NWS-FAA Radar Projects - Update 2013

Mike Istok: National Weather Service
Bob Saffle: Noblis, Inc.
Bill Bumgarner: SAIC

AMS 29th EIPT Conference

Austin, Texas
January 9, 2013
Radar Improvement Drivers

• Improve severe weather warning services performance
  – Tornado warning performance has been stagnant at 14-min average lead time, with only ~50% detection with positive lead time, and stubborn 75% false alarm rate
  – NWS stretch goals are probabilistic high-resolution tornado warnings with 60-min lead time, and greatly reduced deterministic false alarm rate (50%)

• Address meso-scale, including storm scale, observation gaps
  – Geographical coverage in inter-mountain west and coastal areas
  – Boundary layer coverage (<2km from ground level) and adequate spatial resolution
  – Improved temporal resolution to capture the rapid evolution of strong convective storms
  – Data for assimilation into NWP models for warn-on-forecast

• Address need for better weather information to support safer, more efficient aviation operations, especially as aviation traffic increases in the future
Long history of NWS & FAA collaboration on weather radar projects

  - Partnership with DoD/USAF
  - Joint development of operational and system requirements
  - Joint acquisition program
  - Joint network operations, overseen by NEXRAD Program Management Committee
  - Joint program to improve WSR-88D capabilities (NEXRAD Product Improvement)

- FAA Terminal Doppler Weather Radar (TDWR)
  - Collaboration with NWS for NWS ingest of TDWR data from all 45 TDWR sites
  - NWS development of Supplemental Product Generator to produce WSR-88D format products from TDWR data for use by NWS forecast offices
  - FAA enhancements to TDWR; will also add value for NWS operations
  - Significant enhancement of radar information for tornado warnings & other severe weather operations

- DoD En-Route (ARSR-4, operated by FAA) and FAA Terminal (ASR-11) Radars
  - Ongoing collaboration with NWS for NWS experimental ingest of data
  - ARSR-4 data ingest from Watford City, ND; Makah, WA; Guantanamo, Cuba
  - ASR-11 data ingest from Erie, PA
  - Proven capability, but no program funding for expansion to operational status
NOAA-NWS Radar Requirements

- **NOAA Consolidated Observing Requirements List (CORL)**
  - Based on physical and temporal attributes of observable weather elements
  - Addresses needs for current analysis as well as current & potential usage in numerical modeling over the next 5 to 10 years
  - Includes storm-scale as well as larger scale attributes
  - Is independent of any particular observing system
  - Available at: https://www.nosc.noaa.gov/tpio/main/pords.html
NOAA-NWS Radar Requirements

- **NOAA-NWS Radar Functional Requirements (RFR)**

  - ... develop an official NOAA/NWS document for functional radar requirements that will satisfy current and future multiple mission needs and will be the basis for agency planning associated with next generation surveillance at NOAA

  - Builds on:
    - CORL, particularly the storm-scale elements
    - Current WSR-88D (NEXRAD) sensing capabilities (including Dual Polarization) and the existing base of science applications and external users
    - Agency Strategic Plans & ‘Stretch Goals’ (e.g., 45 – 60 min tornado warning lead times)
    - Anticipated completion in 2013; future revisions anticipated to reflect mission requirements changes and advances in weather radar technology and science

  - Collaboration with FAA to ensure NWS support to evolving FAA weather information requirements is addressed
NextGen Surveillance & Weather Radar Capabilities Program (NSWRC)

• The FAA currently operates four distinct radar systems for terminal aircraft surveillance and airport hazardous weather detection in the nation’s terminal airspace
  • Airport Surveillance Radar (ASR) models 8, 9, and 11 and Terminal Doppler Weather Radar (TDWR), are nearing the end of their life cycle
  • Sustainment and upgrade programs can keep these radars operating in the near to mid-term
  • For the long term, the FAA recognizes that replacement of these radars is the best option

• NSWRC program initiated for potential procurement of replacement of terminal radars
  • Potential for program to include replacement of WSR-88D units
  • Potential for program to include DoD long range radars (ARSR units) if DoD desires
  • NOAA/NWS collaborating with FAA on planning and technical teams
  • Multifunction Phased Array Radar (MPAR)
    • Working Group – MPAR: with other agencies under lead of OFCM
    • Notional functional requirements for the aircraft and weather surveillance elements currently in place to help drive functional requirements for NSWRC.
    • Proof-of-Concept work with phased array radar at NOAA’s National Weather Radar Test Bed
New York City TDWR: September 16, 2010
Tornados In NYC

NWS quote: TORs issued by OKX yesterday were completely based on the TDWRs.
Watford City, ND, ARSR-4 & Surrounding WSR-88Ds
Erie ASR-11 Reflectivity