloud and to predict lightning strike. In addition, promoting the control of electric power equipment using IoT, and the early warning system of severe weather disasters to be implemented in the society. This project further researches on active and adaptive lightning resistance and protection as well as artificial triggered lightning technique.

The target results of this project are

- 1) The lightning observation network obtaining the data set for real-time lightning 3D imaging is developed.
- 2) Real-time lightning 3D imaging model is composed and evaluated using the lightning observation network.
- 3) Social implementation products of nowcasting, alert system, and countermeasure for lightning damage are developed.

The research plan and its latest status will be introduced in the presentation.