落雷位置情報を用いた雷雨領域の高時間分解能推定
Highly time resolved tracking of the torrential rain from lightning data

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Previous studies suggested that there exists a good relationship between frequency of lightning and atmospheric convection or precipitation [e.g. Deierling and Petersen, 2008]. Therefore, lightning data can be used as a proxy for the presence of deep atmospheric convection and precipitation. To monitor time series behavior of lightning activity, it is possible to understand more detailed relationship between the lightning activity and atmospheric convection and it is also possible to predict the distributional area of precipitation.
Our purpose of research is to estimate rain activity by the information of cloud to ground (CG) lightning discharge location. Therefore, we compare the movement of the torrential rain area with the lightning cell by a calculation of a time variation of the CG lightning frequency and that of spatial distribution of lightning.
We analyzed 3,909 events of CG lightning from 14:00, August 11th 2013 to 15:29 (JST) and 3,693 events of CG lightning from 17:30, August 12th 2013 to 19:24 (JST) observed by Japan Lightning Detection Network (JLDN) in Kanto region to estimate the frequency and spatial distribution of CG lightning for 10 min and with 1km square grid. We use the C-band rain radar data provided by the Japan Meteorological Agency (JMA) as the data of rain intensity. The temporal and spatial resolutions of the data are 10min and 1km.
As a result of comparing spatial distribution of lightning with that of precipitation, it is possible that there is a good correlation between the CG lightning distributional area with torrential rain area (>50mm/h) and it is possible that we can estimate the torrential rain area (>50mm/h) to monitor the time variation of the CG lightning frequency and that of spatial distribution of lightning.
We calculated the cross correlation function between the CG distribution at a certain time and that of the one 1 later in order to estimate the motion vector of CG area and we required the luminance centroid to track CG lightning area. We also calculated the cross correlation function between the torrential rain area (>50mm/h) at a certain time and that of the 10 minute later in order to estimate the motion vector of rain area and we required the luminance centroid to track rain area.
As a result of comparing the lightning luminance centroids and that of precipitation, we can estimate the luminance centroid of the torrential rain area (>50mm/h) with an accuracy of 2km by using the luminance centroid of lightning distributional area and it is possible that we can estimate the motion of the torrential rain area with highly time resolution by CG lightning data.
In this presentation, we will discuss the adequacy of analysis method and our initial result. Also we will consider the relationship between the distributions of the CG lightning frequency and torrential rain area.

キーワード：雷、対地雷撃、雷セルトラッキング
Keywords: Lightning, Cloud to ground lightning discharge, Tracking of the lightning cell

