

Ohigashi, T., T. Maesaka, S. Suzuki, Y. Shusse, N. Sakurai, and K. Iwanami, 2021: Clear-air echoes observed by Ka-band polarimetric cloud radar: A case study on insect echoes in the Tokyo metropolitan area, Japan. *J. Meteor. Soc. Japan*, **99**, 101-112.

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Plain Language Summary: The clear-air echoes (CAEs), that appeared on May 21, 2016 in the Tokyo metropolitan area, Japan, were investigated to establish the potential for distinguishing CAEs and hydrometeor echoes in the initial stage of cloud formation using Ka-band polarimetric cloud radar. The polarimetric variables obtained by Ka-band polarimetric cloud radar are useful in distinguishing between clear-air echoes and hydrometeor echoes.

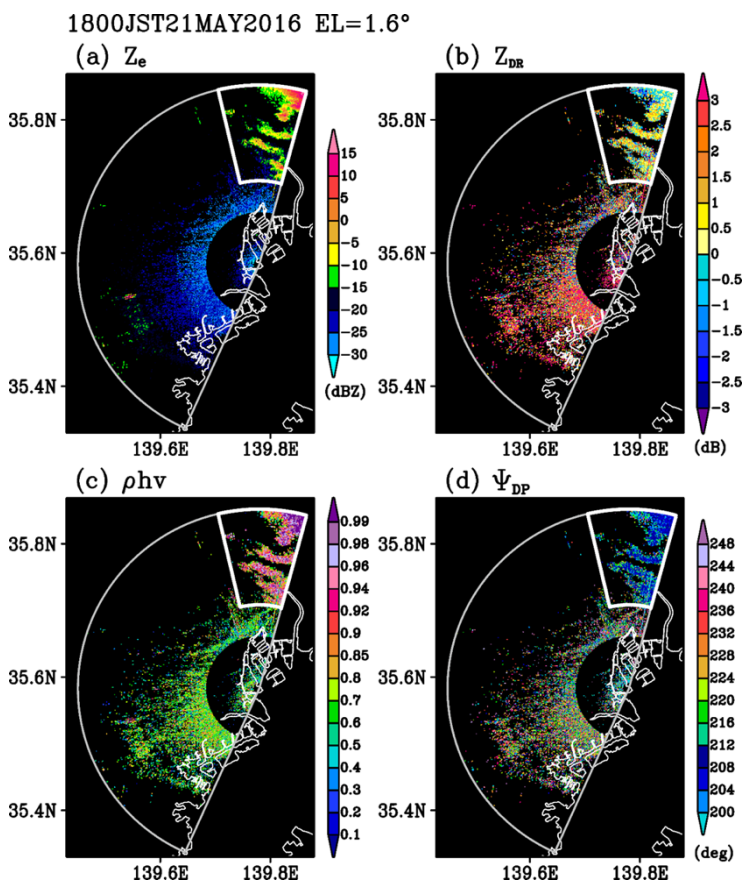


Figure 1. (a) Equivalent radar reflectivity (Z_e , dBZ), (b) differential reflectivity (Z_{DR} , dB), (c) copolar correlation coefficient (ρ_{hv} , unitless), and (d) total differential phase (Ψ_{DP} , degree) at 18:00 JST on May 21, 2016, obtained by a sector PPI scan at the elevation angle of 1.6°. The arc-shaped region to the north of the radar, surrounded by thick white lines, indicates the main region of cloud and precipitation echoes. Black color within the arc-shaped region indicates

- The upper limit of the equivalent radar reflectivity (Z_e) and the distributions of the differential reflectivity (Z_{DR}) and the copolar correlation coefficient (ρ_{hv}) were inconsistent with the characteristics of Bragg scattering observed by S-band (10-cm-wavelength) radar in previous studies.
- The larger Z_{DR} , smaller ρ_{hv} , and larger variability of the total differential phase (Ψ_{DP}) in the range direction, associated with the horizontally widespread echoes, were consistent with the characteristics of insect echoes.
- The depolarization ratio, defined using Z_{DR} and ρ_{hv} , could be effective in distinguishing this type of CAE and hydrometeor echoes observed by Ka-band polarimetric cloud radar.