

Study on monitoring of thunderstorm activity based on multiple electrostatic measurement

*Kozo Yamashita¹, Kakeru Kanno¹, Mitsuteru Sato², Yukihiro Takahashi²

1. Ashikaga Univ., 2. Hokkaido Univ.

Quantitative evaluation of thundercloud activity is essential for early detection and short-term forecast of severe weather events such as heavy rainfall, lightning stroke, downburst, and so on. In previous researches, lightning observation based on electromagnetic measurement has been focused on as an effective tool for nowcast of thunderstorm activity. Advanced lightning sensors have high sensitivity and makes it possible to detect whole lightning activity. Lightning discharge occurs as a result of vertical atmospheric convection which causes thunderstorm. Preceding studies pointed that lightning occurrence could be an indicator of vertical deep convection in storm region and severe thunderstorm intensity.

Ground-based measurement of electrostatic field has been also considered as an efficient way to detect electrification in thundercloud and monitor development of severe storm. In preceding studies, multiple electrostatic measurement has been examined to estimate charge amount in cloud. One of the difficulties for those studies is to understand correlation between electrostatic field on ground and charges in horizontally extended thunderstorm. In this study, methodology for quantitative evaluation of charge amount in cloud is developed. We newly construct multipoint electrostatic sensor network in Tochigi, Japan. In this region, isolated thunderstorm whose horizontal scale is about 10 km occurs. By analyzing isolated thunderstorm, we can simplify the correlation between ground-based electrostatic field and charge in cloud. In this presentation, initial result of electrostatic measurement with multiple sensors is summarized.

Keywords: thunderstorm, electrostatic field, sensor network