A Study of 3D Precipitation Core Tracking Method Using Multi-Parameter Phased Array Weather Radar

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In Japan, a weather radar network, known as the extended radar information network (XRAIN), is operated to provide regular observations of rainfall and wind distribution. The network is comprised of 16 C-band radars and 39 X-band multi-parameter (X-MP) radars that are capable of conducting dual-polarization observations. X-MP radars have parabolic-type antennas, and they require about 5 min to complete a volume scan because both the azimuth and elevation angles are scanned mechanically. Only ten elevation angles (approximately) are scanned, and areas covered at high elevation angles are limited. The Multi-Parameter Phased Array Weather Radar (MP-PAWR) has been developed as the next generation dual-polarized weather radar to address the limitations of X-MP radars. When conducting a volume scan, the MP-PAWR uses electronic and mechanical scanning in the elevation and azimuth angles, respectively, to achieve 3D observation within a radius of 60 km and an altitude of about 15 km in 30 sec.

In order to discuss the distribution and temporal change of 3D precipitation data obtained by MP-PAWR, it is necessary to develop a method to classify and track precipitation cores. In this study, a density-based clustering method, DBSCAN (Density-based spatial clustering of applications with noise), was used for clustering and tracking of 3D precipitation cores.

In this presentation, we will introduce the developed clustering and tracking method for 3D precipitation cores. The distribution and temporal characteristics of convective and stratiform precipitation analyzed by the developed method are also discussed.

Keywords: Phased Array Weather Radar, Dual-polarization Observation, Precipitation Observation

