Performance Evaluation of Spectral Bin Classifier (SBC) using ICE-POP 2018 cases

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Forecasting precipitation types at ground is very difficult when ground temperature is almost freezing point. The reason is that phase of precipitation particle can be influenced by many factors such as temperature/relative humidity profiles, particle size distribution, snow habits, riming degree, interaction between particle and surrounding air, various microphysical processes, thermodynamic processes, and so on. As an effort for understanding the factors and deciding precipitation types, Spectral Bin Classifier (SBC) is being developed by The University of Oklahoma and NOAA/OAR National Severe Storms Laboratory (Carlin et al. 2019). Early version of SBC predicts different types of precipitation such as rain, snow, freezing rain, ice pellet, freezing rain, and snow with freezing rain from characteristics of wet-bulb temperature profiles obtained from sounding on time. The prediction results of SBC agree fairly well with the observed precipitation type (Reeves et al. 2016).

Updated SBC includes thermodynamical interaction between particle and surrounding air. The environmental profiles can be changed by the thermodynamic processes such as melting, sublimation, evaporation, and refreezing. Through the modifications, more realistic environmental profiles and improved expectation of precipitation types can be produced in very short-range forecast. In this study, we selected precipitation events during ICE-POP 2018 (International Collaborative Experiments for Pyeongchang 2018 Olympic and Paralympic winter games) periods to evaluate the updated SBC. The simulation results of the updated SBC are compared with the observation from dual-polarization radar and distrometers.

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