365 NEW SCIENCE FOR THE WSR-88D: VALIDATING THE DUAL POLARIZATION UPGRADE

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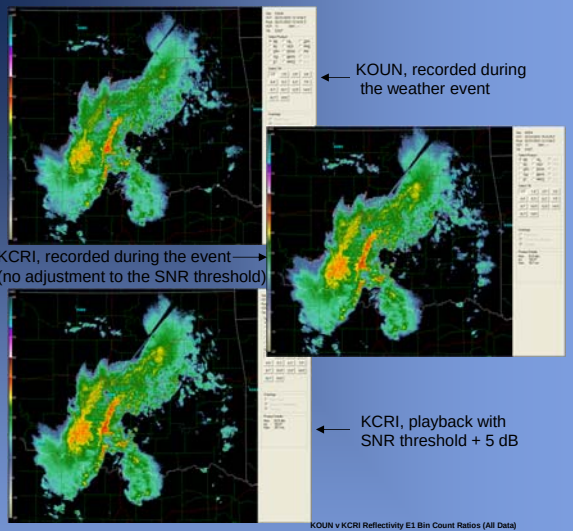
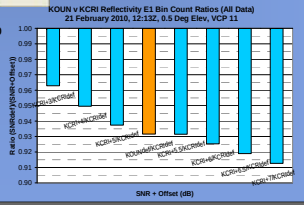
Areal Coverage Comparisons – Early Investigations



The blue bars indicate the bin count ratio of played back KCRI data with adjusted SNR thresholds to recorded KCRI data. The orange bar is the recorded KOUN and original KCRI ratio. This graph indicates that KOUN was nearly 5.5 dB less sensitive that KCRI (assuming accurate noise measurements) prompting more in-depth investigations.



Co-located Radars – Enabled Comparisons to Baseline WSR-88D

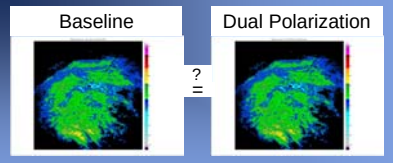
Radar Operations Center (ROC), Norman, Oklahoma

Summary

From September 2009 through May 2010, the ROC Engineering team supported the Data Quality Dual Polarization Subcommittee (DQDP) by quantitatively validating the L-3/Baron upgrade of the WSR-88D from a single polarization signal to a dual polarization signal (referred to as 'dual pol'). This poster presents high-level results of ROC Engineering analysis to ensure that dual pol was functioning properly and did not adversely affect the base moment accuracy. Formal Engineering analysis included **areal coverage comparisons**, in-depth **sensitivity and calibration analyses**, **base moment validation**, and **system stability monitoring**. These analyses were used to help determine that the KOUN dual pol system was ready to transition to System Test, 25 May 2010.

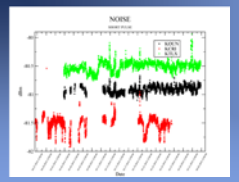
ROC Engineering determined that except for the expected decrease in sensitivity, base moments were not affected by the dual pol upgrade and that dual pol was ready for System Test.

Base Moment Validation



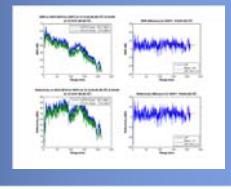
Yes! All dual pol base moments (Z, V, and W) compare to baseline WSR-88D base moments.

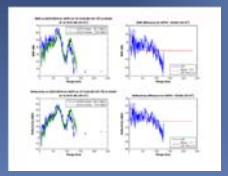
System Stability Monitoring

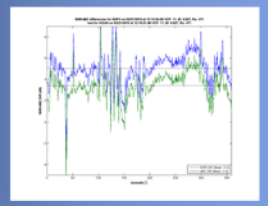


KOUN performance maintenance data was monitored and compared to KCRI and KTLX. Average values and standard deviations were tracked as well. The dual pol upgrade showed stable performance.

Clarifying Sensitivity and Calibration Differences







On 21 February 2010, a line of thunderstorms moved across Oklahoma. Radial plots (upper right and lower left) of reflectivity vs. range and SNR vs. range from the KOUN (dual pol) and KCRI (baseline) provide insight into calibration and sensitivity differences with respect to backscatterer type. Non-Rayleigh scattering (present in strong cores > 40 dBZ) cause significant differences down radial. Differences in regions of Rayleigh scatterers are centered about the average. The 360º SNR/dBZ plot shows the average difference for each radial vs. azimuth. Regions of moderate reflectivity values (Rayleigh scattering) show less variance.

These plots revealed complexities regarding the observed sensitivity and reflectivity calibration differences early in the evaluation process. See Poster 370 "Sensitivity of operational weather radars" for more details regarding the sensitivity analysis. Expected sensitivity loss due to the dual pol upgrade is 3.5 dB. In the plots above, mean difference in reflectivity calibration was 2 dB. ROC and L-3/Baron improved calibration procedures for both KOUN and KCRI bringing reflectivity calibration to 1 dB or less.

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