Polarimetric Radar Characteristics of Simulated and Observed Convective Cores Between Continental and Maritime Environment

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Previous observational and simulation studies have suggested that dry surface turbulent heat fluxes, deeper boundary layers, and elevated lifting condensation levels likely generate continental convective vigor in association with enhanced cold-precipitation processes and stronger mesoscale dynamics. This study presents polarimetric radar characteristics of intense convective cores derived from observations as well as a polarimetric-radar simulator from cloud-resolving model (CRM) simulations from both a continental (MC3E: Midlatitude Continental Convective Clouds Experiment) and a maritime (TWP-ICE: Tropical Warm Pool-International Cloud Experiment) field campaign.

The **POLArimetric Radar Retrieval and Instrument Simulator (POLARRIS)** is a state-of-art Tmatrix-Mueller-Matrix-based polarimetric radar simulator that can generate synthetic polarimetric radar signals (reflectivity, differential reflectivity, specific differential phase, co-polar correlation) as well as synthetic radar retrievals (precipitation, hydrometeor type, updraft velocity) through the consistent treatment of cloud microphysics and dynamics from CRMs. The Weather Research and Forecasting (WRF) model is configured to simulate continental and maritime severe storms over the MC3E (continental) and TWP-ICE (maritime) domains with the Godddard bulk 4ICE single-moment microphysics and HUCM spectra-bin microphysics. Continental and maritime background thermodynamics in pre-storm environment are compared and various statistical diagrams of polarimetric radar signals, hydrometeor types, updraft velocity, and precipitation intensity are investigated with a focus on contrasting convective cores in continental-maritime environments.

Keywords: cloud-resolving model, polarimetric radar, precipitation

