

Enhancing Ground Clutter Suppression for Dual-polarization Weather Radars in China to Improve Data Quality

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China's national weather radar network began its dual-polarization upgrade around 2016, which has been largely completed in coastal and key urban areas. Dual-polarization radars provide crucial parameters like differential reflectivity and correlation coefficient, offering significant improvements in quantitative precipitation estimation and hydrometeor classification. However, these parameters are more susceptible to contamination from ground clutter and noise, making data quality assurance a major challenge. While the current operational network employs real-time ground clutter identification and frequency-domain filtering—a system sufficient for reflectivity data quality—the availability of dual-polarization parameters remains notably low within 100 km of the radar. To address this, the Radar Meteorological Center of the China Meteorological Administration has enhanced the existing operational algorithm. The improved technique incorporates additional checks, such as a correlation coefficient test, to better identify ground clutter under low clutter-to-signal ratio conditions. Furthermore, it adopts an advanced regression filter to replace the conventional frequency-domain filter, thereby avoiding the information loss associated with windowing techniques in the filtering process. Evaluation based on eight precipitation events demonstrates a substantial improvement in ground clutter suppression compared to the current operational algorithm. This enhancement has led to an approximately 40% increase in the usability of dual-polarization parameters within the critical 100 km range of the radar.