



Mini supercell accompanied by multiple vortex tornado in Kochi, Japan

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JEF 2 scale tornado occurred in Kochi City, Japan at 14JST on 5 October 2014. At this time, Typhoon ‘Chaba’ located just southeast of Korean Peninsula in the Sea of Japan and was becoming to extratropical cyclone. The parent storm of the tornado occurred in the warm sector of the Typhoon. The present observational study aims to clarify the structure of the tornado and its parent storm.

CAPE and SReH at 14:00JST were 1668 J/kg and 297 m²/s², respectively. They exceeded critical values for environment that supercell may occur. Muroto Doppler radar of Japan Meteorological Agency observed mesocyclone of about 3 km in diameter for one hour from 13:35JST. High intensity echo region of more than 40 dBZ in reflectivity was, however, observed up to 5 km around the mesocyclone. Therefore, the parent storm was regarded to be mini supercell. The circulation of the mesocyclone gradually increased where as high intensity echo top became lower by 14:30JST. This fact shows that the present mini supercell was intensified not by updraft but by stretching due to strong vertical shear. At this time, the wind velocity at 2km AGL exceeded 30 m/s. Tornado also occurred while the circulation increased. Hook like echo pattern and rear flank gust front were clearly observed by our Monobe polarimetric radar at 14:21JST. Tornado vortex was also observed in the mesocyclone. Its diameter was about 400 m and one order of magnitude smaller than that of the mesocyclone. The movie of the tornado filmed by a high school student showed that the tornado was multiple vortex tornado with more than two suction vortices. Its diameter near ground was about 200 m. Therefore, tornado vortex was found to be smaller at lower layer. The movie also showed strong rear flank downdraft with precipitation.

Conclusively, the parent storm was a kind of mini supercell accompanied by a multiple vortex tornado. It became stronger by vertical wind shear.