6 Improving and Exploiting Polarimetric Weather Radar Data - Plans and Status

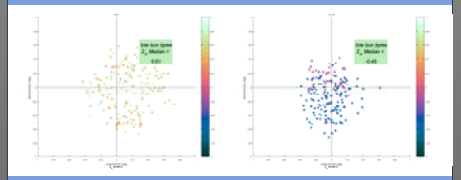
WSR-88D Radar Operations Center
Working to Improve Dual Polarization Data

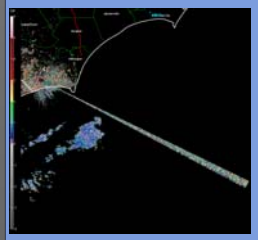
Since 1993, the Radar Operations Center (ROC) has led joint projects with the National Severe Storms Laboratory (NSSL) and the National Center for Atmospheric Research (NCAR) for improving the foundational radar data quality.

Successes: R-V Ambiguity Mitigation, Automatic Clutter Identification, Hybrid Spectrum Width.

Plans: Improve ZDR Calibration, Enhance Clutter Identification and Filtering Quality, Better Noise and Interference Mitigation, Decrease DP Variable Bias and Variance.

Exploiting the Sun's Signal

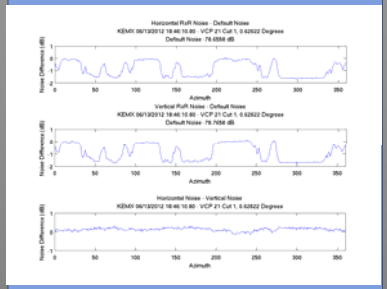




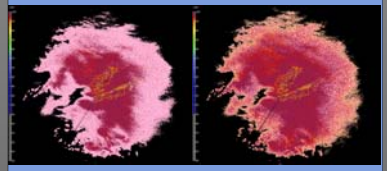
Above, ZDR Calibration Bias Estimated from Sun Spikes.

Left, ZDR Estimates in a Typical Sun Spike

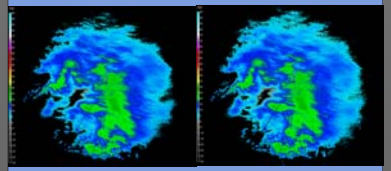
On-line Determination of the System Noise Level



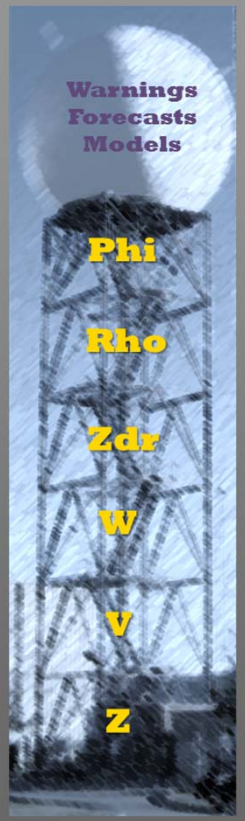
This noise estimator delivers a value for each radial by analyzing range dependent power variations.



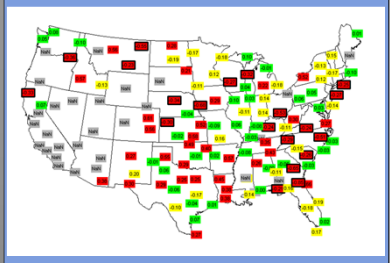
The new estimator greatly improves correlation coefficient. The left image shows legacy CC, the right was processed with radial dependent noise power.



The reflectivity image on the right, processed with the radial noise estimator, shows some weak signals can be recovered if the correct noise powers are used.

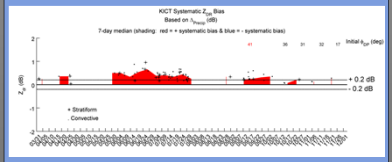


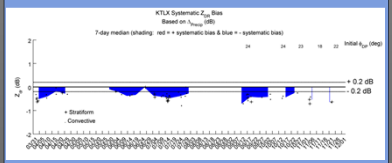
Observing ZDR Calibration



Calibration Bias Estimated from Expected Value of ZDR in Light Rain Per Table Below (SNR 20 dB, RHO > 0.98

Z (dBZ)	20	22	24	26	28	30
ZDR (dBZ)	0.23	0.27	0.32	0.38	0.46	0.55

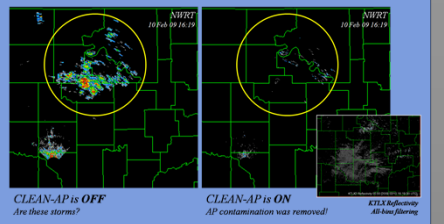




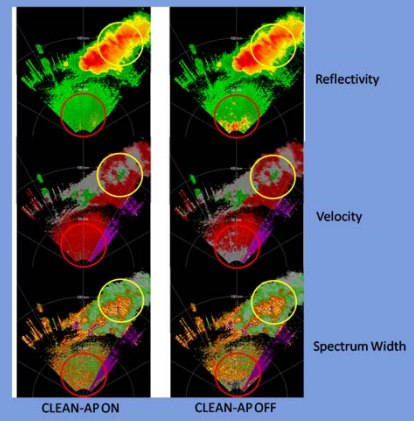
Time Series of Calibration Bias Estimated from Expected Value of ZDR in Light Rain for Two Sites. Range of +/- 0.2 dB Tolerance Indicated. Initial System Phase Also Indicated.

R. L. Ice, J. N. Chrisman, J. G. Cunningham
WSR-88D Radar Operations Center

SPRT with CLEAN AP



The AP image shows a comparison of the KTLX radar with the NWRT PAR. The environment exercised the capability provided by the CLEAN-AP filer to automatically mitigate (detection and removal) ground clutter in both AP (yellow circle) and NP (near radar) conditions. The KTLX radar ran all bins clutter filtering to remove the AP ground clutter.



The RVW image shows how the moments (R,V,&W) with near-zero velocities from a meso-cyclone (yellow circles) are not harmed by the CLEAN-AP filter; while, ground clutter near the radar is mitigated quite nicely.

(Courtesy Dave Warde, OU/CIMMS/NSSL)

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