

High-speed radar observation of spatiotemporal structure of mesocyclone associated with wall cloud

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The Tokyo Metropolitan area is known as a region where tornados frequently occur in Japan. For mitigating damages caused by tornadoes which happen in a short time scale such as 5-10 minutes, earlier detection of their precursors by means of high-speed volumetric observations of the parent thunderstorm is essential. Phased array weather radar (PAWR) is a recently-developed instrument which, by electronically changing the beam elevation, realizes a quick volume scan in 30 seconds to spatiotemporally resolve thunderstorms within a range of 60 km. Since 8 July 2015, Meteorological Research Institute (MRI) has been operating a PAWR in Tsukuba city to cover the Tokyo Metropolitan area, and succeeded in observing a well-developed thunderstorm on the late afternoon of 12 August. The observed thunderstorm moved toward the east-southeast direction at 5-10 km north of the radar site, accompanying with a mesocyclone and vault structure at the southwest edge, which are characteristics often seen in tornadic supercells. In this presentation, we report high-speed fine-scale properties of the mesocyclone and vault structure observed by MRI-PAWR which would otherwise be difficult to resolve by a mechanically-rotating conventional radar.

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