

Study on electric energy derivation of lightning using optical observation of lightning from TRMM tropical rainfall observation satellite

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Lightning is an electric phenomenon in the atmosphere that occurs on a global scale and its electrical characteristics are extremely important parameters for physically and optically understanding lightning discharge phenomena. Lightning charge moment Qds is a parameter that can represent the magnitude of lightning energy in the electrical characteristics of lightning and its magnitude is due to damage to the wind turbine at the wind power plant. It is understanding that it will affect the damage of natural disasters such as damage and mountain fires. There is a method that can remotely derive Qds by observing the electromagnetic waves radiated at the time of lightning discharge from the ground observation instruments. Especially ELF band transients are progressing to estimate Qds by observation. In recent years, researches have been conducted to estimate Qds from the optical emission intensity of lightning discharge. Using this method, it is expected that Qds can be calculated for lightning discharge occurred all over the world. In this study, therefore, the lightning observation data, which were obtained by the lightning imaging sensor installed on tropical rain observation satellite TRMM, are used to estimate the derivation of Qds across the whole world by deriving the correlation between the data on the lightning emission intensity obtained from the equipment LIS and the lightning charge moment Qds obtained from the ELF electromagnetic wave ground measurement data. As a result, it was shown that there is a strong positive correlation between the Qds and optical lightning emission. The correlation coefficient was about 0.9. It was shown that lightning charge moment Qds estimation can be expected from the value of lightning emission intensity. In the future, we will improve the accuracy of deriving the lightning charge moment Qds from the lightning emission intensity. The time-space distribution of lightning charge moment Qds of the world lightning characteristics will be found based on the data of optical observation of lightning by LIS over 19 years.