13.31 IMPROVEMENTS TO POLARIMETRIC RADAR RETRIEVALS DURING HURRICANE HARVEY

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Hurricane Harvey hit the Texas Gulf Coast as a major hurricane on August 25, 2017 before exiting the state as a tropical storm on September 1, 2017. In its wake, it left a flood of historic proportions, with some areas measuring 60 inches of rain over a five-day period. Although the storm center stayed west of the immediate Houston metropolitan area, training bands of precipitation being fed by the Gulf of Mexico impacted the Greater Houston area for five days. The National Weather Service (NWS) WSR88D dual-polarimetric radar (KHGX), located southeast of Houston, maintained operations for the entirety of the event. The Harris County Flood Warning System (HCFWS) had 150 rain gauges deployed in its network and seven NWS Automated Surface Observing Systems (ASOS) rain gauges are also located in the area.

In this study, we used the full radar data set to retrieve daily and event-total precipitation estimates within 120 km of the KHGX radar for the period August 25-29, 2017. These estimates were then compared to the HCFWS and ASOS gauges. Three different polarimetric hybrid rainfall retrievals were used: Cifelli et al. 2011; Bringi et al. 2004; and, Chen et al. 2017. Each of these hybrid retrievals have demonstrated robust performance in the past; however, both daily and event-total comparisons from each of these retrievals compared to those of HCFWS and ASOS rain gauge networks resulted in significant underestimates. Following Tokay et al. 2008 and others, we propose that the reason for these underestimations was due to the presence of a large number of small drops, commonly seen in tropical cyclone rain bands. The DP estimators mentioned above work quite well for continental convection, but do not perform well in these tropical systems. Following suggestions by other researchers (Cocks et al. 2017), we derive and apply another rain rate estimator using DP-based specific attenuation, which has been shown to increase with increasing concentration of small rain drops.