

5.14 REAL-TIME RADAR DATA QUALITY FOR DATA ASSIMILATION

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A system for real-time quality control of ground-based scanning weather radars has been developed and tested. The goals for the system are real-time editing of contaminated radar data and estimation of the measurement variance, with the results being suitable for use in numerical weather prediction models without further processing. Version 1 of the Radar Quality Control System (RQCS) has been completed. The RQCS currently operates on reflectivity (Z_e) and radial velocity (V_r) with plans to expand to spectrum width and the dual-polarization variables in the future.

For editing radar data, the system uses a number of different quality control indices based on parameters determined to be good indicators of data quality, e.g. signal-to-noise ratio, Z_e gradients etc. The system provides edited Z_e and V_r data in near real-time. The QC indices and thresholds can all be customized for different radar systems and different thresholding needs.

The measurement variance is estimated directly from the data. The first step is to remove the natural gradients in the radar data that might otherwise contribute to a spatial variance estimate. This is accomplished by subtracting a smoothed version of the data from the original data, leaving just the measurement variance in the detrended data. The filter used is a finite impulse response (FIR) filter with a designed response that removes the gate-to-gate variations. The measurement variance can then be computed from the detrended data over the user-defined spatial resolution. The results are consistent with the theoretical values of measurement variance. An advantage of this method is that, since it comes directly from the data, it accounts for all sources of variance.

These methods have been demonstrated on the NCAR S-Pol radar and several NWS NEXRAD radars using VDRAS. Improvements were shown compared to the previous VDRAS radar QC system. The methods will be described and results presented.
