Characteristics of Two Quality Control Techniques for Operational Radars in Korea

Sora Park
Weather Radar Center, KMA, Korea
Ji-Hyeon KIM(Weather Radar Center, KMA, Seoul, Korea)
Heon-ae KIM(Weather Radar Center, KMA, Seoul, Korea)
Jong-Seo Park(Weather Radar Center, KMA, Seoul, Korea)

E-mail: sorapark@korea.kr

Weather radar data is subject to many contaminants, mainly due to non-precipitating targets (such as insects, birds, and radar chaff ejected by military aircraft) and anomalous propagation (AP) or ground clutter. These contaminants may create serious problems for meteorological applications, such as quantitative precipitation estimation or hydrometeor classification. The Weather Radar Center (WRC) at the Korea Meteorological Administration (KMA) employs two quality control (QC) algorithms for real-time radar operation: 1) an open radar product generator (RPG; ORPG) and 2) a fuzzy logic algorithm to improve the quality of radar reflectivity for a single polarization radar.

In this study, we investigate the seasonal occurrence of AP echoes during one year and evaluate the performance of two QC algorithms to eliminate AP echoes. The seasonal performances of the two QC algorithms in eliminating non-precipitation and AP echoes are also compared. AP echoes frequently occur in spring and fall, with the most frequent occurrence being in May. ORPG QC shows better performance in the elimination of non-precipitation echoes generally, but it removes large area of weak rain echoes in summer and snow echoes in winter. In contrast, fuzzy QC preserves the snow and weak rain echoes in winter and summer, but it shows low performance on contaminated echo, including the AP echo. Consequently, fuzzy QC is more useful in the winter season.

The WRC recently conducted tests of two S-band dual polarization radars for which we modified and tested the fuzzy QC algorithm. Fuzzy QC successfully removes non-precipitation echoes, such as AP and chaff echoes. When precipitation and non-precipitation echoes coexist, the algorithm successfully eliminates only non-precipitation echoes. However, the fuzzy QC algorithm can sometimes eliminate precipitation echoes in bright band areas and strong precipitation echoes.

It is concluded that the two operational QC algorithms show seasonal characteristics in their performance for single polarization radars. It is necessary to improve fuzzy QC algorithms in the future to optimize dual polarization radars.