11.8 AUTOMATED IDENTIFICATION OF GROUND CLUTTER CONTAMINATION FOR POLARIMETRIC DOPPLER WEATHER RADARS

DAVID A. WARDE[1], SEBASTIAN M. TORRES[1]

[1] Cooperative Institute for Mesoscale Meteorological Studies, The University of Oklahoma and NOAA/OAR National Severe Storms Laboratory, United States
dwarde@ou.edu

Ground clutter contamination is still a major limitation in obtaining unbiased measurements from Polarimetric Doppler weather radars. Ground clutter contamination is characterized as having near-zero Doppler velocity with a narrow spectrum width, and removing it in the signal processor prior to obtaining the radar variables involves the use of a ground clutter filter (GCF). A GCF is typically a high-pass filter that removes near-zero Doppler velocities. However, the GCF itself can negatively affect weather signals, especially when returns from hydrometeors have similar characteristics as those from ground clutter. Accordingly, it is crucial to identify clutter contamination when it occurs. Often, this identification is done by measuring the spatial variability (e.g., gate-to-gate, azimuth-to-azimuth, or both) of both the filtered and unfiltered radar variables. However, this adds significant processing and implementation complexity, given that most signal processors operate on a single range gate at a time. Thus, features that do not require the use of data from multiple range gates (e.g., in sample time) are preferable because they can help identify the presence of clutter contamination and immediately trigger the application of the clutter filter before the radar variables are calculated. In this work, we investigate the use of single-range-gate parameters to enhance the identification of clutter contamination, including directional statistics of the autocorrelation and cross-correlation. Using WSR-88D time-series data, we train a feedforward neural network with these parameters and gage their relative skill in identification of ground clutter. We then add the trained neural network into our signal processing chain and qualitatively assess its performance to mitigate ground clutter using additional archived WSR-88D data. We compare the level II radar data obtained from the neural network processing with other processes that use spatially derived parameters for ground clutter recognition. We provide these results and recommendations for future work.