

Temporal Variation of Close-Proximity Soundings within a Significant Tornadoic Supercell Environment

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We examined proximity soundings at intervals of a few minutes and at distances of less than 20 km from a significant tornadoic (SIGTOR) supercell that occurred on 6 May 2012 in Japan. We used a 1-dimensional variational (1DVAR) technique that combined the observations of a ground-based microwave radiometer with outputs from a numerical model. Based on the results of the 1DVAR, several supercell and tornado forecast parameters were calculated and compared with values typical of SIGTOR supercell environments in the United States. One and a half hours before the occurrence of the tornado, the value of convective available potential energy increased significantly to about 1000 J kg^{-1} , a value that is smaller than the typical value in the United States. Low-level vertical wind shear and some composite parameters attained maximum values at the time when the distance to the supercell was the smallest. The vertical wind shear parameters and some composite parameters indicated that the environment fell into the SIGTOR supercell category. This result shows that the thermodynamic environments became unstable before the approach of the supercell, and the low-level vertical wind shear changed locally near the supercell.

Keywords: tornado, supercell, microwave radiometer, 1DVAR