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Observations of a Hailstorm from ER2-HIWRAP, COSMIR and Ground-based Polarimetric Radar During MC3E

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Retrieval of precipitation in mixed-phase region in convection over land is a challenging problem in GPM DPR algorithm. Observations from Dual-wavelength (Ku/Ka band) airborne radar system (ER-2 HIWRAP) flew on NASA's ER2 high altitude aircraft could be used to test assumptions in the algorithm. In this study, we examine the observations of a hailstorm during NASA's Mid-Latitude Continental Convective Clouds Experiment by the airborne radar and radiometer as well as a ground-based S-band polarimetric radar. The hail region at low level is easily identified by the S-band reflectivity greater than 65 dBZ and near zero ZDR. The tall ZDR column extended above freezing level is coincided with regions of maximum updraft, indicating we hail growth process. An updraft greater than 50 m/s, derived from the Ku-band Doppler velocity, indicate the presence of hail at an altitude of around 12 km. The present of mixed-phased hydrometeor (e.g., water-coated hail/graupel) produces a scattering signature that is similar to the bright band in stratiform rain. Such signature may be used to identify the mixed phased region in deep convective storm.