



## **Investigating the potential of using X-band polarimetric parameters to detect cloud-to-ground lightning in the warm season in Kanto region, Japan**

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Tornadic thunderstorm that occurred on 2 September 2013 was examined to evaluate lightning indexes using radar reflectivity, dual-polarization signatures, and vertical motion. We used data of two X-band polarimetric Doppler radars (MP-X) at Ebina city (EBN) and Kisarazu city (KSR) obtained by National Research Institute for Earth Science and Disaster Prevention, Japan (NIED) and cloud-to-ground lightning data (CG) obtained by Japan Lightning Detection Network (JLDN) for analysis. We examined six kinds of lightning indexes: reflectivity threshold at some temperature in the atmosphere, reflectivity lapse rate between 0 and -20 degree, volume of graupel, volume of updraft, maximum updraft, and averaged updraft. Dual-polarization signatures such as KDP and ZDR were used to examine the volume of graupel. Hit rate (HR) of each index and the threshold value when the HR was the best were examined, and the best HRs were compared among the six kinds of indexes. In this case, the HR of the index using updraft volume was the highest among the six indexes. The HR of the index using graupel volume was higher than that of the HR using reflectivity only. To validate the usefulness of polarimetric parameters and updraft for the detection of CG lightning, other thunderstorm cases observed in the summer season during 2011-2013 will be analyzed.