



NWS Research-to-Operations (R2O) Projects Update

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November 4, 2015

NEXRAD Technical Advisory Committee



R&D Support for NWS Radar R20

- Science and Signal Processing Techniques
 - New science/technology MOU with NSSL
 - ROC Directors Office (formerly OS&T/NPI)
- Improving Data Quality
 - RDA-centric contract with NCAR
 - ROC Engineering Branch
- Technology Transfer
 - RPG-centric MOU with NSSL
 - ROC Applications Branch



Science and Signal Processing Techniques

- RDA Data Quality

- 1) Range-and-Velocity Ambiguity Mitigation

- A. Staggered PRT (SPRT) mode to replace mid-elevation Batch cuts (1) – Build 18

- 2) Ground Clutter Mitigation

- A. CLEAN-AP for SPRT mode on batch cuts (1) – Build 18
- B. CLEAN-AP for the FFT (2) and SZ-2 (3) processing modes
- C. Weather Environment Thresholding (WET) for the FFT mode (2)
- D. WET for the SPRT (3) and SZ-2 (3) processing modes

RDA Project Readiness	
1	Supporting ROC implementation & testing
2	R&D done - ready to document algorithm
3	Current R&D effort
4	Not fully funded - little progress

- 3) Meteorological-Variable Estimators

- A. Less tapered data window for super-resolution polarimetric-variables (1) – Build 18
- B. ASD-based spectrum width estimator for SPRT (1), FFT (2), and SZ-2 (2) processing modes
- C. Improved Correlation Coefficient estimator (2)
- D. Adaptive range averaging to improve data quality at low SNRs (3)
- E. Doppler estimators that use combined information from H and V channels (3)
- F. Polarimetric-variable estimators that combine information from multiple scans (e.g., split cuts) (3)
- G. Polarimetric-variable hybrid estimators based on lag-0 and lag-1 correlations (3)
- H. ASD based (matched-autocorrelation) estimators for all radar meteorological variables (4)
- I. Improved spatial sampling using the properties of the range weighting function (4)
- J. Improvements to all radar-variable estimators that use ground-clutter filtered data (4)



Science and Signal Processing Techniques

- RDA Data Quality (cont.)

- 4) Improved Radar Data Quality Control

- A. Improved SZ-2 censoring thresholds (1) – Build 18
 - B. Polarimetric-variable-specific SNR thresholds (1)
 - C. Coherency -based thresholding (CBT)(1)
 - D. Pulsed Interference Filters (3)
 - E. Wind Turbine Clutter Mitigation (4)
 - F. Spatial reconstruction of censored data (4)
 - G. Use range-Doppler spectrum to remove artifacts and improve data quality (4)
 - H. Use polarimetric spectral densities to remove artifacts and improve data quality (4)

RDA Project Readiness	
1	Supporting ROC implementation & testing
2	R&D done - ready to document algorithm
3	Current R&D effort
4	Not fully funded - little progress

- 5) Range oversampling processing (2)

- Calibration

- 1) Monitoring of Zdr bias using ground clutter (3)

- RPG Algorithms and Products

- 1) Hail size discrimination - Build 17
 - 2) Tornado debris signature
 - 3) Zdr columns (updraft location and strength)
 - 4) All-season surface-based hydrometeor classification: background classifier, HMLDA, Surface HCA
 - 5) Quantitative precipitation estimation: Zdr slope, Kdp', R(A), QVP



Improving Data Quality

- **Spectrum Width - Build 18**
 - A. Update Hybrid Spectrum Width algorithm for Staggered PRT and CLEAN-AP
- **Differential Reflectivity (ZDR) Calibration**
 - A. Antenna gain and pointing accuracy via solar “box” scans - Build 18
 - B. Evaluate the diurnal/seasonal/long term stability of dual pol hardware
 - C. Data collection and processing strategy for cross polar power calibration
 - D. Investigate accuracy and precision of ZDR bias estimate from external targets
- **Dual Polarization Data Quality**
 - A. Update Clutter Mitigation Decision (CMD) algorithm description to Build 13.0
 - B. Investigate improving CMD performance at low clutter to signal ratios
 - C. Recommend improvements to the clutter filtering process
 - D. Develop methods to comparing S-Pol radar data with surrounding WSR-88Ds



Technology Transfer

- QPE Improvements – Leverage D-MRMS to:
 - A. Determine site specific Z-R parameters for dry snow/ice crystals using gauge data
 - B. Provide network Zdr bias monitoring tools using RPG Zdr bias estimates
 - C. Control use of rain gauge data with quality control metadata and data filter tools
 - D. Develop display of precipitation type (e.g., tropical vs. continental)
- Hail - Single radar MESH and to use dual pol and SAILS data
- Mesocyclone – Single radar version of LLSD (Vorticity Tracks)
- TVS - R&D to improve performance and to use SAILS data
- Snow Accumulation - R&D to use dual pol and SAILS data
- Cloud Identification Techniques - Identify layers and vertical extent
- Volcanic Ash Detection - Investigate detectability and optimal scan settings